13. *Reiterates the hope* that, following a comprehensive political solution, an intergovernmental committee will be established to consider a programme of assistance to Kampuchea for the reconstruction of its economy and for the economic and social development of all States in the region;

14. *Requests* the Secretary-General to report to the General Assembly at its thirty-eighth session on the implementation of the present resolution;

15. *Decides* to include in the provisional agenda of its thirty-eighth session the item entitled "The situation in Kampuchea".

48th plenary meeting
28 October 1982

37/7. World Charter for Nature

The General Assembly,

Having considered the report of the Secretary-General on the revised draft World Charter for Nature,[14]

Recalling that, in its resolution 35/7 of 30 October 1980, it expressed its conviction that the benefits which could be obtained from nature depended on the maintenance of natural processes and on the diversity of life forms and that those benefits were jeopardized by the excessive exploitation and the destruction of natural habitats,

Further recalling that, in the same resolution, it recognized the need for appropriate measures at the national and international levels to protect nature and promote international co-operation in that field,

Recalling that, in its resolution 36/6 of 27 October 1981, it again expressed its awareness of the crucial importance attached by the international community to the promotion and development of co-operation aimed at protecting and safeguarding the balance and quality of nature and invited the Secretary-General to transmit to Member States the text of the revised version of the draft World Charter for Nature contained in the report of the *Ad Hoc* Group of Experts on the draft World Charter for Nature,[15] as well as any further observations by States, with a view to appropriate consideration by the General Assembly at its thirty-seventh session,

Conscious of the spirit and terms of its resolutions 35/7 and 36/6, in which it solemnly invited Member States, in the exercise of their permanent sovereignty over their natural resources, to conduct their activities in recognition of the supreme importance of protecting natural systems, maintaining the balance and quality of nature and conserving natural resources, in the interests of present and future generations,

Having considered the supplementary report of the Secretary-General,[16]

Expressing its gratitude to the *Ad Hoc* Group of Experts which, through its work, has assembled the necessary elements for the General Assembly to be able to complete the consideration of and adopt the revised draft World Charter for Nature at its thirty-seventh session, as it had previously recommended,

Adopts and solemnly proclaims the World Charter for Nature contained in the annex to the present resolution.

48th plenary meeting
28 October 1982

[14] A/36/539.
[15] *Ibid.*, annex I.
[16] A/37/398 and Add.1.

ANNEX

World Charter for Nature

The General Assembly,

Reaffirming the fundamental purposes of the United Nations, in particular the maintenance of international peace and security, the development of friendly relations among nations and the achievement of international co-operation in solving international problems of an economic, social, cultural, technical, intellectual or humanitarian character,

Aware that:

(*a*) Mankind is a part of nature and life depends on the uninterrupted functioning of natural systems which ensure the supply of energy and nutrients,

(*b*) Civilization is rooted in nature, which has shaped human culture and influenced all artistic and scientific achievement, and living in harmony with nature gives man the best opportunities for the development of his creativity, and for rest and recreation,

Convinced that:

(*a*) Every form of life is unique, warranting respect regardless of its worth to man, and, to accord other organisms such recognition, man must be guided by a moral code of action,

(*b*) Man can alter nature and exhaust natural resources by his action or its consequences and, therefore, must fully recognize the urgency of maintaining the stability and quality of nature and of conserving natural resources,

Persuaded that:

(*a*) Lasting benefits from nature depend upon the maintenance of essential ecological processes and life support systems, and upon the diversity of life forms, which are jeopardized through excessive exploitation and habitat destruction by man,

(*b*) The degradation of natural systems owing to excessive consumption and misuse of natural resources, as well as to failure to establish an appropriate economic order among peoples and among States, leads to the breakdown of the economic, social and political framework of civilization,

(*c*) Competition for scarce resources creates conflicts, whereas the conservation of nature and natural resources contributes to justice and the maintenance of peace and cannot be achieved until mankind learns to live in peace and to forsake war and armaments,

Reaffirming that man must acquire the knowledge to maintain and enhance his ability to use natural resources in a manner which ensures the preservation of the species and ecosystems for the benefit of present and future generations,

Firmly convinced of the need for appropriate measures, at the national and international, individual and collective, and private and public levels, to protect nature and promote international co-operation in this field,

Adopts, to these ends, the present World Charter for Nature, which proclaims the following principles of conservation by which all human conduct affecting nature is to be guided and judged.

I. General principles

1. Nature shall be respected and its essential processes shall not be impaired.

2. The genetic viability on the earth shall not be compromised; the population levels of all life forms, wild and domesticated, must be at least sufficient for their survival, and to this end necessary habitats shall be safeguarded.

3. All areas of the earth, both land and sea, shall be subject to these principles of conservation; special protection shall be given to unique areas, to representative samples of all the different types of ecosystems and to the habitats of rare or endangered species.

4. Ecosystems and organisms, as well as the land, marine and atmospheric resources that are utilized by man, shall be managed to achieve and maintain optimum sustainable productivity, but not in such a way as to endanger the integrity of those other ecosystems or species with which they coexist.

5. Nature shall be secured against degradation caused by warfare or other hostile activities.

II. Functions

6. In the decision-making process it shall be recognized that man's needs can be met only by ensuring the proper functioning of natural systems and by respecting the principles set forth in the present Charter.

7. In the planning and implementation of social and economic development activities, due account shall be taken of the fact that the conservation of nature is an integral part of those activities.

8. In formulating long-term plans for economic development, population growth and the improvement of standards of living, due account shall be taken of the long-term capacity of natural systems to ensure the subsistence and settlement of the populations concerned, recognizing that this capacity may be enhanced through science and technology.

9. The allocation of areas of the earth to various uses shall be planned and due account shall be taken of the physical constraints, the biological productivity and diversity and the natural beauty of the areas concerned.

10. Natural resources shall not be wasted, but used with a restraint appropriate to the principles set forth in the present Charter, in accordance with the following rules:

(*a*) Living resources shall not be utilized in excess of their natural capacity for regeneration;

(*b*) The productivity of soils shall be maintained or enhanced through measures which safeguard their long-term fertility and the process of organic decomposition, and prevent erosion and all other forms of degradation;

(*c*) Resources, including water, which are not consumed as they are used shall be reused or recycled;

(*d*) Non-renewable resources which are consumed as they are used shall be exploited with restraint, taking into account their abundance, the rational possibilities of converting them for consumption, and the compatibility of their exploitation with the functioning of natural systems.

11. Activities which might have an impact on nature shall be controlled, and the best available technologies that minimize significant risks to nature or other adverse effects shall be used; in particular:

(*a*) Activities which are likely to cause irreversible damage to nature shall be avoided;

(*b*) Activities which are likely to pose a significant risk to nature shall be preceded by an exhaustive examination; their proponents shall demonstrate that expected benefits outweigh potential damage to nature, and where potential adverse effects are not fully understood, the activities should not proceed;

(*c*) Activities which may disturb nature shall be preceded by assessment of their consequences, and environmental impact studies of development projects shall be conducted sufficiently in advance, and if they are to be undertaken, such activities shall be planned and carried out so as to minimize potential adverse effects;

(*d*) Agriculture, grazing, forestry and fisheries practices shall be adapted to the natural characteristics and constraints of given areas;

(*e*) Areas degraded by human activities shall be rehabilitated for purposes in accord with their natural potential and compatible with the well-being of affected populations.

12. Discharge of pollutants into natural systems shall be avoided and:

(*a*) Where this is not feasible, such pollutants shall be treated at the source, using the best practicable means available;

(*b*) Special precautions shall be taken to prevent discharge of radioactive or toxic wastes.

13. Measures intended to prevent, control or limit natural disasters, infestations and diseases shall be specifically directed to the causes of these scourges and shall avoid adverse side-effects on nature.

III. Implementation

14. The principles set forth in the present Charter shall be reflected in the law and practice of each State, as well as at the international level.

15. Knowledge of nature shall be broadly disseminated by all possible means, particularly by ecological education as an integral part of general education.

16. All planning shall include, among its essential elements, the formulation of strategies for the conservation of nature, the establishment of inventories of ecosystems and assessments of the effects on nature of proposed policies and activities; all of these elements shall be disclosed to the public by appropriate means in time to permit effective consultation and participation.

17. Funds, programmes and administrative structures necessary to achieve the objective of the conservation of nature shall be provided.

18. Constant efforts shall be made to increase knowledge of nature by scientific research and to disseminate such knowledge unimpeded by restrictions of any kind.

19. The status of natural processes, ecosystems and species shall be closely monitored to enable early detection of degradation or threat, ensure timely intervention and facilitate the evaluation of conservation policies and methods.

20. Military activities damaging to nature shall be avoided.

21. States and, to the extent they are able, other public authorities, international organizations, individuals, groups and corporations shall:

(*a*) Co-operate in the task of conserving nature through common activities and other relevant actions, including information exchange and consultations;

(*b*) Establish standards for products and manufacturing processes that may have adverse effects on nature, as well as agreed methodologies for assessing these effects;

(*c*) Implement the applicable international legal provisions for the conservation of nature and the protection of the environment;

(*d*) Ensure that activities within their jurisdictions or control do not cause damage to the natural systems located within other States or in the areas beyond the limits of national jurisdiction;

(*e*) Safeguard and conserve nature in areas beyond national jurisdiction.

22. Taking fully into account the sovereignty of States over their natural resources, each State shall give effect to the provisions of the present Charter through its competent organs and in co-operation with other States.

23. All persons, in accordance with their national legislation, shall have the opportunity to participate, individually or with others, in the formulation of decisions of direct concern to their environment, and shall have access to means of redress when their environment has suffered damage or degradation.

24. Each person has a duty to act in accordance with the provisions of the present Charter; acting individually, in association with others or through participation in the political process, each person shall strive to ensure that the objectives and requirements of the present Charter are met.

37/8. Co-operation between the United Nations and the Asian-African Legal Consultative Committee

The General Assembly,

Recalling its resolution 36/38 of 18 November 1981,

Having heard the statements of the Secretary-General of the United Nations[17] and the Secretary-General of the Asian-African Legal Consultative Committee[18] on further strengthening and widening the scope of the co-operation between the United Nations and the Committee,

1. *Notes with deep satisfaction* the ongoing close and effective co-operation between the United Nations and the Asian-African Legal Consultative Committee in the field of progressive development and codification of international law and other areas of common interest;

2. *Requests* the Secretary-General to report to the General Assembly at its thirty-eighth session on the state of the co-operation between the United Nations and the Asian-African Legal Consultative Committee;

3. *Decides* to include in the provisional agenda of its thirty-eighth session the item entitled "Co-operation between the United Nations and the Asian-African Legal Consultative Committee".

49th plenary meeting
29 October 1982

37/9. Question of the Falkland Islands (Malvinas)[19]

The General Assembly,

Having considered the question of the Falkland Islands (Malvinas),

[17] *Official Records of the General Assembly, Thirty-seventh Session, Plenary Meetings*, 49th meeting, paras. 2-7.

[18] *Ibid.*, paras. 9-17.

[19] See also sect. I, footnote 10, and sect. X.B.6, decision 37/404.

2. *Also decides* that the Governing Council shall hold a special one-week session every six years, beginning in 1988, to consider and approve the system-wide medium-term environment programme and to consider the global programme on the environment of the proposed United Nations medium-term plan;

3. *Further decides* that in 1988 the Governing Council shall meet to consider and approve the next system-wide medium-term environment programme and to consider appropriate changes to the global programme on the environment of the extended United Nations medium-term plan for the period 1984-1989, and that it shall, at its regular session in 1989, consider the global programme on the environment of the next United Nations medium-term plan before submitting it to the General Assembly for approval;

4. *Requests* the Secretary-General to conduct consultations with Governments to establish the necessary transitional arrangements for a change in the term of office of members of the Governing Council from three years to four, with half of the membership being elected every two years;

5. *Decides* that the reports requested of the Governing Council in section I, paragraph 3, of its resolution 2997 (XXVII) and in paragraph 5 of its resolution 3436 (XXX) shall be submitted biennially instead of annually.

96th plenary meeting
11 December 1987

42/186. Environmental Perspective to the Year 2000 and Beyond

The General Assembly,

Recalling its resolution 38/161 of 19 December 1983 on the process of preparation of the Environmental Perspective to the Year 2000 and Beyond, in which it, *inter alia*, welcomed the desire of the Governing Council of the United Nations Environment Programme to develop the Environmental Perspective and transmit it to the General Assembly for adoption, benefiting in carrying out that function from its consideration of the relevant proposals made by a special commission, which adopted the name World Commission on Environment and Development,

Welcoming the Environmental Perspective to the Year 2000 and Beyond,[51] prepared by the Intergovernmental Inter-sessional Preparatory Committee on the Environmental Perspective to the Year 2000 and Beyond of the United Nations Environment Programme, referred to in General Assembly resolution 38/161, considered further by the Governing Council of the United Nations Environment Programme at its fourteenth session and adopted in its decision 14/13 of 19 June 1987,[46] as a basis for the further elaboration of its programme and operations, while acknowledging that different views exist on some aspects,

Appreciating that concepts, ideas and recommendations contained in the report of the World Commission on Environment and Development[12] have been incorporated into the Environmental Perspective,

1. *Expresses its appreciation* for the efforts of the Governing Council of the United Nations Environment Programme and its Intergovernmental Inter-sessional Preparatory Committee on the Environmental Perspective to the Year 2000 and Beyond in the preparation of the Environmental Perspective to the Year 2000 and Beyond;

2. *Adopts* the Environmental Perspective to the Year 2000 and Beyond, contained in the annex to the present resolution, as a broad framework to guide national action and international co-operation on policies and programmes aimed at achieving environmentally sound development, and specifically as a guide to the preparation of further system-wide medium-term environment programmes and the medium-term programmes of the organizations and bodies of the United Nations system, in the light of Governing Council decision 14/13;

3. *Notes* that the perceptions generally shared by Governments of the nature of environmental problems, and their interrelations with other international problems, and of the efforts to deal with them include the following:

(*a*) An international atmosphere of peace, security and co-operation, free from the presence and the threat of wars of all types, especially nuclear war, in which intellectual and natural resources are not wasted on armaments by any nation, would greatly enhance environmentally sound development;

(*b*) The imbalance of present world economic conditions makes it extremely difficult to bring about sustained improvement in the world's environmental situation; accelerated and balanced world development and lasting improvements in the global environment require improved world economic conditions, especially for the developing countries;

(*c*) Since mass poverty is often at the root of environmental degradation, its elimination and ensuring equitable access of people to environmental resources are essential for sustained environmental improvements;

(*d*) The environment puts constraints on as well as provides opportunities for economic growth and social well-being; environmental degradation, in its various forms, has assumed such proportions as can cause irreversible changes in ecosystems, which threaten to undermine human well-being; environmental constraints, however, are generally relative to the state of technology and socio-economic conditions, which can and should be improved and managed to achieve sustained world economic growth;

(*e*) Environmental issues are closely intertwined with development policies and practices; consequently, environmental goals and actions need to be defined in relation to development objectives and policies;

(*f*) Although it is important to tackle immediate environmental problems, anticipatory and preventive policies are the most effective and economical in achieving environmentally sound development;

(*g*) The environmental impacts of actions in one sector are often felt in other sectors; thus internalization of environmental considerations in sectoral policies and programmes and their co-ordination are essential for the achievement of sustainable development;

(*h*) Since conflicts of interest among population groups, or among countries, are often inherent in the nature of environmental problems, the participation of the concerned parties is essential in determining effective environmental management practices;

(*i*) Environmental degradation can be controlled and reversed only by ensuring that the parties causing the damage will be accountable for their actions, and that they will participate, on the basis of full access to available knowledge, in improving environmental conditions;

(*j*) Renewable resources, as part of complex and interlinked ecosystems, can have sustainable yields only if used

while taking into account system-wide effects of exploitation;

(*k*) The safeguarding of species is a moral obligation of humankind and should improve and sustain human well-being;

(*l*) Building awareness at various levels of environmental conditions and management, through the provision of information, education and training, is essential for environmental protection and improvement;

(*m*) Strategies to deal with environmental challenges have to be flexible and should allow for adjustments to emerging problems and evolving environmental management technology;

(*n*) International environmental disputes, which are growing in number and variety, need to be resolved by peaceful means;

4. *Welcomes* as the overall aspirational goal for the world community the achievement of sustainable development on the basis of prudent management of available global resources and environmental capacities and the rehabilitation of the environment previously subjected to degradation and misuse, and the aspirational goals to the year 2000 and beyond as set out in the Environmental Perspective, namely:

(*a*) The achievement over time of such a balance between population and environmental capacities as would make possible sustainable development, keeping in view the links between population levels, consumption patterns, poverty and the natural resource base;

(*b*) The achievement of food security without resource depletion or environmental degradation and restoration of the resource base where environmental damage has been occurring;

(*c*) The provision of sufficient energy at reasonable cost, notably by increasing access to energy substantially in the developing countries, to meet current and expanding needs in ways which minimize environmental degradation and risks, conserve non-renewable sources of energy and realize the full potential of renewable sources of energy;

(*d*) The sustained improvements in levels of living in all countries, especially the developing countries, through industrial development that prevents or minimizes environmental damage and risks;

(*e*) The provision of improved shelter with access to essential amenities in a clean and secure setting conducive to health and to the prevention of environment-related diseases, which would, at the same time, alleviate serious environmental degradation;

(*f*) The establishment of an equitable system of international economic relations aimed at achieving continuing economic advancement for all States based on principles recognized by the international community, in order to stimulate and sustain environmentally sound development, especially in developing countries;

5. *Agrees* that the recommendations for action contained in the Environmental Perspective should be implemented, as appropriate, through national and international action by Governments, intergovernmental and non-governmental organizations and scientific bodies;

6. *Requests* the Governing Council to keep under review the extent to which the long-term environmental actions recommended in the Environmental Perspective have been implemented and to identify any new environmental concerns that may arise;

7. *Calls* special attention to section IV of the Environmental Perspective, which spells out instruments of environmental action, to be used as support in addressing, as appropriate, problems dealt with in previous sections of the Environmental Perspective;

8. *Stresses* the essential role of the United Nations Environment Programme within the United Nations system in catalyzing environmentally sound and sustainable development, and agrees with the Governing Council that this role should be strengthened and that the resources of the Environment Fund should be substantially increased with greater participation;

9. *Endorses* the priorities and functions for the United Nations Environment Programme set out in paragraph 117 of the Environmental Perspective;

10. *Decides* to transmit the text of the Environmental Perspective to all Governments and to the governing bodies of the organs and organizations of the United Nations system as a broad framework to guide national action and international co-operation on policies and programmes aimed at achieving environmentally sound and sustainable development;

11. *Calls upon* the governing bodies of the organs and organizations of the United Nations system to consider the Environmental Perspective and take it into account in the development of their own medium-term plans and programmes as relevant to their own mandates;

12. *Requests* the governing bodies of relevant United Nations organizations to report regularly to the General Assembly on the progress made in achieving the objectives of environmentally sound and sustainable development in line with paragraph 114 of the Environmental Perspective;

13. *Invites* the Governing Council of the United Nations Environment Programme to report to the General Assembly at its forty-fourth session on the implementation of the present resolution and the relevant provisions of the Environmental Perspective to the Year 2000 and Beyond.

96th plenary meeting
11 December 1987

ANNEX

Environmental Perspective to the Year 2000 and Beyond

CONTENTS

I. Introduction

1. Awareness of environmental issues has been growing during the past decade. This awareness has emerged among and within the Governments as they have addressed environmental problems singly, bilaterally, regionally and globally. The establishment of ministries for environmental conservation and enhancement is but one sign of this growth of common concern. Much of this concern has crystallized in the decisions of the Governing Council of the United Nations Environment Programme. Despite these noteworthy developments, and the emergence in the world community of many shared perceptions regarding environmental problems and actions, environmental degradation has continued unabated, threatening human well-being and, in some instances, the very survival of life on our planet.

2. To meet this challenge, the overall aspirational goal must be sustainable development on the basis of prudent management of available global resources and environmental capacities, and the rehabilitation of the environment previously subjected to degradation and misuse. Development is sustainable when it meets the needs of the present without compromising the ability of future generations to meet theirs.

3. The following are some shared perceptions of Governments of the nature of environmental issues and their interrelations with other international problems and the efforts to deal with them:

(*a*) An international atmosphere of peace, security and co-operation, free from the presence and the threat of wars of all types, especially nuclear war, in which intellectual and natural resources are not wasted on armaments by any nation, would greatly enhance environmentally sound development;

(*b*) The imbalance of present world economic conditions makes it extremely difficult to bring about sustained improvement in the world's environmental situation. Accelerated and balanced world development and lasting improvements in the global environment require improved world economic conditions, especially in the developing countries;

(*c*) Since mass poverty is often at the root of environmental degradation, its elimination and ensuring equitable access of people to environmental resources are essential for sustained environmental improvements;

(*d*) The environment puts constraints on as well as provides opportunities for economic growth and social well-being. Environmental degradation, in its various forms, has assumed such proportions as can cause irreversible changes in ecosystems which threaten to undermine human well-being. Environmental constraints, however, are generally relative to the state of technology and socio-economic conditions, which can and should be improved and managed to achieve sustained world economic growth;

(*e*) Environmental issues are closely intertwined with development policies and practices; consequently, environmental goals and actions need to be defined in relation to development objectives and policies;

(*f*) Although it is important to tackle immediate environmental problems, anticipatory and preventive policies are the most effective and economical in achieving environmentally sound development;

(*g*) The environmental impacts of actions in one sector are often felt in other sectors; thus, internalization of environmental considerations in sectoral policies and programmes and their co-ordination are essential for the achievement of sustainable development;

(*h*) Since conflicts of interest among population groups, or among countries, are often inherent in the nature of environmental problems, participation of the concerned parties is essential in determining effective environmental management practices;

(*i*) Environmental degradation can be controlled and reversed only by ensuring that the parties causing the damage will be accountable for their actions, and that they will participate, on the basis of full access to available knowledge, in improving environmental conditions;

(*j*) Renewable resources, as part of complex and interlinked ecosystems, can have sustainable yields only if used while taking into account system-wide effects of exploitation;

(*k*) The safeguarding of species is a moral obligation of humankind, and should improve and sustain human well-being;

(*l*) Building awareness at various levels of environmental conditions and management through the provision of information, education and training is essential for environmental protection and improvement;

(*m*) Strategies to deal with environmental challenges have to be flexible and should allow for adjustments to emerging problems and evolving environmental management technology;

(*n*) International environmental disputes, which are growing in number and variety, need to be resolved by peaceful means.

4. Environmental problems cut across a range of policy issues and are mostly rooted in inappropriate development patterns. Consequently, environmental issues, goals and actions cannot be framed in isolation from the development and policy sectors from which they emanate. Against this background, and in the light of General Assembly resolution 38/161 of 19 December 1983, the present document reflects an intergovernmental consensus on growing environmental challenges to the year 2000 and beyond, in six main sectors. In addition, the document discusses briefly other issues of global concern which do not fit easily under the sectoral headings and considers instruments for environmental action, including the role of institutions in dealing with environmental issues. Throughout the Environmental Perspective, an attempt has been made to reflect consistently the interdependent and integrated nature of environmental issues. Under each sectoral heading, this document covers: the issue; the outlook; the goal to be aspired to in dealing with the issue; and recommended action. While drawing upon the report of the World Commission on Environment and Development, the Environmental Perspective has sought to delineate, in an organized manner, the elements of shared perceptions, environmental issues, aspirational goals and the agenda for action envisaged for the Environmental Perspective by the Governing Council and the General Assembly.

II. Sectoral Issues

A. *Population*

1. *Issue and outlook*

5. *Issue*: The optimum contribution of human resources for the achievement of sustainable development has not been realized. Yet population levels, growth and distribution will continue to overload the capacities of the environment in many countries. Rapid population growth, among other factors, has exacerbated poverty. The negative interaction between population and environment has tended to create social tensions.

6. *Outlook*: People are the most valuable asset anywhere for the betterment of economic and social conditions and the quality of life. Yet, in a number of countries, the momentum of population growth today, coupled with poverty, environmental degradation and an unfavourable economic situation, has tended to create serious disequilibria between population and environment and to aggravate the problem of "environmental refugees". Traditions and social attitudes, especially in rural areas, have been a major impediment to population planning.

7. World population may exceed 6 billion by the year 2000. Several countries have achieved population equilibrium as defined by low birth and death rates and high life expectancies. But, for a large part of the developing world, this has not happened because of unfavourable economic conditions. Over 90 per cent of the net addition to the world's population between now and the year 2025, when the world population may exceed 8 billion, will occur in the developing countries. Many of them already suffer from desertification, fuelwood deficits, and loss of forests. Population planning would help, but is not sufficient, to achieve equilibrium between population and environmental capacities. Countries have not yet related population planning to development planning, nor have they linked population and environmental action for mutually reinforcing improvements. Equally, there is the need for more concern for human progress and social justice as factors influencing human resources development and environmental improvement.

2. *Goal and recommended action*

8. *Goal*: The achievement over time of such a balance between population and environmental capacities as would make possible sustainable development, keeping in view the links between population levels, consumption patterns, poverty and the natural resource base.

9. *Recommended action*:

(*a*) Development planning which takes into account environmental considerations should be an important instrument in achieving population goals. Countries should identify the rural and urban areas with acute population pressures on the environment. The environmental problems of large cities in developing countries should receive special attention. As poverty increases, economic development decreases and population rates grow, development plans should give special attention to population-related programmes aimed at improving environmental conditions at local levels;

(*b*) Significant changes in natural resources should be monitored and anticipated. This information should be fed back into sub-national and national development plans and related to the planning of spatial distribution of populations;

(*c*) Land and water use and spatial planning should bring about a balanced distribution of population through, for example, incentives for industrial location, and for resettlement and development of intermediate-sized towns, keeping in view the capacities of the environment;

(*d*) Public works, including food-for-work programmes, should be designed and implemented in areas of environmental stress and population pressures, with a view to providing employment and simultaneously improving the environment;

(*e*) Governments and voluntary organizations should increase public understanding, through formal and non-formal education, of the significance of population planning for environmental improvement and the important role of local action. The role of women in improving the environment and in population planning should receive special attention, as social changes that raise the status of women can have a profound effect in bringing down population growth rates;

(*f*) Private enterprise, and industry in particular, should participate actively in the work of governmental and non-governmental organizations aimed at relieving population and environmental stress;

(*g*) Education should be geared towards making people more capable of dealing with problems of excessive population density. Such education should help people acquire practical and vocational skills to enable them to become more self-reliant and enhance their participation in the improvement of the environment at the local level;

(*h*) International agencies, notably, the United Nations Fund for Population Activities, the United Nations Children's Fund, the International Labour Organisation, the World Health Organization and the World Food Programme, should give priority attention to the geographical areas experiencing acute population pressures on the environment. They should reflect sensitivity to environmental improvement in the design and implementation of their population-related programmes. Multilateral and bilateral development assistance should be increased to finance innovative projects to make population programmes more effective by relating them to environmental improvement;

(*i*) Population policies must have a broader focus than controlling numbers. Governments should work on several fronts: to achieve and maintain population equilibrium, to expand the carrying capacity of the environment and improve health and sanitation at local levels, to develop human resources through education and training, and to ensure equitable distribution of the benefits of economic growth.

B. *Food and agriculture*

1. *Issue and outlook*

10. *Issue*: The shortage of food in many developing countries creates insecurity and environmental threats. The quest to meet rapidly growing food needs, combined with insufficient attention to the environmental impact of agricultural policies and practices, has been causing great environmental damage. This includes: degradation and depletion in the form of loss of soil and forests; drought and desertification; loss and deterioration of the quality of surface and ground water; reduction in genetic diversity and of fish stocks; damage to the sea floor; waterlogging, salinization, and siltation; soil, water and air pollution; and eutrophication caused by improper use of fertilizers and pesticides and by industrial effluents.

11. *Outlook*: While food production capabilities have increased greatly over the last three decades, self-reliance in food production has not been achieved in many countries. In the absence of proper environmental management, the conversion of forests and grassland into cropland will increase land degradation. For example, in sub-Saharan Africa desertification and frequent droughts are major concerns causing large-scale migration from rural areas. In most developing countries the pressure on the natural resources, including those in the public domain, is a serious concern. In some developed countries loss of land productivity from excessive use of chemicals and loss of prime quality land to urbanization are major concerns.

12. Soil erosion has increased in all regions: increased intensity of land use has resulted in the reduction of fallowing which, in turn, has undermined soil conservation, management of moisture and control of weeds and diseases in small holder agriculture. The main causes of soil erosion have been deforestation, overgrazing and overworking of farmland. Inappropriate patterns of land use and inadequate access to land are other factors which have been at work. Some off-site impacts have been flooding, reduction in hydro-electric capacity, reduced life of irrigation systems and declines in fish catches. The world's rivers may be carrying 24 billion tons of sediment to the seas annually. Technologies which make optimal use of natural resources, minimum tillage, fallowing and drought-, pest- and disease-resistant varieties, combined with mixed cropping, crop rotation, terracing and agro-forestry, have kept erosion under control in some places.

13. Nearly one third of all land is at risk of desertification. Over the last quarter century the population in arid lands has increased by more than 80 per cent. Since the adoption in 1977 of the Plan of Action to Combat Desertification[55] awareness of the problem has grown and so have organizational efforts to deal with it. But the basic elements of the action needed, namely, to stop the process, to rehabilitate degraded lands, and to ensure their effective management, do not yet receive the attention they urgently need. Although long-term economic returns on investments in the control of dryland degradation are high, insufficient resources are being devoted to it.

14. Forests cover approximately one third of all land. Tropical forests occupy over 1.9 billion hectares, of which 1.2 billion hectares are closed forests, and the remaining open tree formations. Although the rate of tree plantations in the tropics has accelerated recently (about 1.1 million hectares annually), it amounts to only about one tenth of the rate of deforestation. Use of forest land for agriculture through shifting or sedentary cultivation, increasing demand for fuelwood, unmanaged clearance and logging, burning and conversion for pastoral purposes are the main factors behind tropical deforestation. In semi-humid and dry climates fire can be a significant cause as well. Widespread deforestation has brought about far-reaching changes in tropical forest ecosystems, which no longer can perform well their essential functions of water retention, climate control, soil conservation and provision of livelihood.

15. Timber, an increasingly scarce commodity, has become the subject of extensive international negotiations. The International Tropical Timber Agreement, ratified in 1985, aims at promoting international trade in industrial wood and environmental management of tropical forests. The Tropical Forestry Action Plan, prepared under the auspices of the Food and Agriculture Organization of the United Nations, puts forward five priority areas aimed at: forestry land use planning, forestry-based industrial development, fuelwood and energy planning, conservation of tropical forest ecosystems and institutional support for better forestry management.

16. There have been significant changes in weather patterns as a result in part of loss of forests and vegetation cover. This has reduced river flows and lake levels and also lowered agricultural productivity. Irrigation has greatly improved arability in many areas of uncertain, or inadequate, rainfall. It has also been playing a vital role in the Green Revolution. Inappropriate irrigation, however, has wasted water, washed out nutrients and, through salinization and alkalinization, damaged the productivity of millions of hectares. Globally, salinization alone may be removing as much land from production as the land being irrigated, and about half of the land under surface irrigation may be saline or waterlogged. Excessive use of ground water for irrigation has resulted in lower water tables and semi-arid conditions.

17. Fisheries potential has not yet been tapped sufficiently or in such ways as to ensure sustainable yields, particularly in the developing coastal States, which do not possess the necessary infrastructure, technology or trained manpower to develop and manage fisheries in their exclusive economic zones. Excessive fishing activities have led to overexploitation of several important fish stocks and the exhaustion of some. By the year 2000, annual fish supplies may fall short of demand by about 10 to 15 million tons. Regional agreements on co-ordination of national fishing policies for licensing procedures, catch reporting, monitoring and surveillance have begun to consider sustainability of yields and use of appropriate technology. The World Conference on Fisheries Management

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[55] *Report of the United Nations Conference on Desertification, Nairobi, 29 August-9 September 1977* (A/CONF.74/36), chap. I.

and Development[56] established a framework and programmes of action for fisheries management.

18. Freshwater fish farming and aquaculture now produce annually about 8 million tons of fish. In Europe and in South and South-East Asia, aquaculture has made important strides. Whether as part of a traditional way of supplementing farm incomes and protein intake or as an industry, carefully practised aquaculture holds great promise for integrated environmental management and rural development in many countries.

19. The use of high-yielding seed varieties has multiplied agricultural output but has led to a reduction in the genetic diversity of crops and an increase in their vulnerability to diseases and pests. The emerging technology of direct gene transfer, or transfer of the symbiotic nitrogen-fixing capacity of leguminous crops to cereals, can greatly increase production and reduce costs. Also, the spread of gene banks, through the International Board for Plant Genetic Resources, and the work of the International Centre for Genetic Engineering and Biotechnology should improve the prospects for genetic diversity, and thereby enhance agricultural productivity.

20. Overuse of pesticides has polluted water and soil, damaging the ecology of agriculture and creating hazards for human and animal health. Pesticides have to be used to increase agricultural production, but their indiscriminate use has destroyed natural predators and other non-target species and increased resistance in target pests. More than 400 insect species are believed to be resistant to pesticides and their number is increasing.

21. Use of chemical fertilizers per capita has increased fivefold between 1950 and 1983. In some countries excessive use of fertilizers, along with household and industrial effluents, has caused eutrophication of lakes, canals, irrigation reservoirs, and even coastal seas through runoffs of nitrogen compounds and phosphates. Ground water has also been polluted by nitrates in many places, and nitrate levels in rivers have risen steadily over the last two decades. Degradation of the quality of surface and ground water, caused by chemicals, including nitrates, has been a significant problem in developed and developing countries alike.

22. In North America, Western Europe and some other areas, food surpluses have accumulated as a result in part of farm price subsidization. The push to produce more in response to incentives, coupled with excessive use of fertilizers and pesticides, has led to degradation and soil erosion in some countries. Similarly, export subsidization of food grains by some countries has undermined agricultural exports of some others, and also led to environmental neglect of farmland. In some countries, however, there is a trend towards reducing the scale of farming, encouraging organic farming, restoring the natural beauty of the countryside and diversifying the rural economy.

23. In the developing countries, farmers receive too little for their produce, and production is thereby discouraged. City dwellers often buy food at subsidized prices, and peasants may receive only a fraction of the market price. In countries where farmers have begun to receive better prices for their produce, agricultural production has increased and soil and water management has improved. When equitable agricultural prices are accompanied by technical assistance for environmental management of farming, they can help improve the quality of life in the countryside as well as in cities, partly by stemming the flow of rural-urban migration. Upward adjustment of food prices is, however, a politically sensitive issue, especially in situations of low resource productivity, low income, large-scale unemployment and slow economic growth.

2. *Goal and recommended action*

24. *Goal*: The achievement of food security without resource depletion or environmental degradation, and restoration of the resource base where environmental damage has been occurring.

25. *Recommended action:*

(*a*) Policies of Governments for using agricultural land, forests and water resources should take into account degradation trends as well as evaluation of potentials. Agricultural policies should vary from region to region to reflect different regional needs, encouraging farmers to adopt practices that are ecologically sustainable in their own areas and promote national food security. Local communities should be involved in the design and implementation of such policies;

(*b*) Policy distortions that have caused undue pressures on marginal lands, or taken away prime farmland for urbanization, or led to environmental neglect of natural resources, have to be identified and eliminated;

(*c*) Governments should design and implement regulatory measures, as well as taxation and price policies and incentives, aimed at ensuring that the right of owning agricultural land carries an obligation to sustain its productivity. Long-term agricultural credits should require farmers to undertake soil conservation practices, including keeping a portion of land fallow, where appropriate;

(*d*) Governments should promote equity in means for food production and in distribution. Governments should design and implement comprehensive agrarian reforms to improve the levels of living of farm workers who lack land. Governments should take decisive action to turn the terms of trade in favour of farmers, through pricing policy and government expenditure reallocation;

(*e*) Governments should ascertain direct and indirect environmental impacts of alternative crop, forestry and land use patterns. Fiscal and trade policies should be based on such environmental assessments. Governments should give priority to establishing a national policy and to creating or strengthening institutions to restore areas where natural factors and land use practices have reduced productivity;

(*f*) In the national development plans and agricultural programmes of countries experiencing desertification, dryland rehabilitation and management have to figure prominently. Better systems of early warning against drought and other dryland disasters have to be developed, with the World Meteorological Organization, the Food and Agriculture Organization of the United Nations, the United Nations Environment Programme and the relevant regional organizations playing appropriate roles;

(*g*) Sound forest policies should be based on an analysis of the capacity of the forests and the land under them to perform various functions. Programmes to conserve forest resources should start with the local people. Contracts covering forest use will have to be negotiated or renegotiated to ensure sustainability. Clear-cutting of large forest areas should be avoided and replanting of logged forestry areas should be required. Portions of forests should be designated as protected areas to conserve soil, water, wildlife and genetic resources in their natural habitat;

(*h*) Social and economic costs of deforestation, including clear-cutting, have to be estimated and reported on in relation to the periodic national reporting on the economic performance of forestry. Similarly, the damage costs of waterlogging and salinization have to be reported in conjunction with the reporting on irrigation and agricultural production. The loss of land to deserts and its consequences for food production, trade, employment and income have to be made part of the annual reporting on economic growth. Economic policies and planning have to reflect such environmental accounting;

(*i*) In areas experiencing deforestation and lack of forest resources, economic and other incentives should be introduced to manage forests and woody vegetation from an environmental standpoint and to promote tree nurseries, tree farming and fuelwood plantations. Local communities should be encouraged to take major responsibility for such undertakings;

(*j*) Projects should be designed and implemented to promote afforestation, agro-forestry systems, water management and soil conservation measures, such as land contour-levelling and terracing, in areas of environmental stress. Such projects should respond to the needs of the local people for food, fodder and fuel, while increasing the long-term productivity of natural resources. Environmental improvement schemes should become a regular part of national relief, rural employment and income-support schemes to sustain development in regions prone to drought or other environmental stress;

(*k*) Within the framework of a national water policy, which should facilitate an intersectoral and integrated approach to water development and use, technical, economic and organizational means have to be geared to improving efficiency of water use in farming and animal husbandry. Emphasis on ground-water storage in drylands should improve assurance of water availability. Improvements in water application techniques to minimize wastage, co-ordination of farming patterns with water supply, and such pricing of water as would cover the cost of its collection, storage and supply, should be introduced to conserve water in scarcity areas;

(*l*) In the choice of technology and the scale of irrigation environmental costs and benefits should be taken into account. Decentralized and small-scale irrigation have to receive special attention. Proper drainage to prevent salinization and waterlogging has to accompany irriga-

[56] Food and Agriculture Organization of the United Nations, *Report of the FAO World Conference on Fisheries Management and Development, Rome, 27 June-6 July 1984.*

tion. Development assistance has to play a vital role in improving productivity of existing irrigation, reducing its environmental damage and adapting it to the needs of small-scale, diversified agriculture;

(*m*) The traditional rights of subsistence farmers, particularly shifting cultivators, pastoralists, and nomads, must be protected from encroachment. Provision of infrastructure, services and information should help modernize nomadic life-styles without damaging their traditionally harmonious relationships with ecosystems. Programmes of land clearance and resettlement should be based on an assessment of their environmental, along with their social and economic, impacts. Agro-industry, mining and schemes of geographical dispersal of settlements should also aim at improving environmental conditions in rural areas;

(*n*) Public education, information campaigns, technical assistance, training, legislation, standard setting and incentives should be oriented toward encouraging the use of organic matter in agriculture. The use of fertilizers and pesticides has to be guided, *inter alia*, through training, awareness building and appropriate price policies, so as to establish integrated nutrient supply systems responsive to environmental impacts. Similarly, subsidies, which have led to the overuse or abuse of chemical fertilizers and pesticides, have to be phased out;

(*o*) Decentralized storage facilities, with the upgrading of traditional methods to ensure protection of stored grains, should receive attention in the planning of support services for rural and agricultural development;

(*p*) Where the agricultural frontier has extended in an uncontrolled manner, Governments should make special efforts to expand the area under woodland and nature reserves;

(*q*) Satellite imagery, aerial photography and geographical information systems of assessing and monitoring should be deployed to establish natural resource data bases. Such data should be made available, freely or at a nominal charge, to the countries in need. The United Nations Environment Programme should co-ordinate international programmes in this field. Such data collection and their socio-economic analyses should facilitate the design and implementation of land use and natural resource development plans, and improve international co-operation in the environmental management of transboundary natural resources;

(*r*) In international co-operation, priority should be given to schemes aimed at strengthening skills and institutional capabilities in the developing countries in fields such as applied genetics, agro-forestry, organic recycling, integrated pest management, crop rotation, drainage, soil-conserving ploughing, sand-dune stabilization, small-scale irrigation and environmentally sound management of fresh-water systems;

(*s*) Biotechnology, including tissue culture, conversion of biomass into useful produce, micro-electronics and information technology, should be deployed, after assessing carefully their environmental impacts and cost effectiveness, with a view to promoting environmental management of agriculture. Governments should enhance the access of farmers to such technologies through national policies and international co-operation. Research should be intensified on new technologies urgently needed in regions which have unreliable rainfall, uneven topography, and poor soils. Governments should also set up targets for the development of cadres of professionals specializing in environmental management of soil, water and forests and in biotechnology with a multi-disciplinary and integrated outlook;

(*t*) Aquaculture should be developed to the fullest, where possible in conjunction with farming, using low-cost, simple, labour-intensive technology. Co-operation for environmental management of marine living resources and fisheries should be intensified, through technical assistance as well as conventions and agreements;

(*u*) Because of women's important role in agriculture in many developing countries, they should be provided with adequate education and training opportunities. They should also have the necessary power to take decisions regarding agriculture and forestry programmes;

(*v*) Distortions in the structure of the world food market should be minimized, and the focus of production should be shifted to food deficit countries. In developed countries incentive systems should be changed to discourage overproduction and foster improved soil and water management. Governments must recognize that all parties lose through protectionist barriers, and redesign trade and tax policies using environmental and economic criteria;

(*w*) International agreements should be concluded in respect of agricultural price policies, with a view to minimizing waste and mismanagement of food and natural resources in agriculture. Such agreements should aim at bringing about an international division of labour in agriculture in conformity with the long-term capabilities of countries in agricultural production. In this context, consideration should be given to strengthening the work of the World Food Programme through the establishment of a world food bank from which countries could draw food supplies in emergency situations;

(*x*) Special attention should be given to protection and careful development of wetlands, particularly in view of their long-term economic value;

(*y*) Sustainable exploitation of living wild resources should receive special consideration in the light of its contribution to achieving food security.

C. *Energy*

1. *Issue and outlook*

26. *Issue*: There are vast disparities in the patterns of energy consumption. Accelerated economic growth and growing populations require a rapid expansion in energy production and consumption. Major problems in this regard include: depletion of the supplies of, and inadequate access to, fuelwood, and environmental impacts of fossil energy production, transmission and use, for example, acidification of the environment, accumulation of greenhouse gases and consequent climatic change. Although energy is crucial to the development process, there has been little concerted action to balance environmental imperatives and energy demands.

27. *Outlook*: About three fourths of the world's energy consumption is in the form of fossil fuels: oil, coal, and natural gas. The remainder is supplied mainly by biomass, hydropower and nuclear power. The main problems caused by fossil fuel use are: air pollution, acidification of soil, fresh water and forests, and climatic change, especially warming of the atmosphere. The costs of controlling these problems and of dealing with their environmental and health impacts have been enormous. New and renewable sources of energy, including solar, wind, ocean and geothermal, are being developed but are unlikely to make a significant contribution during the rest of this century.

28. International oil prices are fluctuating. The immediate economic impact of lower prices has been significant, yet the momentum of efforts to improve energy efficiency and to develop alternatives for fossil fuels, which began in the wake of high oil prices, may decline.

29. Though developing countries account for about one third of the world's energy consumption, many of them do not have adequate access to energy. Most of them depend on oil imports and on biomass and animal energy. Wood, which provides energy to about half of the world's people, is becoming scarce, and overcutting has devastated the environment. Some countries have made progress in developing biogas while improving the environment, but the potential of biogas remains largely untapped. Given the needs of industrialization and the trends of population growth, energy needs will increase tremendously during the coming decades. If energy efficiency measures are not put in place, it will not be possible to meet those needs.

30. Many countries have made efforts to control air pollution by setting standards and introducing appropriate equipment in factories as well as automobiles, and by developing clean technologies for cooking, space heating, industrial processes and power generation. But attempts to deal with urban and industrial air pollution have often effectively transported the problem, for example, in the form of acid deposition, to other areas and countries. At least 5 to 6 per cent of the European forests may have already died because of acidification. As a first step, some European countries have agreed on a technical co-operation programme to monitor and control long-range transmission of some air pollutants. Reducing emissions of sulphur dioxide and nitrogen oxides, however, is rather costly, although effective reduction technologies have been introduced in some countries. On the other hand, no effective technologies exist to control carbon dioxide accumulation which can markedly change climate. Moreover, available technology is not being fully utilized. The difficulty is to determine up to what level the damage costs of polluting fossil fuels should be accepted and how much to invest in scientific research to develop clean technologies.

31. Energy is often used in wasteful ways. The costs of this waste are being borne by all, but mostly by the poor. Moreover, part of these costs are being transferred to children, future generations and other countries. Several countries have experimented successfully over the last decade with conservation of energy for domestic use, improved efficiency of energy in industry and agriculture and adoption of energy mixes to minimize environmental damage. In some countries the nature of industrial growth has been changing in ways which economize on energy, for example, rapid growth of electronic, recreation and service industries. Conse-

quently, there has been a noticeable delinking of economic growth from increase in energy consumption. Energy savings, renewable sources and new technologies can reduce energy consumption while maintaining the momentum of economic growth.

32. While oil exploration and coal mining have received great attention, the potential of natural gas has not been realized. Considerable quantities are being wasted in the absence of necessary infrastructure and investment. The world also has a relatively untapped capacity to develop hydropower. In the past, environmental planning has not received adequate attention in hydropower development. Decentralized small-scale hydropower schemes are not yet used on a significant scale, although they may be capable of providing economical, efficient and environmentally sound sources of energy.

33. Nuclear energy is widely used as a source of electricity, and the International Atomic Energy Agency has formulated guidelines to ensure that it is developed and used safely. The problems associated with it include the risk of accidental contamination, which can spread quickly over long distances, and the safe handling and disposal of radioactive wastes, including decommissioned nuclear reactors.

2. *Goal and recommended action*

34. *Goal*: The provision of sufficient energy at reasonable cost, notably by increasing access to energy substantially in the developing countries, to meet current and expanding needs in ways that minimize environmental degradation and risks, conserve non-renewable sources of energy and realize the full potential of renewable sources of energy.

35. *Recommended action*:

(*a*) Governments' energy plans should systematically take into account environmental requirements. Energy efficiency policies coupled with environmentally sound energy production and appropriate energy mixes should be pursued to achieve sustainable energy consumption patterns. National efforts should be supported by international co-operation, especially scientific research, establishment of standards and transfer of technology and information;

(*b*) Energy pricing, taxation, trade and other policies should take into account the environmental costs of all forms of energy. Subsidies for fossil fuels should be progressively phased out. Private enterprise, consumers and government institutions should be provided with economic incentives to make greater use of renewable sources of energy. Where needed, international co-operation should facilitate the exploration for and environmentally sound production of energy;

(*c*) Information should be made available on the harmful environmental impacts of intensive use of fossil fuels. Urban and industrial air pollution, accumulation of greenhouse gases and the attendant climatic change, as well as transfrontier transport of air pollutants in all regions must receive urgent attention, including monitoring by appropriate methods. Standards must be set and enforced within and among countries, and conventions and agreements should be concluded to deal with these problems. In this context, the "polluter pays principle" should be accepted. Governments should ensure that clean technologies are put into practice on a wider scale than in the past at the local level. The United Nations system, in conjunction with other intergovernmental bodies, should improve access to information on renewable sources of energy and on efficient energy use;

(*d*) In view of the significance of fuelwood, national programmes of afforestation and of environmental management of woodlands should receive increased resources. Agro-forestry programmes, tree plantations and village woodlots should receive special encouragement in countries experiencing fuelwood deficit. Commercial cutting of fuelwood should be subjected to rigorous scrutiny and control, in view of its environmental costs. Application of fuel-efficient stoves and charcoal should be encouraged. Pricing of fuelwood should be guided by the consideration of sustaining supplies consistent with needs;

(*e*) As biogas can be an important source of energy, the existing technology for the use of agricultural, animal and human wastes should be applied more widely by means of incentives and guidance. Technical co-operation among developing countries should play a vital part in this process, bearing in mind its sanitation and agricultural benefits;

(*f*) Decisions on large-scale hydropower projects should be guided by analysis of social costs and benefits in the light of likely environmental impacts. Small-scale hydropower schemes should receive particular attention since they could facilitate simultaneous attainment of environmental, economic and social objectives;

(*g*) Renewable energy sources should receive high priority and should be applied on a wider scale than in the past, giving full consideration to their environmental impacts. Technologies to develop renewable sources of energy, such as wind, geo-thermal and especially solar, should receive particular attention. International co-operation should facilitate this process;

(*h*) International co-operation should aim at the creation of a régime for the safe production and use of nuclear energy, as well as the safe handling of radioactive waste, taking into account, through appropriate mechanisms including prior consultations, the interests and concerns of countries that have decided not to produce nuclear energy, in particular concerns regarding the siting of nuclear plants close to their borders. This régime should extend globally to encompass observance of comparable standards and procedures on management of reactors and the sharing of information and technology for nuclear safety. The Convention on Early Notification of a Nuclear Accident and the Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency[57] should be complemented by bilateral and subregional agreements and should also lead to technical co-operation among countries on environmental management of nuclear energy.

D. *Industry*

1. *Issue and outlook*

36. *Issue*: Industrial development brings obvious benefits, but it frequently entails damage to the environment and to human health. The main negative impacts are: wasteful use and depletion of scarce natural resources; air, water and soil pollution; congestion, noise and squalor; accumulation of hazardous wastes; and accidents with significant environmental consequences. Industrialization patterns and the consequent exploitation of natural resources and environmental degradation have been markedly unbalanced. The prospect for accelerated, yet environmentally sound, world industrial development is slim in the absence of concerted international action.

37. *Outlook*: Although some efforts to deal with environmental problems of industry have been made, negative impacts will grow in magnitude if not addressed methodically now. A promising trend is the steadily growing awareness of industrial environmental risks throughout the world. While this awareness increasingly informs and influences public policy, environmental knowledge remains as yet markedly uneven. In the absence of mechanisms for the unhindered sharing of environmental knowledge, Governments and industry may import hazardous materials and allow establishment of processes discarded elsewhere. Inadequate knowledge at the grassroots level of changes in the environment, and of their causes as well as economic implications, impedes participation of the concerned people in decision-making on siting of industrial plants and choice of industrial technology.

38. Natural resources have been used wastefully in industry. Recently, a number of countries have made significant progress in developing and adopting low-waste and clean industrial technologies and in recovering as well as recycling scarce industrial raw materials. New materials and processing technologies have made it possible to save raw materials and energy resources and to reduce environmental stress. Nevertheless, in many countries resource-intensive processes persist in the absence of suitable policies and access to proper technology.

39. Uncontrolled industrial practices have led to unacceptably high levels of harmful or toxic substances in the air, the pollution of rivers, lakes, coastal waters and soil, the destruction of forests, and the accumulation of carbon dioxide and other greenhouse gases which threaten to cause climatic changes, including a global warming of the atmosphere. Sea levels may rise considerably as a result. Industrial production and emission of chlorofluorocarbons threaten a significant depletion of the ozone layer, leading to increased ultraviolet radiation.

40. Recently, there has been an increase in the seriousness of industrial accidents, particularly in the chemicals industry. Even in the developed countries, the state of preparedness to meet such contingencies has been inadequate. Also, frameworks for international co-operation in such situations have been lacking. A crucial problem has been the lack of timely warning and of full sharing of information on the nature and magnitude of the hazards at local and regional levels.

41. With industrial growth and spread, the transport, storage and disposal of chemical, toxic and radioactive wastes will pose an increasingly serious challenge. The "polluter pays principle" has been applied with good results in some countries, but in many others it is still not ap-

[57] See International Atomic Energy Agency, *Final Document, Resolutions and Conventions adopted by the first special session of the General Conference, 24-26 September 1986*, sects. I-IV.

plied at all, so that the source of environmental damage often is not held accountable for the harm caused. In the pursuit of rapid industrialization, some polluting industries may be relocated from other countries. As many developing countries do not possess the technical or institutional capability to analyse or monitor environmental implications of industrial processes, products or wastes, they are vulnerable to industrial environmental damage.

42. Many developed countries have successfully applied technology, policies and institutional and legislative frameworks to deal with industrial pollution. Several have succeeded in innovating or applying low-waste or clean technologies. The Industry and Environment Office of the United Nations Environment Programme has produced publications with extensive and detailed information on environmentally sound technologies in specific industries. Thus, although environmental hazards of industrial processes, products and wastes persist, there is available considerable experience, expertise and technology to prevent industrial accidents and implement environmentally responsible practices.

43. Technical innovation has opened up promising opportunities for achieving mutually supportive economic and environmental objectives. Properly guided technology can transform patterns of industrialization and improve the international division of labour. Innovation in microelectronics and opto-electronics has revolutionized information and communications industries and could lead to geographical dispersal of industry. These innovations hold promise for developing countries suffering from the twin problems of excessive industrial concentration in urban areas and relative neglect of rural areas.

44. In the decades ahead, the developing countries will depend more and more on industry, including processing of their own raw materials, for incomes and employment. In contrast, in some developed countries, the pattern of industry is changing in the direction of knowledge-intensive, energy-saving, and materials-saving activities. Moreover, leisure and service industries have begun to play a significant part in this change.

45. Countries have been coming together to forge agreements on preventive measures to contain global, regional and transfrontier environmental impacts of industrial products and processes. Examples of this encouraging trend include: conventions and protocols for the control of land-based sources of marine pollution within the frameworks of various regional seas programmes; the Vienna Convention for the Protection of the Ozone Layer and the evolving international consensus on the control of emission of chlorofluorocarbons; the Convention on Long-range Transboundary Air Pollution and its Co-operative Programme for the Monitoring and Evaluation of Long-range Transmission of Air Pollutants in Europe; and the Cairo Guidelines and Principles for the Environmentally Sound Management of Hazardous Wastes,[48] sponsored by the United Nations Environment Programme. Such international co-operation can extend into many areas of industrial environmental management and many geographical regions. Moreover, industry itself, following the World Industry Conference on Environmental Management convened in 1984 by the United Nations Environment Programme, is increasingly ready to undertake environmental responsibilities.

2. *Goal and recommended action*

46. *Goal*: Sustained improvements in levels of living in all countries, especially the developing countries, through industrial development that prevents or minimizes environmental damage and risks.

47. *Recommended action*:

(*a*) Governments should implement policies to assist in the transition of economies characterized by the wasteful use of natural resources and raw materials and dependence on their export, to environmentally sound industrial development. National efforts to plan and implement environmentally sound industrial policies should be intensified. Governments should introduce incentive schemes to help establish facilities for recovery and recycling of scarce raw materials. The transfer of industrial technology and skills from developed to developing countries to arrest environmental degradation associated with industry should be internationally supported. The United Nations Development Programme, the United Nations Environment Programme, the Economic Commission for Europe, and the United Nations Industrial Development Organization should intensify efforts in this direction;

(*b*) Governments should introduce programmes to monitor air, soil, fresh water and coastal pollution from industrial emissions and effluents, and hazardous industrial activities, where such programmes do not already exist;

(*c*) Governments should establish and enforce environmental standards, and should provide fiscal and other incentives to industry for the retro-fitting of equipment for pollution control. They should also ensure penalties for non-compliance, in conformity with the "polluter pays principle". International organizations should co-operate with Governments in establishing global or regional standards;

(*d*) Governments should require periodic reports by industries on measures implemented to protect and improve the environment, especially those industries involving high environmental and health risks;

(*e*) Industrial enterprises should carry out environmental impact and social cost-benefit analyses prior to the siting and design of industrial plants. Governments should ensure that such analyses are carried out and made public. Governmental policies should facilitate the location of industries in areas which would relieve urban congestion and encourage rural development. Industries which use each other's products and wastes should be located near each other;

(*f*) Governments and industrial enterprises should be receptive to the views of citizen groups, community associations, labour organizations and professional and scientific bodies in arriving at and implementing decisions on industrial siting, design and technologies to meet the environmental, economic and social needs of the people;

(*g*) Chambers of commerce and federations of industry should collaborate actively in implementing emissions standards and pollution control measures. They should establish mechanisms to bridge the gap in environmental management knowledge and capabilities among their members. Such co-operation should also be encouraged among small-scale producers;

(*h*) Transnational corporations should comply with the environmental legislation of the host country, while respecting similar legislation of the home country. Legislation could include requirements for public environmental audits of the activities of transnational corporations and local enterprises. In accordance with proposed international codes of conduct, transnational corporations should establish progressively in the host countries the skills and technological capabilities needed for environmentally sound management of industry, even in the absence of legislation on desirable environmental standards;

(*i*) International industrial collaboration, like national industry, should be subjected to environmental impact assessments;

(*j*) Countries, especially developing countries, should, as a matter of urgency, design and implement research, training and manpower-planning programmes to strengthen the management of hazardous industrial processes and wastes;

(*k*) International organizations, including the United Nations Development Programme, the United Nations Industrial Development Organization, the World Health Organization, the Food and Agriculture Organization of the United Nations, the World Meteorological Organization and the International Labour Organisation, and intergovernmental organizations, such as the Organisation for Economic Co-operation and Development, and the Council for Mutual Economic Assistance, should ensure that their programmes will progressively strengthen the capacities of the developing countries for designing and implementing industrial operations along environmentally sound lines. They should also assist in establishing or strengthening information services on environmental and health implications of industrial processes, products and wastes. In addition, access of the developing countries to information and data on environmentally benign technologies should be promoted, including risk management techniques;

(*l*) International co-operation for the monitoring of the accumulation of carbon dioxide and other greenhouse gases and of their impacts on climate and sea levels must be strengthened to encompass both the conclusion of international agreements and the formulation of industrial strategies to mitigate the environmental, economic, and social impacts of potential changes. Intergovernmental negotiations, based on the Vienna Convention for the Protection of the Ozone Layer, should lead to agreements on the reduction of ozone-depleting substances;

(*m*) Within the framework of their existing legal and technical activities, United Nations organizations, especially the United Nations Environment Programme, in closer co-operation with regional organizations, should progressively establish international agreements and monitoring mechanisms to deal with spills and other industrial accidents, particularly chemical; to control the transportation, storage, management and disposal of hazardous industrial wastes; and to settle disputes involving damages and claims for compensation. United Nations and regional organizations should encourage Governments to extend the "polluter pays principle" to transboundary problems;

(*n*) The International Register of Potentially Toxic Chemicals programme of the United Nations Environment Programme should maintain and improve its assistance to Governments in assessing whether producing, marketing, distributing or disposing of any industrial substances, including chemicals and wastes, are potentially damaging to health and environment.

E. *Health and human settlements*

1. *Issue and outlook*

48. *Issue*: Despite considerable advances in dealing with problems of health and human settlements, the environmental basis for further improving the situation is deteriorating. Inadequate shelter and basic amenities, rural underdevelopment, overcrowded cities and urban decay, lack of access to clean water, poor sanitation and other environmental deficiencies continue to cause widespread disease and death, ill-health and intolerable living conditions in many parts of the world. Poverty, malnutrition and ignorance compound these problems.

49. *Outlook*: Human ability to prevent disease has grown greatly over the last few decades, mainly owing to scientific achievements and better access to sanitation, clean water and safe waste disposal. In many developed countries better living conditions have helped prevent disease and have enhanced average life expectancy. In the developing countries, however, achievements have lagged behind what is technically feasible.

50. More than 4 million children under the age of five die of diarrhoea in the developing countries annually. Even when it does not cause death, diarrhoea saps vitality and stops physical and mental growth. Malaria is another water-borne disease which infects about 100 million annually. Typhoid and cholera are similarly endemic in the developing countries. Bilharzia and river blindness are other common diseases caused by mismanagement of water. Sleeping sickness, caused by the tsetse fly, effectively denies the use of vast tracts of land in Africa for pastoral or settlements development. The burning of coal, oil, wood, dung and agricultural wastes builds up dangerous concentrations of toxic gases in houses and factories, and chronic heart and lung diseases, bronchitis, emphysema and asthma are the result.

51. In warm, humid countries where storage is inadequate, aflatoxins in food cause liver cancer. On the other hand, over-use of fertilizer has caused excessive nitrate levels in ground water, endangering children's health, and nitrate run-offs have led to eutrophication of surface waters and contamination of shellfish. Phosphates in fertilizer have caused high concentrations of cadmium in food. Further, pesticides, herbicides and fungicides pose a direct threat to health in the rural areas when their use is not properly guided. Over-use of pesticides has also led to high levels of pesticide residue in food.

52. About a billion people do not have adequate shelter, and millions practically live on the streets. By the year 2000, about 2 billion people, or 40 per cent of the developing countries' population, will live in cities and towns, thereby putting pressure on city planners and Governments. Most developing countries already do not have the resources required to provide housing and services to the people who need them. The influx of refugees in some developing countries has exacerbated health, shelter and environmental conditions. Also, where rural settlements are widely dispersed, health, housing and infrastructural services become practically unattainable.

53. About one third of all city and town dwellers in the developing countries live in slums and shanties, with no help or infrastructural support whatever, and often under adverse conditions. The inexorable trend towards urbanization will ensure that by the year 2000, 15 of the world's 20 largest urban metropolitan areas will be in the developing countries. Simultaneously, rural environmental degradation reinforces migration to urban areas even when people are unable to earn incomes high enough to ensure decent housing and there is no prospect of meeting their infrastructural needs.

54. There are three main environmental aspects of urbanization: characteristics of the dwelling —living space, ventilation, sanitation, water supply, waste disposal, recreation space, domestic energy; ambient environmental situation —air pollution, water pollution, environmental risks and hazards, noise, stress and crime; and environment of the area surrounding the urban centres —deforestation, soil erosion, changes in micro-climate. Between a quarter and a half of all urban residents in the developing countries live in unhealthy and degraded dwellings. Consequently, diarrhoea, dysentery and typhoid are common, and there are periodic outbreaks of cholera and hepatitis. Tuberculosis and other respiratory diseases spread easily in ill-ventilated, damp and crowded surroundings.

55. Excessive concentrations of industry and commerce in a few urban centres often reflect a dualistic development pattern, implying a relative neglect of rural and agricultural development. Concentrations of people, settlements and income and employment opportunities often become mutually reinforcing in such a situation. People continue to migrate to the urban areas even if their expected incomes are not high enough to ensure decent housing, or there is no prospect of their infrastructural needs being met. Thus, the problems of safe disposal of toxic and hazardous wastes, control of air and water pollution, collection and disposal of domestic wastes and provision of clean drinking water assume gigantic proportions, requiring enormous finance and great organizational and technical capabilities. Photochemical smog, oxides of nitrogen and sulphur, hydrocarbons, lead, mercury, cadmium poisoning, carbon monoxide, polychlorinated biphenyls, asbestos and other particulate matter along with the respiratory and gastroenteritic diseases and malnutrition, cause serious damage to public health. The consequent stress of living in such conditions contributes to social tensions and outbreaks of violence and unrest. When industrial accidents or natural disasters occur, loss of life and human suffering follow on a large scale because of the congestion, lack of organizational and technical capacities and vulnerability.

56. Heavy urban concentrations have also placed excessive demands on natural resources and polluted and degraded surrounding areas. High land prices have caused good agricultural land to be used for construction and speculation. Urban firewood demand has led to widespread deforestation, soil erosion and even changes in micro-climate.

57. The congestion of settlements near factories multiplies the health risks of chemicals production in the developing countries. The accumulation of toxic wastes and their inappropriate disposal similarly endanger the health of millions. Awareness of the risks to human health posed by environmental contamination has increased greatly. Such risks arise partly through an absence of environmental regulation and management capability. Most developed countries have succeeded in reducing environmental pollution and its risks and impacts. International co-operation has also progressed on several fronts: national programmes launched under the International Drinking Water Supply and Sanitation Decade, the World Health Organization/United Nations Children's Fund Programme on Primary Health Care, the Onchocerciasis Control Programme in Africa in the Volta River basin, the United Nations Environment Programme/World Health Organization/International Labour Organisation International Programme on Chemical Safety, the dissemination of information on chemicals of environmental concern through the International Register of Potentially Toxic Chemicals of the United Nations Environment Programme, the International Code of Conduct on the Distribution and Use of Pesticides of the Food and Agriculture Organization of the United Nations and its accompanying technical guidelines, the Food and Agriculture Organization of the United Nations/United Nations Environment Programme Panel of Experts on Integrated Pest Control, the United Nations Development Programme/World Bank/World Health Organization Special Programme for Research and Training in Tropical Diseases, the World Health Organization/Food and Agriculture Organization of the United Nations/United Nations Environment Programme Panel of Experts on Environmental Management of Disease Vector Control, the specification of radiation dose limits by the International Commission on Radiological Protection, and the two recent international Conventions adopted under the auspices of the International Atomic Energy Agency on exchange of information and assistance in the event of a nuclear accident,[57] are some examples.

2. *Goal and recommended action*

58. *Goal*: The provision of improved shelter with access to essential amenities in a clean and secure setting conducive to health and to the prevention of environment-related diseases, which would, at the same time, alleviate serious environmental degradation.

59. *Recommended action*:

(*a*) Governments should make health and settlements development an integral part of environmental management of natural resources and geographically-balanced development. They should address systematically the issue of equity in development to ensure provision of basic health, housing and amenities for their people;

(*b*) International co-operation should be intensified in the field of scientific research to deal with the environmental conditions underlying tropical diseases;

(c) Rural development, including natural resources management and provision of drinking water and sanitation, should receive systematic attention in public policies. Governments should design and implement, with the participation of the communities concerned, integrated programmes to improve water supply and management, sanitation and waste disposal;

(d) Governments should set targets at national, provincial and district levels for such priority areas as housing, access to clean water and sanitation, and control of air pollution in urban areas;

(e) To reduce adverse environmental impacts of transportation, especially in highly populated areas, Governments should give priority to facilitating commuting between residential and working areas, enforcing emission standards for vehicles, encouraging fuel efficiency and improving traffic management policies and urban planning;

(f) Intermediate-sized towns should receive particular attention in programmes of industrial and settlement development;

(g) Governments should create an "enabling environment", in which the creativity and resources of people are mobilized to improve the health conditions, shelter and environmental information at local levels. This should include collection and disposal of domestic, agricultural and human wastes, land use planning, area development and self-help construction. Efforts should be made to encourage the participation of the private sector and non-governmental organizations;

(h) Industrial, agricultural, energy, irrigation and land development and resettlement projects should include a component which addresses environmental and health impacts, including risk assessment, which, in turn, should be influential in guiding the location, scale and choice of technology for the projects. Regulations should be established to prevent settlements development in high environmental-risk areas, such as those proximate to chemical or nuclear plants. Responsibility for enforcing such regulations should be shared with the private sector;

(i) Primary and occupational education should include information on the environment. The mass media should regularly make available information and know-how to enable people to improve sanitation, waste disposal and drinking water quality. Deterrents and incentives should be introduced at local levels to encourage people to keep their immediate environment healthy;

(j) Scientific research should be geared to the immediate improvement of the health and environmental situation of degraded settlements. Technologies for the safe disposal of wastes with minimum use of water in arid and semi-arid areas, improvement of water quality, reuse of waste water, and harvesting of rain should be developed. The United Nations Centre for Human Settlements (Habitat), the World Health Organization and the United Nations Children's Fund should intensify efforts to promote the application of such technologies in the developing countries;

(k) Urban planning should receive priority attention, together with the rational management of natural resources. Staffing, finance and organizational efforts should reflect the high priority given to this issue. Urban centres should systematically provide areas to meet the needs of various income categories, for industry, business, recreation and open spaces. Technical co-operation in this field has to expand greatly under the leadership of the United Nations Centre for Human Settlements (Habitat);

(l) Countries hosting a large number of refugees should receive more international assistance through the Office of the United Nations High Commissioner for Refugees and other bodies to improve environmental conditions of refugee settlements.

F. *International economic relations*

1. *Issue and outlook*

60. *Issue*: Inequalities in international economic relations, coupled with inappropriate economic policies in many developed and developing countries alike, continue to affect adversely sustainable development and cause environmental degradation. Deteriorating terms of trade, chronic trade deficits, which are partly caused by growing protectionism, heavy debt-service payments, and inadequate financial flows have made it very difficult to allocate resources to environmental protection and improvement, particularly in developing countries. Specific problems include: insufficient consideration of environmental impacts in development co-operation; insufficient control of trade in scarce natural resources and hazardous substances; and transnational investment and transfer of technology without adequate observance of environmental standards or information on environmental management.

61. *Outlook*: Awareness of the environmental aspects of international economic relations has increased, but it has not yet found adequate expression in institutional practices and national policies.

62. Development co-operation projects have not helped build significantly national capabilities to avert environmental disasters. The environmental damage resulting from the execution of some large-scale projects is now better understood than in the past. There is also a growing awareness of the need for additional resources to rehabilitate degraded environments.

63. Long-term declines in commodity prices, coupled with their inequity and instability, have adversely affected environmental management of natural resources. Furthermore, these prices do not fully reflect the environmental costs of depletion of the resource base. Good quality land, fishing areas and other natural resources are being overworked, and tropical forests are being encroached upon in order to achieve additional income. The substitution of export crops in place of subsistence crops has displaced small farmers and pastoralists from good quality land and has led to excessive pressures on marginal land and natural resources.

64. There is a growing awareness of the hazards associated with trade in chemicals, pesticides and some other products, but international practices for controlling the transport of hazardous chemical goods do not yet provide for a systematic consideration of the environment.

65. Mounting debt burdens, repayment obligations, austerity measures and reductions in financial flows to developing countries have endangered and, in some cases, blocked sustainable development, and this has had negative economic, environmental and social impacts.

66. Recent years have seen a sharp worsening of the international economic situation. Its impact has been particularly severe on developing countries. Lack of economic growth in developing countries could have devastating consequences.

2. *Goal and recommended action*

67. *Goal*: The establishment of an equitable system of international economic relations aimed at achieving continuing economic advancement for all States, based on principles recognized by the international community, in order to stimulate and sustain environmentally sound development, especially in developing countries.

68. *Recommended action*:

(a) In the ongoing search for concerted action to deal with international economic problems, the urgent need to improve the world environmental situation and to ensure a solid environmental foundation for sustainable development has to be recognized. Correcting the deteriorating terms of trade and stabilizing international commodity prices at equitable levels, through international commodity agreements such as the Integrated Programme on Commodities, in conjunction with appropriate environmental management practices in the producing countries, should play an important role in this regard;

(b) Especially in situations of environmental stress, development co-operation should aim at long-term improvement of natural resource productivity and environmental health. Projects that focus on the alleviation of poverty and improve the environment should receive greater attention in development co-operation. Such co-operation has to increase substantially, keeping in view the growing need for environmental rehabilitation;

(c) Development co-operation institutions should increase significantly their assistance to the developing countries for environmental restoration, protection and improvement;

(d) Country programmes and policy papers prepared by multilateral and bilateral development co-operation institutions for allocation of aid resources should provide for analyses of the environmental needs of recipient countries, with particular focus on major problems, such as desertification, deforestation and pollution. Developing countries should be assisted where necessary in preparing environmental accounting and relating it to the reporting on national economic well-being;

(e) The system of appraising development co-operation projects should provide for assessments of environmental and socio-economic impacts of alternative designs and locations. Area development programmes, in particular, should seek to establish mutual support between environmental and socio-economic objectives. Development co-operation institutions should train their staff according to these objectives;

(f) Trade in hazardous industrial products, such as toxic chemicals and pesticides, and in some other products, such as pharmaceuticals, should be subjected to regulations to ensure sharing by the contracting parties, Governments and consumers of information on their environ-

mental and health implications and on methods for their safe use and disposal. Labelling of products should be in local languages. Governments of the exporting as well as the importing countries should collaborate in this regard. They should also agree on the selection of chemicals for priority testing;

(*g*) International trade and commodity agreements should provide environmental safeguards, where applicable. They should also encourage producers to take a long-term view and provide for assistance for diversification programmes, where appropriate. Governments should study the environmental impacts of their trade practices and make the findings available to their agencies responsible for trade negotiations, which should take them into account. The United Nations Conference on Trade and Development and the General Agreement on Tariffs and Trade should develop and apply effective policies and instruments to integrate environment and development considerations in international trade;

(*h*) Environmentally related regulations and standards should not be used for protectionist purposes. The International Trade Centre should assist countries in meeting such requirements. The United Nations Conference on Trade and Development should make available information on such regulations and standards as they apply to commodities and manufactured products;

(*i*) Host Governments should institute policies and regulations to ensure sound environmental management of transnational investments. In agreements on transnational, including corporate, investments, Governments, through appropriate controls, should ensure that information and technology on environmental management will be provided specifying the responsibilities of the parties concerned. In accordance with proposed code of conduct on transnational corporations of the Commission on Transnational Corporations, transnational corporations should implement programmes in the host countries to minimize the environmental hazards of their activities. These programmes should include training of personnel. The United Nations Centre on Transnational Corporations should play a role in facilitating this process;

(*j*) The transfer of clean, low-waste and pollution control technologies should be promoted through international co-operation. The possibility of making such technologies available at concessional prices to the countries in need should be explored. Governments of recipient countries should establish procedures for ascertaining the environmental implications of imported technologies;

(*k*) International financial institutions, while dealing with questions of structural adjustment in developing countries and world economic reform, should link short-term financial stabilization to sustainable development.

III. Other issues of global concern

69. This section discusses briefly the major environmental issues of global concern that have not been adequately dealt with in previous sections.

A. *Oceans and seas*

70. Oceans and seas are being polluted extensively. The rising pollution levels and degradation of coastal ecosystems threaten the life-support capacities of oceans and seas and undermine their role in the food chain. Efforts to monitor the state of oceans and seas, including those of the United Nations Environment Programme and other international organizations, confirm that there is cause for concern. This problem is particularly serious for coastal waters and semi-enclosed seas that border highly populated and industrialized zones. The situation will get much worse unless concerted action is undertaken now. The ongoing monitoring effort is far from comprehensive and, where it has advanced, it has not yet led to adequate change in the practices causing environmental damage.

71. The challenge is to control and decrease marine pollution, and establish or strengthen régimes of environmental management of oceans and seas through international co-operation and national action.

72. A comprehensive data base should be established over time on which action programmes to restore and preserve the environmental balance in the world's oceans and seas can be based. Among others, the Global Environmental Monitoring System, Global Resource Information Data Base and the oceans and coastal areas programmes of the United Nations Environment Programme should intensify efforts towards this end.

73. Conventions and agreements to monitor and manage human activities with a view to ensuring environmental protection of the seas and oceans should be ratified and implemented by all concerned countries. Where such legal instruments do not exist, they should be negotiated. Governments should strengthen or introduce policies and measures aimed at preventing practices harmful to marine ecosystems and ensuring environmentally sound development of inland areas. Such policies and measures should include control of the discharge of industrial effluents and sewage, dumping of wastes, including hazardous and radioactive materials, disposal of hazardous residues and operational wastes from ships, incineration at sea, and oil spills from tankers and off-shore platforms. Environmentally sound land-based technology for the disposal of hazardous wastes should be developed and promoted. The United Nations Environment Programme should continue to collaborate in this work with the Intergovernmental Oceanographic Commission, the International Maritime Organization and other appropriate international organizations.

B. *Outer space*

74. Outer space has now become a recognized area of human activity. As activity in this area develops over the coming decades, sound management of outer space will become increasingly important. To this end, international co-operation exclusively for the peaceful use of outer space is essential, especially on the part of those countries that now have the capacity to undertake outer space activities.

75. All countries, in particular those with a major capacity to exploit the benefits of outer space, should create conditions, including specifically the maintenance of its non-militarization, for broad international co-operation in the exploration and use of outer space for peaceful purposes. This should include the use of space technology to monitor Earth's environment. The benefits of the peaceful use of outer space, including weather forecasting, remote sensing and medical benefits, should be made readily available to the world community, particularly through assistance to the developing countries.

C. *Biological diversity*

76. Traditional crop and livestock species are giving way to high-yielding varieties and breeds. As the genetic base of plants, animals and micro-organisms becomes narrower, some genetic material is being irretrievably lost at such a rate that the world could lose one tenth to one fifth of its 5 to 10 million species by the year 2000.

77. Over 100 countries are collaborating in the global programme co-ordinated by the International Board for Plant Genetic Resources for conserving crop genetic resources, and the global gene banks network contains over 1 million samples of crop germ plasm. Yet, in many countries, national efforts for conservation are still ill-organized and underfinanced, and often do not attend systematically to the components of planning, training, education and research. International co-operation and technical assistance in this field should be further developed.

78. An international network of protected areas for conserving animal and plant genetic resources, encompassing about 10 per cent of the world's land area, should be established to reverse the trend towards depletion of species. Management plans for conserving ecosystems as reservoirs of species diversity have to be prepared.

79. Efforts to conserve crop genetic resources and the global data banks network have to be extended to cover adequately germ plasm with economic potential for providing food, fodder, fibres, waxes, oils, gums, medicines, energy and insecticides. *In situ* and *ex situ* components of conservation have to develop in a complementary manner in the light of the interdependence of nature conservation and genetic diversity.

80. Mechanisms should be established to provide information on rates of exploitation of genetic resources to facilitate selection of those to be conserved.

81. The gap between conservation of species and economic access to them should be bridged through maximum international co-operation. Agreements involving rights of possession of and access to genetic material, including research results, should facilitate such co-operation. Conserved genetic resources should be regarded as a common interest of mankind.

D. *Security and environment*

82. The accumulation and deployment of weapons of war and destruction present very grave risks to the environment. The use of weapons of mass destruction, including nuclear, chemical and biological weapons, could bring about far-reaching, even irreversible, changes in the global environment.

83. The development and stockpiling of nuclear arms and delivery systems at current levels have made the human race technically capable of putting an end to its own existence. In addition, the growing capacity of some States to undertake deliberate manipulation of the environment represents an immense potential danger. If the material, financial and intellectual resources devoted to armaments were to be used to solve problems such as those of the human environment, food security and shelter, prospects for sustainable development would be considerably enhanced.

84. The World Charter for Nature proclaims that "Nature shall be secured against degradation caused by warfare or other hostile activities".[58] A comprehensive system of international security is essential in order to ensure that this declaration is implemented.

85. Progressive disarmament through détente, negotiation, and avoidance of the use of force as a means of resolving conflicts should be pursued to minimize the environmental risks associated with armed conflicts. Governments should continue to pursue, in relevant negotiating forums, efforts to ban weapons that have the effect of modifying the environment.

86. One of the roles of the United Nations Environment Programme is to promote environmentally sound development in harmony with peace and security, and towards this end, issues of disarmament and security, in so far as they relate to the environment, should continue to receive appropriate attention.

IV. Instruments of environmental action

87. Sections I, II and III above largely sought to indicate how to deal effectively with environmental problems by addressing their policy sources. However, such actions need to be reinforced by the performance of certain overarching functions. This section deals with those functions.

A. *Assessment*

88. Environmental rehabilitation and management depend upon the availability of organized information on the state of the environment, its trends, and their relationship to social and economic factors. Decisions, however, continue to be made in ignorance of the changing state of the environment and its implications for human well-being. It is essential, therefore, that reliable environmental information, obtained and analysed using modern technology, is made available to planners and managers in a usable form. Most developing countries face the constraint of lack of access to modern technology and to the necessary expertise to collect and interpret environmental data.

89. Environmental and resource data are being collected at global and regional levels by the United Nations and international organizations working with Governments. Additional data also exist at the national level, although often in a fragmented form. The institutional mechanisms needed to relate such data sets to each other and to analyse them in the context of existing practices and policies are often lacking. Governments and intergovernmental organizations at the regional level should intensify efforts to collect and analyse data, especially data relating to common environmental problems.

90. The United Nations Environment Programme, working through the United Nations system, co-ordinates the collection, monitoring and assessment of selected environmental variables and distributes this information worldwide through: the Global Environmental Monitoring System, encompassing the monitoring and assessment systems relating to climate, health and natural resources and the Global Resource Information Data Base; data bases and systems for the conservation and management of genetic resources; the International Register of Potentially Toxic Chemicals, which operates a global information exchange network to provide information and data on chemicals and their effects on health and environment through a query-response service and evaluations of the effects of chemicals on the environment; INFOTERRA, the International Referral System for sources of environmental information; and the state of the environment reports of the United Nations Environment Programme, which address major issues of topical environmental concern.

91. Through improved collection and analysis of data and its wide distribution to potential users, which should be a service to countries as well as international organizations, the United Nations Environment Programme should become, and come to be accepted as, a leading authority in environmental assessment.

92. Countries, particularly developing countries, should be assisted, through international co-operation on environmental assessment, with the participation of the United Nations system and with the United Nations Environment Programme playing a leading role, in establishing effective national monitoring systems, geographic information systems and assessment capabilities, and improving data compatibility. In order for this to take place, technical co-operation among countries regionally and globally has to increase significantly.

93. Notable environmental assessments have been carried out recently and related to socio-economic factors by non-governmental organizations in some countries. These have helped expand awareness and stimulate action to protect and improve the environment. Governments should encourage such efforts.

B. *Planning*

94. Environmental planning should provide a conceptual, methodological and institutional framework within which to internalize progressively the consideration of the environment in development decision-making. Every country should define its national environmental objectives and make them part of its plans for socio-economic development. Just as each country sets targets for sectoral growth, it should set time-bound targets in respect of environmental resources and indicators of major concern. Plans and policies at sub-national levels should also provide for the simultaneous pursuit of the specified environmental and development objectives.

95. Governments should establish mechanisms and procedures to facilitate interdepartmental co-ordination of policies and unified direction for integrating environmental concerns in development planning. Use of analytical methods to ascertain the environmental and socio-economic implications of alternative courses of action should inform decisions on projects and programmes. It should also help resolve conflicts of interest among departments, among population groups and among regions.

96. The allocation of investment resources of a national plan among regions and sectors has to reflect a sensitivity to environmental constraints and objectives. This should be facilitated by periodic analyses of the socio-economic significance of the changing state of natural resources and the environment at national and provincial levels. Efforts should also be made to prepare an accounting of the use of scarce natural resources, focusing particularly on the country's major environmental problems, for example desertification, and to relate it to the periodic reporting on national income and well-being.

97. Sectoral ministries should be encouraged to apply environmental impact assessments and social cost-benefit analyses in decision-making regarding development projects and programmes. Taxation and economic policies should encourage sectoral decisions that favour environmentally benign technologies and locations, recycling and safe disposal of wastes and conservation of natural resources, and should establish mutual support between environmental and economic objectives. Land and water use plans should be prepared and their implementation monitored. Already some countries have made progress in planning at the district level to reflect environmental needs.

98. There have been advances in the analytical methods of environmental impact and risk assessment, social benefit-cost analyses of environmental measures, physical planning and environmental accounting. Theoretical work on decision models with multiple objectives and constraints has also progressed. The United Nations Environment Programme, the Scientific Committee on Problems of the Environment and the Organisation for Economic Co-operation and Development have played a useful role. This work should be strengthened so that it will have a greater impact on decision-making.

99. Environmental action and economic planning remain insufficiently related to each other in most countries. Efforts must be intensified at national and international levels to promote the application of suitable methods, procedures and institutional arrangements to make economic planning fully responsive to environmental constraints and opportunities. The guiding role of the United Nations Environment Programme in this field should include technical assistance to the developing countries. Collaborative arrangements should be made at the working level between the United Nations Environment Programme, the United Nations Development Programme, the Department of Technical Co-operation for Development of the United Nations Secretariat and the World Bank. They should set up, or strengthen, units to conduct environmental analyses of their projects and programmes and, in collaboration with the United Nations Environment Programme, assist Governments in systematically considering the environment in development planning.

[58] Resolution 37/7, annex, sect. I, para. 5.

C. *Legislation and environmental law*

100. Increasingly, environmental legislation has been providing practical frameworks at the national level for implementing environmental standards and regulating the activities of enterprises and people in the light of environmental objectives. At the international level, conventions, protocols and agreements have been providing a basis for co-operation among countries at bilateral, regional and global levels for the management of environmental risks, control of pollution and conservation of natural resources.

101. There is a need to expand the number of accessions to and ratifications of these conventions and to institute mechanisms at the national level to ensure their application. The present momentum should be maintained of concluding conventions on questions such as hazards relating to chemicals, treatment and international transport of hazardous wastes, industrial accidents, climate change, protection of the ozone layer, protection of the marine environment from pollution from land-based sources and protection of biological diversity, in which the United Nations Environment Programme has been playing an active part.

102. Groundwork has been prepared over the last 15 years under the aegis of the United Nations Environment Programme to establish legal frameworks to manage regional seas. Governments should intensify their efforts to implement legislative measures and other policies at national levels so that the policy sources of the environmental problems of the regional seas are effectively tackled. Increasingly, environmental management of rivers, lakes and forests has been posing a challenge to international co-operation. Governments, with the collaboration of the Programme and concerned international organizations, should accelerate action to establish legal régimes at international and national levels to improve significantly the environmental management of rivers, lakes and forests. The new programme for environmental management of freshwater systems, sponsored by the United Nations Environment Programme, is a promising start.

103. The Montevideo Programme for the Development and Periodic Review of Environmental Law,[59] prepared under the auspices of the United Nations Environment Programme, should be implemented fully. Development of international environmental law should continue, with a view to providing a strong basis for fostering co-operation among countries. The progressive emergence of general environmental norms and principles and the codification of existing agreements could lead to a global convention on protection and enhancement of the environment.

104. Governments should settle their environmental disputes by peaceful means, making use of existing and emerging agreements and conventions. The International Court of Justice, the International Court of Arbitration and regional mechanisms should facilitate peaceful settlement of environmental disputes.

D. *Awareness building and training*

105. The participation of people in environmental protection and improvement depends upon their being aware of the environmental problems and possibilities, of how the changing state of the environment affects their well-being, and how their lifestyles affect the environment. People's effectiveness in dealing with environmental problems depends upon their technical and organizational capabilities to design and implement the needed measures.

106. Since the United Nations Conference on the Human Environment, held at Stockholm in 1972, awareness of the interrelationship between human activities and the environment has steadily grown. Voluntary action groups at the community level, national and global non-governmental organizations, scientific bodies, schools and universities, mass media and Governments all have played a part in this process. Also the United Nations Environment Programme, through its programme and through its information activities, has helped build environmental awareness.

107. In a large number of developing countries, knowledge of proper environmental management practices still does not reach millions who suffer as a result of environmental degradation. People are the most valuable resource in development, but in order for them to participate constructively in accelerating and sustaining development, environmental information must be made available in languages they understand and in a form that can help them relate it easily to their own situation. Governments should intensify efforts to make this possible. Non-governmental organizations, with appropriate support from the United Nations Environment Programme, should play an increasingly active role in this field, especially by way of provision of requisite materials.

108. The United Nations Educational, Scientific and Cultural Organization, in collaboration with the United Nations Environment Programme should ensure systematic coverage of environmental education needs at all levels of schooling, especially in the developing countries. They should also prepare and promote course materials which would include environmental components in professional training given to selected occupational groups, for example, engineers, builders, foresters, farm extension workers and managers. Training in analysing environmental considerations in relation to economic and other goals also has to receive growing attention. Governments should make environmental education and training an integral part of their education and communication policies and programmes.

109. International support for the training of personnel in environmental assessment and management, especially in the developing countries, has grown steadily. It is essential, however, to ensure that the content and modality of such instruction is relevant to the needs of the countries where it is intended that the skills be applied. International co-operation and governmental efforts should also help ensure a progressive strengthening of institutional capabilities within the developing countries themselves to make available such training.

E. *Institutions*

110. Consideration of the environment must be internalized in sectoral policies and practices to ensure that environmental objectives are met and sustainable development is achieved. Sectoral bodies should be made accountable for such internalization. Existing environmental problems also have to be dealt with through concerted action and allocation of resources. This is true at both national and international levels.

111. At the national level, the mandates of sectoral ministries and other governmental institutions should explicitly state their responsibility and accountability for sustainable development and environmental protection within their sectors. Their policies, functions, structures and budgetary allocations should be consistent with this. As appropriate, the same should apply at provincial and local levels. Authoritative mechanisms and procedures are needed to oversee and ensure that national environmental objectives are met throughout the Government. Governments should establish or strengthen environmental ministries to stimulate, guide, support and monitor actions to achieve these objectives. To this end, essential functions should include: environmental assessment, planning and incentives, legislative and regulatory advice, awareness-building and training, stimulation of research and application of its results. Environmental ministries should also provide leadership and co-ordination for direct action to deal with environmental problems, including rehabilitation. Bilateral and multilateral institutions and international organizations should assist developing countries in this regard.

112. International institutions, both inside and outside of the United Nations system, dealing with such areas as food and agriculture, health, industry, energy, science, trade, finance and development assistance, should reorient their policies and programmes to make steady progress towards environmentally sound development.

113. These institutions should be accountable for integrating the objectives of sustainable development into their policies, budgets and staffing strategies. Governments should ensure, through consistent policy guidance to these institutions, that their mandates and programmes meet this objective.

114. The governing bodies of all United Nations organizations should report regularly to the General Assembly on the progress made in achieving the objectives of sustainable development. Such reports should also be submitted to the Governing Council of the United Nations Environment Programme for that body to provide comments on matters within its mandate to the General Assembly. The Administrative Committee on Co-ordination, under the chairmanship of the Secretary-General, should oversee effectively the inclusion of the concept of sustainable development in all programmes of the United Nations system, by reviewing and co-ordinating the efforts of all organs, organizations and bodies of the United Nations system in this field, and by including this in its reports to the General Assembly and the Governing Council of the Programme.

115. The inter-agency mechanism of Designated Officials for Environmental Matters should guide, support and monitor more effectively activities within the United Nations system to ensure consistent policy.

116. In parallel with the institutional arrangements at the national level, the United Nations Environment Programme should promote,

[59] UNEP/GC.10/5/Add.2 and Corr.1 and 2, annex, chap. II.

guide, support and monitor actions to achieve environmentally sound development and stimulate and co-ordinate action to deal with environmental problems.

117. The major priorities and functions of the United Nations Environment Programme should be:

(*a*) To provide leadership, advice and guidance in the United Nations system on restoring, protecting, and improving the environmental basis for, and in general act as a catalyst in the promotion of, sustainable development;

(*b*) To monitor, assess and report regularly on the state of the environment and natural resources and emerging environmental issues;

(*c*) To support priority scientific and technological research on major environmental and natural resource protection issues;

(*d*) To make available, in co-operation with other agencies where appropriate, guidance for environmental management, including the development of management techniques, criteria and indicators for environmental quality standards and guidelines for the sustainable use and management of natural resources;

(*e*) To initiate and support the programmes and activities worked out by the developing countries for dealing with their serious environmental problems;

(*f*) To initiate and facilitate the development and, upon request, the co-ordination of the implementation of action plans in the developing countries for the management of ecosystems and critical environmental problems. Such plans should be implemented and financed by the Governments concerned with appropriate external assistance;

(*g*) To encourage and promote international agreements on critical environmental issues and to support and facilitate the development of international laws, conventions and co-operative arrangements for environmental and natural resource conservation and protection;

(*h*) In co-operation with other concerned institutions, to establish and strengthen the institutional and professional capacity of developing countries, with a view to integrating environmental considerations into their development policy and planning;

(*i*) To promote awareness of environmental matters through education and the mass media;

(*j*) To co-operate with the United Nations Development Programme and other United Nations agencies, the World Bank and regional development banks, to strengthen the environmental dimensions of their programmes and technical assistance projects, *inter alia*, through training and personnel secondments.

118. Specialized agencies, organizations and bodies of the United Nations system should more speedily assume full operational and financial responsibility for environmental programmes supported by the United Nations Environment Programme in their sectors included in the system-wide medium-term environment programme and the Environment Fund. The human and financial resources which will become available to the United Nations Environment Programme as a result should be concentrated on the priority areas listed above.

119. Environmentally sound development cannot be assured solely by actions of governmental, intergovernmental or international organizations. It requires the participation of other entities, particularly industry, non-governmental environmental and development organizations and the scientific community. Non-governmental organizations have important contributions to make in various areas, including environmental education and awareness, as well as design and implementation of programmes at the grass-roots levels. The scientific community should continue to play an important role in environmental research and risk assessment and international scientific co-operation.

120. Regional and continental co-operative arrangements are being established to deal with common environmental problems. For example, the first session of the African Ministerial Conference on the Environment, held at Cairo in 1985, adopted the Cairo Programme for African Co-operation and modalities to implement it. Governments and development co-operation agencies should support such institutional arrangements and programmes.

42/187. Report of the World Commission on Environment and Development

The General Assembly,

Concerned about the accelerating deterioration of the human environment and natural resources and the consequences of that deterioration for economic and social development,

Believing that sustainable development, which implies meeting the needs of the present without compromising the ability of future generations to meet their own needs, should become a central guiding principle of the United Nations, Governments and private institutions, organizations and enterprises,

Recognizing, in view of the global character of major environmental problems, the common interest of all countries to pursue policies aimed at sustainable and environmentally sound development,

Convinced of the importance of a reorientation of national and international policies towards sustainable development patterns,

Recalling that, in its resolution 38/161 of 19 December 1983 on the process of preparation of the Environmental Perspective to the Year 2000 and Beyond to be prepared by the Governing Council of the United Nations Environment Programme, it welcomed the establishment of a special commission, which later assumed the name World Commission on Environment and Development, to make available a report on environment and the global *problématique* to the year 2000 and beyond, including proposed strategies for sustainable development,

Recognizing the valuable role played in the preparation of the report of the World Commission by the Intergovernmental Inter-sessional Preparatory Committee of the Governing Council of the United Nations Environment Programme, as envisaged by the General Assembly in its resolution 38/161,

Recalling that in resolution 38/161 it decided that, on matters within the purview of the United Nations Environment Programme, the report of the Commission should in the first instance be considered by the Governing Council of the Programme, for transmission to the General Assembly together with the comments of the Council and for use as basic material in the preparation, for adoption by the Assembly, of the Environmental Perspective, and that on those matters which were under consideration or review by the Assembly itself, it would consider the relevant aspects of the report of the Commission,

Taking note of Governing Council decision 14/14 of 19 June 1987[46] transmitting the report of the Commission to the General Assembly,

Noting that the Environmental Perspective to the Year 2000 and Beyond[51] has taken account of the main recommendations contained in the report of the Commission,

Recognizing the instrumental role of the Commission in revitalizing and reorienting discussions and deliberations on environment and development and in enhancing the understanding of the causes of present environmental and development problems, as well as in demonstrating the ways in which they transcend institutional frontiers and in opening new perspectives on the interrelationship between environment and development as a guide to the future,

Emphasizing the need for a new approach to economic growth, as an essential prerequisite for eradication of poverty and for enhancing the resource base on which present and future generations depend,

United Nations A/73/419*

General Assembly

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Seventy-third session
Agenda item 14
Integrated and coordinated implementation of and follow-up to the outcomes of the major United Nations conferences and summits in the economic, social and related fields

Gaps in international environmental law and environment-related instruments: towards a global pact for the environment

Report of the Secretary-General

Summary

The present report has been prepared pursuant to General Assembly resolution 72/277 entitled "Towards a Global Pact for the Environment", in which the Assembly requested the Secretary-General to submit, at its seventy-third session in 2018, a technical and evidence-based report that identifies and assesses possible gaps in international environmental law and environment-related instruments with a view to strengthening their implementation.

The report reviews and analyses the corpus of international environmental law and environment-related instruments as well as the governance structure and implementation of international environmental law. It reveals gaps and deficiencies at multiple levels.

First, there is no single overarching normative framework that sets out what might be characterized as the rules and principles of general application in international environmental law even though such principles may help unify the current, sectoral, approach to international environmental law and help fill the gaps in the rules laid out in treaties. While some principles of international environmental law are now well recognized through their incorporation into issue-specific multilateral environmental agreements and have been affirmed by a number of international courts and tribunals, others enjoy neither clarity nor judicial consensus as to their applicability, nor recognition in binding legal instruments. This has an impact on the predictability and implementation of sectoral environment regimes.

Second, international environmental law is piecemeal and reactive. It is characterized by fragmentation and a general lack of coherence and synergy among a large body of sectoral regulatory frameworks. This leads to an important deficit

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in coordination at the law-making and implementation levels and a need for better policy coherence, mutual supportiveness and synergies in implementation.

Third, the articulation between multilateral environmental agreements and environment-related instruments remains problematic owing to the lack of clarity, content-wise and status-wise, of many environmental principles.

Fourth, the structure of international environmental governance is characterized by institutional fragmentation and a heterogeneous set of actors, revealing important coherence and coordination challenges. International courts and tribunals often stress the lack of international consensus concerning environmental principles.

Fifth, the implementation of international environmental law is challenging at both the national and international levels. National implementation is constrained in many countries by the lack of appropriate national legislation, financial resources, environmentally sound technologies and institutional capacities. At the international level, implementation is constrained by the lack of clarity of many environmental principles.

International environmental law and its effective implementation could be strengthened through such actions as the clarification and reinforcement of principles of international environmental law. This could be done through a comprehensive and unifying international instrument that gathers all the principles of environmental law. There should also be more effective reporting, review and verification measures and robust compliance and enforcement procedures and mechanisms, ensuring that those States that require support have adequate resources to enable them to effectively implement their commitments, and the role of non-State actors should be enhanced at multiple levels.

Building upon the creative approaches that States have thus far adopted to protect the environment, it is essential that States and the United Nations work together to address gaps in international environmental law. We must collectively seize the opportunity to use international environmental law in new and dynamic ways to provide a strong and effective governance regime with a view to better safeguarding the environment for future generations.

Contents

I. Introduction

1. Most environmental challenges and problems and their impacts are transboundary, and some are global in nature, which led to the early recognition that international cooperation among States through appropriate legal frameworks was indispensable to the creation of effective responses and solutions. International environmental law is the area of public international law that addresses States and international organizations with respect to the protection of the environment.[1] It does not operate in isolation, but is anchored in the rules and principles of general public international law. The traditional sources of international law set out in article 38 of the Statute of the International Court of Justice have given rise to a large body of international legal obligations whose primary objective is the protection of the environment and the sustainable use of natural resources.[2]

2. International treaties adopted at the regional and global levels, commonly referred to as multilateral environmental agreements, are the dominant sources of international environmental law. A vast body of multilateral environmental agreements, comprising more than 500 instruments, have been adopted so far. Each agreement addresses a specific environmental challenge and is legally and institutionally distinct from the others. The incremental and piecemeal nature of international environmental law-making has resulted in a proliferation of largely sectoral regulatory regimes and a fragmented international legal framework for the protection of the environment.[3] Fragmentation has become a frequent phenomenon in international law, and is one of the consequences of multilateral decision-making.

3. There is no single overarching normative framework in the area of international environmental law that sets out what might be characterized as rules and principles of general application. However, many other areas of international law have some binding framework instruments that contain general rules whose scope is broad enough to cover more specific rules and principles in sectoral or regional instruments and provide for a certain degree of coordination and coherence. Examples include the human rights covenants, international trade law and the international law of the sea. In most of these areas, however, the framework agreements codified existing customary norms and in most cases, if not all, pre-dated the development of more specific treaties. It has been noted that the fragmented structure of international environmental law and the incremental process of regime creation inevitably lead to the situation where some environmental challenges are addressed, while others are not.

4. Customary international environmental law is sparse. The existence of a rule of customary international law requires that there be a settled practice together with opinio juris of States (a belief that the practice is rendered obligatory by the existence

[1] See Alan Boyle and Catherine Redgwell, *International Law and the Environment*, 4th ed. (Oxford University Press, 2019); Philippe Sands and others, *Principles of International Environmental Law*, 4th ed. (Cambridge University Press, 2018); Daniel Bodansky, *The Art and Craft of International Environmental Law* (Harvard University Press, 2011); Daniel Bodansky, Jutta Brunnée and Ellen Hey, eds., *The Oxford Handbook of International Environmental Law* (Oxford University Press, 2008).

[2] Sands and others, *Principles of International Environmental Law*, p. 102.

[3] While the focus of the present study is on fragmentation within international environmental law, such incoherence also extends to the interaction between rules of international environmental law and those applicable to other areas of international law, such as those relating to armed conflict, a topic currently being considered by the International Law Commission (ILC) (see A/73/10, paras. 164–218).

of a rule of law requiring it).4 With regard to international environmental norms, the identification of rules of customary international law is a challenging task, in particular in situations where there is a gap between what States say and what they actually do.[5] Nevertheless, existing customary rules of international environmental law have already been codified in treaties. In addition, several international courts and tribunals have confirmed the existence of rules of customary international law in the field of environmental protection.[6]

5. Owing to the critical challenges posed by environmental issues as well as the urgency of action and the difficulties inherent in reaching agreement on legally binding international instruments, an important body of non-binding instruments – declarations, resolutions, guidelines and recommendations – has emerged in international environmental law. Notable examples are the Declaration of the United Nations Conference on the Human Environment (the Stockholm Declaration) and the Rio Declaration on Environment and Development.[7] Such non-binding instruments have acted as important guidance for national and international action and often act as precursors to the subsequent development and adoption of legally binding instruments. They are also commonly used within the framework of multilateral environmental agreements to clarify the meaning of specific provisions.

6. The normative and institutional fragmentation of international environmental law and the sectoral approach to environmental regulation have led over the years to proposals to enhance the coherence and coordination of global environmental governance, including successful proposals to enhance coordination among specific multilateral environmental agreements, and less successful proposals to establish a World Environment Organization[8] or to adopt an international covenant on environment and development.[9] More recently, the idea of a global pact for the environment that synthesizes and codifies the principles of international environmental law in one document was proposed.[10] On 10 May 2018, the General Assembly adopted resolution 72/277, entitled "Towards a Global Pact for the Environment", and requested that the Secretary-General submit, at its seventy-third session in 2018, a technical and evidence-based report that identifies and assesses possible gaps in international environmental law and environment-related instruments

[4] *North Sea Continental Shelf (Federal Republic of Germany/Denmark; Federal Republic of Germany/Netherlands), Judgment, I.C.J. Reports 1969*, p. 44, para. 77; Statute of the International Court of Justice, art. 38 (1) (b); A/73/10, para. 65, conclusion 2.

[5] See Daniel Bodansky, "Customary (and not so customary) international environmental law", *Indiana Journal of Global Studies*, vol. 3, No. 1 (Fall 1995), p. 105.

[6] See, for example, *The Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, I.C.J. Reports 1996*; *Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment, I.C.J. Reports 2010*; *Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area, Advisory Opinion, Case No. 17, International Tribunal for the Law of the Sea Reports 2011*.

[7] ILC has also developed a number of non-binding instruments (further referred to below) concerning aspects of international environmental law and matters related thereto.

[8] See for example, Frank Biermann, "The emerging debate on the need for a world environment organization", *Global Environmental Politics*, vol. 1, No. 1 (February 2001); Daniel C. Esty, "The case for a global environmental organization", in Peter B. Kenen, ed., *Managing the World Economy: Fifty Years After Bretton Woods* (Institute for International Economics, 1994).

[9] See International Union for Conservation of Nature and Natural Resources, *Draft International Covenant on Environment and Development: Implementing Sustainability*, 5th ed. (2015) (IUCN Draft Covenant).

[10] See "Global pact for the environment", preliminary draft, 24 June 2017, available at https://perma.cc/L4PM-PTV2; Le club des juristes, *White Paper: Global Pact for the Environment* (2017).

with a view to strengthening their implementation. The present report has been prepared pursuant to that request.

7. The report identifies and assesses regulatory and governance gaps in international environmental law. A "gap" is defined as a lacuna, void, defect or deficiency.[11] For the purposes of the report, the terms "regulatory gaps" and "governance gaps" are understood to mean, respectively, substantive/normative (including procedural and institutional) gaps and implementation gaps in the international legal framework. A gap can occur within a multilateral environmental agreement with respect to its content or its ability to fulfil its object and purpose; between legal frameworks (e.g., substantive or procedural overlaps, discrepancies or conflicts); or where there is no regulation at all (e.g., limitations in substantive, institutional or geographical coverage). The term "environment-related instruments" in paragraph 1 of General Assembly resolution 72/277 is taken to include those international legal instruments that do not fall exclusively within the field of the environment or have as their primary objective the protection of the environment. In this regard, it may be noted that environmental concerns have gradually penetrated other international regulatory frameworks, such as those dealing with international trade, investment, intellectual property rights, human rights, peace and security, migration and disaster management.[12] Some of these regulatory frameworks will be addressed in the present report.

8. The report is divided into five substantive sections: section II identifies and assesses the scope and status of the principles of international environmental law; section III addresses gaps relating to the sectoral regulatory regimes; section IV identifies and assesses some environment-related instruments; section V deals with gaps relating to the governance structure of international environmental law; and section VI addresses gaps concerning the implementation and effectiveness of international environmental law.

II. Gaps concerning principles of international environmental law

A. Scope of the principles

9. Principles of international environmental law are an important building block and their usage is widespread. Some are included in non-binding instruments, including political instruments, while others are enshrined in issue-specific multilateral environmental agreements that are legally binding. When enshrined in such agreements, the scope of the principles is confined to that particular multilateral environmental agreement. However, those principles that are not contained in multilateral environmental agreements also play an important role in guiding the interpretation and further development of those agreements.

10. More generally, environmental principles also serve to supplement or complement more specific rules. Indeed, conventions containing environmental law provisions may expressly acknowledge the gap-filling function of principles.[13] The general character of the principles permits their application to the continuously evolving interrelationships between human activity and the environment. The principles also play a role with respect to potential gaps arising from the use of

[11] See Bryan A. Garner, *A Dictionary of Modern Legal Usage*, 2nd ed. (Oxford University Press, 2001), p. 496.
[12] See Sands and others, *Principles of International Environmental Law*, p. 17.
[13] See, for example, United Nations Convention on the Law of the Sea (UNCLOS), preamble.

different legal sources. Mutual supportiveness in contemporary international law progresses beyond the gap-filling paradigm of legal principles and instead requires the synthesis of sources of international law, if possible, in a given instance.[14] In this context, environmental principles may help to unify international environmental law's current sectoral approach. A comprehensive and unifying international instrument clarifying all the principles of environmental law would contribute to making them more effective and strengthen their implementation.

B. Status of the principles

Prevention

11. States are required to exercise their sovereignty over natural resources in a manner which ensures that activities within their jurisdiction or control do not significantly damage the environment beyond their territorial boundaries. Since it first appeared in the 1938 *Trail Smelter* arbitration,[15] the prevention of transboundary harm has been framed as a principle in foundational instruments of international environmental law,[16] United Nations instruments,[17] regional instruments,[18] texts drafted by civil society[19] and the decisions of the International Court of Justice.[20] This principle is intrinsic to a core preference in international law for preventing environmental harm rather than compensating for harm that has already occurred. The prevention principle is well established as a rule of customary international law, supported by relevant practice in many environmental treaties and major codification initiatives.[21] In practice, this principle is also related to due diligence obligations, particularly the duty to undertake an environmental impact assessment prior to engaging in activities which pose a potential risk of transboundary harm.[22]

[14] See A/CN.4/L.682, para. 43.

[15] *Trail Smelter Case (United States, Canada)* (1938, 1941), *Reports of the International Arbitral Awards*, vol. III, p. 1905, et. seq.

[16] See Declaration of the United Nations Conference on the Human Environment (Stockholm Declaration), Principle 21; World Charter for Nature (WCN), arts. 13, 19 and 21; UNCLOS, art. 194; Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention), preamble and art. 2; Convention on Biological Diversity (CBD), preamble and art. 3; Rio Declaration on Environment and Development (Rio Declaration), principles 2, 14, 18 and 19; United Nations Framework Convention on Climate Change (UNFCCC), preamble.

[17] Draft articles on prevention of transboundary harm from hazardous activities, in *Yearbook of the International Law Commission, 2001*, vol. II, Part Two, para. 97. See also resolution 62/68, annex.

[18] See Treaty on the Functioning of the European Union (TFEU), art. 191; Association of Southeast Asian Nations Agreement on the Conservation of Nature and Natural Resources (ASEAN Agreement), art. 20.

[19] See Earth Charter, principle 6 (d); IUCN Draft Covenant, arts. 6, 14 and 41; Centre international de droit compare de l'environnement, Draft International Covenant on the Human Right to the Environment (CIDCE Draft Covenant), arts. 4 (2)–(4).

[20] *Corfu Channel Case, Judgment of April 9th 1949, I.C.J. Reports 1949*, pp. 4 and 22; *Gabčíkovo-Nagymaros Project (Hungary/Slovakia), Judgment, I.C.J. Reports 1997*, p. 7, para. 140; *Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment, I.C.J. Reports 2010*, p. 14, para. 101.

[21] See Leslie Anne Duvic-Paoli and Jorge E. Viñuales, "Principle 2: prevention", in Jorge E. Viñuales, ed., *The Rio Declaration on Environment and Development: A Commentary* (Oxford University Press, 2015), pp. 107, 120 and 121.

[22] Ibid., p. 118.

Precaution

12. This principle stipulates that States are required to adopt a precautionary approach when taking decisions or in regard to potential omissions which may harm the environment. Such a duty remains intact irrespective of the absence of scientific certainty as to the existence or extent of such risk.[23] While the principle as formulated in Principle 15 of the Rio Declaration reflects other critical principles, such as the effective implementation of international environmental law,[24] the legal basis of precaution as a principle is a matter of some controversy and debate.[25] However, the exercise of precaution in this respect is expressed in other foundational instruments of international environmental law,[26] regional instruments,[27] texts drafted by civil society[28] and rulings of the International Tribunal for the Law of the Sea.[29]

Polluter pays

13. States are required not only to take measures against environmental pollution, but also to cooperate on liability regimes. This norm has a firm legal basis as a principle of law deriving from a variety of legal sources, including treaties and regional customs, particularly in Europe.[30] In practice, the principle reduces the regulatory burden on States in achieving pollution control objectives.[31] The polluter pays principle is expressed in Principle 16 of the Rio Declaration, regional instruments[32] and texts drafted by civil society.[33]

Environmental democracy

14. The concept of environmental democracy is generally constituted by the principles of access to information, participation in decision-making and access to environmental justice. These elements of public participation have appeared in various domestic contexts since at least the early 1970s, and demonstrate links with

[23] See António Cançado Trindade, "Principle 15: precaution", in Viñuales, ed., *The Rio Declaration on Environment and Development*, p. 403.
[24] See Martina Kunz, "Principle 11: environmental legislation", in Viñuales, ed., *The Rio Declaration on Environment and Development*, pp. 311 and 321. See further A/HRC/37/59, (Framework principle 11) para. 33 (c), and (Framework principle 12) paras. 34–35.
[25] See Kunz, "Principle 11: environmental legislation", p. 412.
[26] See WCN, art. 11 (b); Vienna Convention for the Protection of the Ozone Layer (Vienna Ozone Convention), preamble; International Convention on oil pollution preparedness, response and cooperation, 1990 (1990 London Convention), preamble; CBD, preamble; UNFCCC, art. 3 (3); Protocol to the 1979 Convention on Long-Range Transboundary Air Pollution on Further Reduction of Sulphur Emissions, preamble (LRTAP Convention); Protocol to the 1972 Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter, preamble and art. 3; Cartagena Protocol on Biosafety to the Convention on Biological Diversity (Cartagena Protocol), arts. 10 (6) and 11 (8); Stockholm Convention on Persistent Organic Pollutants (POPs Convention), preamble, arts. 1 and 8 (7) (a).
[27] See TFEU, art. 191 (2); Convention for the Protection of the Marine Environment of the North-East Atlantic (OSPAR Convention), art. 2 (2) (a).
[28] See IUCN Draft Covenant, art. 7; 2015 Oslo Principles on Global Climate Change Obligations (Oslo Principles), paras. 1 (a-b); CIDCE Draft Covenant, arts. 3 (1-2).
[29] *Southern Bluefin Tuna (New Zealand v. Japan; Australia v. Japan), Provisional Measures, Order of 27 August 1999, ITLOS Reports 1999*, p. 280, para. 77; *Activities in the Area, Advisory Opinion*, *Case No. 17*, para. 135.
[30] See Priscilla Schwartz, "Principle 16: the polluter-pays principle", in Viñuales, ed., *The Rio Declaration on Environment and Development*, pp. 429 and 435.
[31] Ibid., p. 429.
[32] See TFEU, art. 191 (2); OSPAR Convention, art. 2 (2) (b).
[33] See Earth Charter, art. 6 (b); New Delhi Declaration of Principles of International Law Relating to Sustainable Development (New Delhi Declaration), para. 3.1; IUCN Draft Covenant, art. 6.

certain aspects of international human rights law.[34] While most global multilateral environmental agreements adopted since the United Nations Conference on Environment and Development, held in Rio de Janeiro, Brazil, in 1992, endorse public access to information and public participation by some means, many of the underlying legal developments have taken place regionally and with remarkably little geographic symmetry.[35] This constitutes a significant gap in international environmental law.

15. The specific requirement that States should make environmental information held by public authorities available to the public is expressed in foundational instruments of international environmental law,[36] United Nations instruments,[37] regional instruments[38] and texts drafted by civil society.[39] The specific requirement that States should enable the public to participate in the preparation of the decisions, measures, plans, programmes, activities, policies and normative instruments of public authorities that may have a significant effect on the environment is also expressed in foundational instruments of international environmental law,[40] regional instruments[41] and texts drafted by civil society.[42] The specific requirement that States should ensure effective and affordable access to administrative and judicial procedures to challenge the acts or omissions of public authorities or private persons that contravene environmental law is expressed in Principle 10 of the Rio Declaration, regional instruments[43] and texts drafted by civil society.[44]

Cooperation

16. States are required to contribute to the conservation, protection and restoration of the integrity of the Earth's ecosystem. This entails an obligation to cooperate in good faith and in a spirit of global partnership towards the fulfillment of this objective. The framing of cooperation as a principle of international environmental law through the adoption of supplementary instruments and norms by conferences of parties serves the progressive development and dynamic evolution of treaty law.[45] The principle has been recognized in foundational instruments of international

[34] See Jonas Ebbesson, "Principle 10: public participation", in Viñuales, ed., *The Rio Declaration on Environment and Development*, p. 287.
[35] Ibid., p. 293.
[36] See WCN, arts. 18 and 21 (a); Rio Declaration, Principle 10; Paris Agreement, art. 12.
[37] See draft articles on the prevention of transboundary harm from hazardous activities, in *Yearbook of the International Law Commission*, 2001, art. 13; and resolution 62/68, annex.
[38] See Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (Aarhus Convention), art. 1; African Convention on the Conservation of Nature and Natural Resources (African Convention), arts. XVI (1) (a-b).
[39] See Earth Charter, art. 8 (c); Johannesburg Principles on the Role of Law and Sustainable Development (Johannesburg Principles); New Delhi Declaration, para. 5.2; IUCN Draft Covenant, art. 15 (3); Oslo Principles, preamble; World Declaration on the Environmental Rule of Law (IUCN World Declaration), art. I (d); CIDCE Draft Covenant, arts. 8 (1)–(3) and 9 (1)–(2).
[40] See WCN, art. 23; Rio Declaration, Principle 10; Paris Agreement, art. 12.
[41] See Aarhus Convention, arts. 6 (2), 7 and 8; African Convention, art. XVI (c).
[42] See IUCN Draft Covenant, art. 15 (4); IUCN World Declaration, art. I (a), Principle 10; CIDCE Draft Covenant, arts. 10 (1)–(3).
[43] See European Convention for the Protection of Human Rights and Fundamental Freedoms, art. 13; Aarhus Convention, art. 9.
[44] See Johannesburg Principles, preamble; IUCN Draft Covenant, art. 15 (5); Oslo Principles, para. 26; IUCN World Declaration, preamble; 2016 UNESCO First Draft of a Preliminary Text of a Declaration on Ethical Principles in Relation to Climate Change, art. 5 (5).
[45] See Peter H. Sand, "Principle 27: cooperation in a spirit of global partnership", in Viñuales, ed., *The Rio Declaration on Environment and Development*, p. 617.

environmental law,[46] United Nations instruments,[47] texts drafted by civil society[48] and the World Trade Organization (WTO).[49]

17. Cooperation is of vital importance to the objective of preventing the degradation of the environment and human health that may be caused by certain dangerous activities and substances, particularly with respect to developing States.[50] Notification and assistance in cases of emergency also serves to prevent the dangers posed by natural disasters to human life and the environment.[51] While the obligation to cooperate in the form of notification in cases of emergency is already a part of customary international law, the duty of assistance in such events has received only limited recognition.[52] Such specific cases of transboundary cooperation have been recognized in foundational instruments of international environmental law,[53] in article 19, paragraph 1, of the draft international covenant of the International Union for Conservation of Nature and in article 7 of the draft articles on the protection of persons in the event of disasters.[54]

Right to a clean and healthy environment

18. The relationship between the enjoyment of basic human rights and environmental quality has long been recognized. However, international treaties have not defined the threshold below which the level of environmental quality must fall before a breach of a person´s human rights has occurred. Arguably, that threshold differs depending on the human right in question.

19. Currently, it is reported that there are at least 155 States that recognize a human right to a healthy environment in their constitutions or subconstitutional regulations.[55] In addition, such a right is evoked in non-binding declarations, such as the Stockholm and Rio Declarations. Only a few sector-specific binding international and regional conventions recognize the right to live in a healthy environment.[56] Existing regional

[46] See Stockholm Declaration, principle 24; UNCLOS, art. 197; WCN, arts. 21 (a) and 22; Vienna Ozone Convention, art. 2 (2) (a); Agenda 21, chap. 2.1; Rio Declaration, principles 5, 7, 9, 12–14, 24 and 27; UNFCCC, preamble and art. 3 (5); CBD, art. 5; United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (UNCCD), arts. 3(b) and (c); Paris Agreement, arts. 7 (6)–(7) (a) and 8 (4) (a)–(f).

[47] See draft articles on prevention of transboundary harm from hazardous activities, art. 4.

[48] See Oslo Principles, preamble; CIDCE Draft Covenant, art. 20.

[49] World Trade Organization, *United States—Import Prohibition of Certain Shrimp and Shrimp Products*, WT/DS58/AB/R, AB-1998-4, Report of the Appellate Body, 12 October 1998, para. 168.

[50] See Makane M. Mbengue, “Principle 14: dangerous activities and substances”, in Viñuales, ed., *The Rio Declaration on Environment and Development*, p. 383.

[51] See Phoebe Okowa, “Principle 18: notification and assistance in case of emergency”, in Viñuales, ed., *The Rio Declaration on Environment and Development*, p. 471.

[52] Ibid., p. 491.

[53] See UNCLOS, arts. 123(a)–(d) and 198; 1990 London Convention, art. 7 (1); Convention on the Transboundary Effects of Industrial Accidents, preamble; Rio Declaration, principles 14 and 18; CBD, art. 14 (1) (d).

[54] Adopted by ILC in 2016. See A/71/10, para. 48.

[55] See David R. Boyd, “Catalyst for change: evaluating forty years of experience in implementing the right to a healthy environment”, in John H. Knox and Ramin Pejan, eds., *The Human Right to a Healthy Environment* (Cambridge University Press, 2018), pp. 17–42.

[56] These include African Charter on Human and Peoples’ Rights, art. 24; Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights, art. 11; Aarhus Convention, art. 1; African Convention, art. III; Protocol to the African Charter on Human and Peoples’ Rights on the Rights of Women in Africa, art. 18; Arab Charter on Human Rights, art. 38; Inter-American Convention on Protecting the Human Rights of Older Persons, art. 25; Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (Escazú

and international instruments on this subject do not universally or completely define the scope and content of the right. Regional agreements that recognize the right to a healthy environment generally pertain to human rights law and do not take into account the specificities of environmental issues. Several such agreements do not allow individuals or groups to file individual or public interest claims. While the right to a healthy environment is not explicitly included in the European Convention on Human Rights adopted in 1950, the European Court of Human Rights has used it to afford indirect protection through those rights that are included, on the basis of a dynamic interpretation of the Convention.[57] International environmental law also currently lacks an appropriate legal framework to protect environmental rights defenders.[58]

Sustainable development

20. Many international environmental law treaties make explicit or implicit references to the essential tenets of sustainable development.[59] Sustainable development is also referred to in other international agreements, such as trade and investment treaties and WTO agreements.[60] International courts and tribunals have embraced sustainable development as a source of law and policy when addressing treaty implementation and the interpretation of norms.[61] This can be seen in judicial instances ranging from the International Court of Justice[62] to regional courts, including those that address related fields, such as the Inter-American Court of Human Rights,[63] the African Commission on Human and Peoples' Rights,[64] specialized panels and tribunals such as the International Tribunal for the Law of the Sea[65] and

Agreement), art. 4 (1).

[57] See European Court of Human Rights (ECHR), *López Ostra v. Spain*, Application No. 16798/90, Judgment, 9 December 1994, para. 51. In other cases, the Court has felt that the right to life protected by article 2 of the Convention for the Protection of Human Rights and Fundamental Freedoms includes the right to be protected against risks resulting from hazardous industrial activities. See ECHR, *Öneryildiz v. Turkey*, Application No. 48939/99, Judgment, 30 November 2004.

[58] Unlike human rights defenders under resolution 53/144 of 9 December 1998.

[59] See, for example, Minamata Convention on Mercury (2017); Paris Agreement (2015); United Nations Convention to Combat Desertification in those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa (1994); Vienna Convention for the Protection of the Ozone Layer (1988); Montreal Protocol on Substances that Deplete the Ozone Layer (1989).

[60] See Nico Schrijver, "Advancements in the principles of international law on sustainable development", in Marie-Claire Cordonier Segger and H.E. Judge C.G. Weeramantry, eds., *Sustainable Development Principles in the Decisions of International Courts and Tribunals, 1992 – 2012* (Routledge, 2017), pp. 99–102.

[61] See Cordonier Segger and Weeramantry, eds., *Sustainable Development Principles in the Decisions of International Courts and Tribunals, 1992 – 2012*.

[62] See, for example, General list No. 135, in *Gabčíkovo-Nagymaros Project (Hungary v. Slovakia)*, *Judgment, I.C.J. Reports 1997*; *Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment, I.C.J. Reports 2010*; *Whaling in the Arctic (Australia v. Japan: New Zealand intervening)*, *Judgement I.C.J. Reports 2014*.

[63] See the following cases from the Inter-American Court of Human Rights: *Saramaka People v. Suriname*, Judgment, 28 November 2007; *Yakye Axa Indigenous Community v. Paraguay*, Judgment, 17 June 2005; *Mayagna (Sumo) Awas Tingni Community v. Nicaragua*, Judgment, 31 August 2001. See also African Commission on Human Rights and Peoples' Rights, *Centre for Minority Rights Development (Kenya) and Minority Rights Group International (on behalf of Endorois Welfare Council) v. Kenya*, Communication No. 276/03, 2009.

[64] See African Commission on Human Rights and Peoples' Rights, *Social and Economic Rights Action Center (SERAC) and the Center for Economic and Social Rights (CESR) v. Nigeria,* Communication No. 155/96, 2001.

[65] See the following cases from the International Tribunal for the Law of the Sea: *Volga Case (Russian Federation v Australia)*, 42 ILM 159 (2003); *MOX Plant (Ireland v United*

the Dispute Settlement Body of WTO.[66] Recently, sustainable development has been incorporated into the larger global agenda by the 2030 Agenda for Sustainable Development and the Sustainable Development Goals.[67] The Goals can be seen as specific indicators for sustainable development and represent a significant milestone. However, questions remain as to the extent to which the sustainable development principles represent binding or non-binding rules or indeed whether they should constitute a source of law. Some have suggested that this reflects the need for further analysis and a need for the codification of sustainable development principles into a source of law. Others hold that this could undermine the dynamic aspect of sustainable development. Another gap relates to the fact that sustainable development still awaits its effective implementation as a holistic legal concept with regard to addressing the relationship between international environmental law and other fields of international law. [68]

Common but differentiated responsibilities and respective capabilities

21. The principle of common but differentiated responsibilities and respective capabilities developed from the application of equity in general international law. Traditionally, international law is underpinned by the principle of the sovereign equality of States, which aims at guaranteeing that States have equal rights and obligations. In the Rio Declaration, the principle of common but differentiated responsibilities refers to instances where developed countries have contributed more to the environmental problem at stake and have greater capacity to respond to the environmental challenge. Not all multilateral environmental agreements incorporate the concept of differentiation. Those that do include it ensure the participation of all States. As a technique to achieve this objective, States in different situations are subject to different obligations and enjoy different rights. Multilateral environmental agreements express the principle in different ways, and a general application of the principle is not evident.[69] Some agreements operate with categories of developed and developing country parties, with substantively stronger obligations for developed and less onerous obligations as well as entitlements to financial, technological or capacity-building support for developing country parties and parties with economies in transition.[70] Other agreements use self-selection,[71] or address differentiation based on criteria such as financial and technological resources, the capability to engage in

Kingdom), *Order of 13 November2001*; *Southern Bluefin Tuna (Australia v. Japan), Order of 27* August 1999; *M/V Saiga (Saint Vincent and the Grenadines v. Guinea), Case No. 1, Order of 21 November 1997*.

[66] See the following reports from WTO: *China – Measures Related to the Exportation of Various Raw Minerals*, WT/DS394/AB/R, WT/DS395/AB/R and WT/DS398/AB/R, 30 January 2012; *Brazil – Measures Affecting Imports of Retreaded Tyres*, WT/DS332/16, 29 August 2008; *United States – Import Prohibition of Certain Shrimp and Shrimp Products*, WT/DS58/AB/R, 12 October 1998.

[67] United Nations Sustainable Development Goals (2015).

[68] See Christina Voigt, *Sustainable Development as a Principle of International Law: Resolving Conflicts between Climate Measures and WTO Law* (Martinus Nijhoff, 2009).

[69] ITLOS Seabed Disputes Chamber, for example, found that "the responsibilities and liability of the sponsoring State apply equally to all sponsoring States, whether developed or developing." It concluded that: "The spread of sponsoring States 'of convenience' would jeopardize uniform application of the highest standards of protection of the marine environment, the safe development of activities in the Area and protection of common heritage of mankind". See *Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area*, *Advisory Opinion*, paras. 158–159.

[70] Lavanya Rajamani, *Differential Treatment in International Environmental Law* (Oxford University Press, 2006).

[71] International Civil Aviation Organization resolution A39-3: Consolidated statement of continuing ICAO policies and practices related to environmental protection – Global Market-based Measure (MBM) scheme (CORSIA).

cost-effective environmental mitigation action, whether a State is an export or import State,[72] whether a State is affected by the issue[73] or several other categories.[74] The Paris Agreement states that, in the context of climate change, differentiation is dynamic, not limited to particular parameters and has to be seen in the light of different national circumstances.[75]

Non-regression and progression

22. The principle of non-regression is relatively new to the field of environmental law, while its underlying idea of disallowing backtracking is well understood in systems that protect human rights and in labour law. The idea that once a human right is recognized, it cannot be restrained, destroyed or repealed is shared by all major international instruments on human rights.[76] The corollary to the principle of non-regression is the principle of progression. Non-regression aims at ensuring that environmental protection is not weakened, while progression aims at the improvement of environmental legislation, including by increasing the level of protection, on the basis of the most recent scientific knowledge. The Paris Agreement is explicit in this regard and provides, in article 4, paragraph 3, that each successive nationally determined contribution "will represent a progression beyond the Party's then current nationally determined contribution and reflect its highest possible ambition".

III. Gaps relating to existing regulatory regimes

A. General

23. Most States have become parties to major multilateral environmental agreements. Since the relevant environmental problems at stake are often of a global nature, the solution lies in collective action.[77] The challenge is to encourage the participation of all relevant actors while at the same time ensuring that the commitments are ambitious enough to provide for an effective response to the problem, and to ensure that parties comply with their obligations.[78]

24. The involvement of a large number of States with diverse national circumstances and priorities in treaty negotiations leads to the fact that multilateral environmental agreements often serve multiple objectives which are not always easily reconciled or mutually enhancing, but arise out of political compromises struck between different

[72] See, for example, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (Rotterdam Convention), or the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal.

[73] See UNCCD.

[74] Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, decision XXVIII/1: further amendment of the Montreal Protocol, annex I.

[75] See Christina Voigt and Felipe Ferreira, "'Dynamic differentiation': the principles of CBDR-RC, progression and highest possible ambition in the Paris Agreement", *Transnational Environmental Law*, vol. 5, No. 2 (October 2016).

[76] See, for example, Universal Declaration of Human Rights, art. 30.

[77] See Elinor Ostrom, *Governing the Commons: The Evolution of Institutions for Collective Action* (Cambridge University Press, 1990); see also Elinor Ostrom, "Polycentric systems for coping with collective action and global environmental change", *Global Environmental Change*, vol. 20, No. 2 (October 2010).

[78] See Scott Barrett, *Environment and Statecraft: The Strategy of Environmental Treaty-Making* (Oxford University Press, 2003); and Oran R. Young, *The Institutional Dimension of Environmental Change – Fit, Interplay, and Scale* (MIT Press, 2002).

interests.[79] Without these compromises, and their often deliberate constructive ambiguities and gaps, however, the likelihood of agreement on international environmental treaties would be significantly diminished, undermining the prospect for global cooperation on urgent environmental issues.

25. Broad participation also relies on workable notions of fairness, including the concepts of equitable burden and effort-sharing. Multilateral environmental agreements therefore often contain provisions that take into account differing circumstances.[80] Accordingly, certain categories of States, often developing countries, are subject to "softer" obligations, for example longer phase-out periods or more flexible targets, while developed countries are subject to obligations to provide financial, technological and capacity-building support to developing countries and economies in transition. This situation is a necessary requirement to bring all relevant actors on board. In fact, because the national circumstances and capabilities of States differ significantly, the future development of international environmental law is likely to require more, rather than less, differentiation and flexibility.[81]

B. Protection of the atmosphere

Climate change

26. The international climate change regime consists of the United Nations Framework Convention on Climate Change of 1992,[82] its Kyoto Protocol of 1997[83] and the Paris Agreement of 2015.[84] The ultimate objective of the Convention is the stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system.[85] The Convention is a framework instrument establishing general principles, basic obligations and institutional arrangements. It does not contain binding, individual quantified emission reduction targets and timetables, but developed country parties and other parties listed in annex I of the Convention are enjoined to adopt national policies and take corresponding measures.[86]

27. The Kyoto Protocol supplements the Convention by establishing binding, quantified and economy-wide emission reduction targets for a number of developed country parties within a framework of successive commitment periods. At the beginning of its first commitment period in 2008, it covered roughly 60 per cent of global emissions, and at the end of the first commitment period in 2012, this had declined to 25 per cent of global emissions. The Kyoto Protocol remains in force. An amendment adopted in 2012 establishing a second commitment period from 2013 to 2020[87] is receiving an increased number of ratifications, which, if it enters into force, would enable a second commitment period under the Kyoto Protocol.

28. The Paris Agreement, adopted at the twenty-first session of the Conference of the Parties to the United Nations Framework Convention on Climate Change held in

[79] Stephen Humphreys and Yoriko Otomo, "Theorizing international environmental law", in Anne Orford and Florian Hoffmann, eds., *The Oxford Handbook of the Theory of International Law* (Oxford University Press, 2016).

[80] See Rajamani, *Differential Treatment in International Environmental Law*.

[81] Oliver Stuenkel, *Post Western World*, (Polity Press, 2016).

[82] Adopted in New York on 9 May 1992, entry into force on 21 March 1994.

[83] Adopted in Kyoto on 11 December 1997, entry into force on 16 February 2005.

[84] Adopted in Paris on 12 December 2015, entry into force on 4 November 2016.

[85] UNFCC, art. 2.

[86] Daniel Bodansky, "The United Nations Framework Convention on Climate Change: a commentary", *Yale Journal of International Law*, vol. 18, Issue 2 (1993).

[87] Doha Amendment to the Kyoto Protocol, adopted on 8 December 2012, not yet in force.

December 2015, aims, inter alia, at holding the increase in global average temperatures to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C, thereby specifying the ultimate objective of the Convention in measurable temperature terms. The Agreement is transformative, seeking to globally reshape economies and societies towards climate neutrality and resilience. It explicitly recognizes the link between human rights and the environment, calling upon States to respect, promote and consider their respective human rights obligations when taking climate action. It requires global emissions to peak as soon as possible, enjoins States to achieve climate neutrality by the second half of this century, establishes the goal of enhancing adaptive capacity, reiterates the obligations of developed country parties regarding the provision of support while encouraging other parties to do so voluntarily and, in its preamble, calls on parties, when taking action to address climate change, to consider human rights obligations as well as gender equality, the empowerment of women and intergenerational equity. The main obligation, binding on all parties, is the communication of nationally determined contributions every five years, which will reflect each party's highest possible ambition and represent a progression beyond the previous nationally determined contribution. [88] It may also be noted that the current nationally determined contributions are so far not sufficiently ambitious, and if they are not increased they will not lead to the realization of the global temperature goal.[89] Arguably, a top-down allocation of binding, individual emission reduction obligations, perhaps even combined with an enforcement mechanism, would have been a more direct and predictable way of staying below that threshold, but that proved impossible to agree on. Liability and compensation for climate damage was explicitly excluded from the regime of the Paris Agreement, and some have argued that such exclusion represents an important gap.[90]

29. The Kyoto Protocol and the Paris Agreement have arrangements to promote and facilitate compliance as well as address cases of non-compliance. The United Nations Framework Convention on Climate Change foresaw the establishment of a multilateral consultative process for the resolution of questions regarding implementation that was never operationalized. The interplay of multiple treaties that have different parties and different obligations poses a systemic challenge within the United Nations climate change regime. There may be a need for harmonization, for example with respect to reporting, in order to prevent regression and tensions among the requirements of the three treaties.

Stratospheric ozone layer

30. The international legal framework for the protection of the stratospheric ozone layer consists of the Vienna Convention for the Protection of the Ozone Layer of 1985 [91] and the Montreal Protocol to the Vienna Convention of 1987 [92] and its subsequent amendments. The most recent amendment, adopted in Kigali in 2016, expanded the scope of the Montreal Protocol to cover the phase-down of hydrofluorocarbons, [93] which closed a gap between the climate and the ozone regimes. [94] The amendment ensures the implementation of the two regimes in a mutually supportive manner. Though the international ozone regime has been largely

[88] See Paris Agreement, art. 4 (2); Voigt and Ferreira, "'Dynamic differentiation'".

[89] United Nations Environment Programme (UNEP), *The Emissions Gap Report: A UN Environment Synthesis Report* (2017).

[90] See FCCC/CP/2015/10/Add.1, para. 51 and art. 8.

[91] Adopted in Vienna on 22 March 1985, entry into force on 22 September 1988.

[92] Adopted in Montreal on 16 September 1987, entry into force on 1 January 1989.

[93] Adopted in Kigali on 15 October 2016, entry into force on 1 January 2019.

[94] See Amendment to the Montreal Protocol on Substances that Deplete the Ozone Layer, art. IV.

successful, some important substantive gaps exist. The Montreal Protocol addresses only the production and consumption of controlled substances. Some ozone-depleting substances are not controlled under the Montreal Protocol, including some short-lived chemical pollutants and nitrous oxide (N_2O); some specific uses of controlled substances are not subject to any controls, such as uses in feedstock and for quarantine and pre-shipment; and the Protocol does not regulate the disposal of controlled substances that are in banks, such as insulation foams or equipment. With respect to monitoring and verification, all parties are required by the Protocol to report their production and consumption of all controlled substances on an annual basis, even if the substances have been completely phased out. While the Vienna Convention and the Montreal Protocol both provide for ongoing scientific monitoring of the ozone layer, there is no explicit requirement for periodic verification at the national level to ensure that substances that have been phased out remain so. Parties operating under paragraph 1 of Article 5, that is, developing countries that have levels of consumption below the limits defined by the Protocol and receive funding under the Multilateral Fund for the Implementation of the Montreal Protocol for the conversion of manufacturing industries that are based on the use of controlled substances, are required to destroy the replaced equipment that used the controlled substances. Countries receiving funding are also required to report additional data annually to demonstrate their compliance with their phase-out agreements. Periodic independent verification is undertaken to confirm this compliance, although in general verification ceases after a project has been completed.

31. The Montreal Protocol has a non-compliance procedure based on a cooperative and consultative approach to addressing cases of non-compliance. Parties are directly responsible for the enforcement of the Protocol's restrictions on controlled substances, and report annually to the secretariat of the Montreal Protocol on their production and consumption of controlled substances and related matters. These reports inform the discussions of the Implementation Committee under the Non-Compliance Procedure for the Montreal Protocol, which reviews compliance issues and makes recommendations to the Meeting of the Parties to the Montreal Protocol with respect to decisions to be adopted. The reported data is accepted at face value; there is no mandate for the secretariat or the Implementation Committee to undertake verification of any reported data, except at the invitation of the party concerned. However, in situations where the secretariat, in reviewing the data reports, becomes aware of possible non-compliance by any party, it may request further information and, if the matter remains unresolved, refer the matter to the Implementation Committee for its consideration.

32. Illegal trade in ozone-depleting substances controlled under the Protocol is dealt with at the country level through a system of export and import licenses enforced by relevant national authorities.[95] The secretariat has a limited role to play by sharing data on imports and exports with concerned exporting and importing countries, respectively, and disseminating any information on illegal trade that parties may provide.[96] Beyond this, there is no specific mandate for any institution of the Protocol to investigate or undertake any verification with respect to illegal trade.

Mercury

33. Mercury and mercury compounds are recognized as chemicals of global concern as a result of their long-range transport in the atmosphere, persistence in the

[95] See "The 1987 Montreal Protocol on Substances that Deplete the Ozone Layer as adjusted and amended by the second meeting of parties", articles 4, 4A and 4B.

[96] Decisions XIV/7, XVII/16 and XXIV/12 of the Meeting of the Parties to the Montreal Protocol.

environment, ability to bioaccumulate in ecosystems and significant negative effect on human health and the environment.[97] The Minamata Convention on Mercury of 2013[98] obligates parties to reduce or control sources of mercury pollution in order to protect human health and the environment.[99] Reporting is the principal basis for evaluating both individual government compliance and the overall effectiveness of the Minamata Convention. Robust monitoring as well as independent evaluation and verification of data will be crucial. Some experts have suggested that a consistent and comprehensive data collection system needs to be established to best evaluate the effectiveness of the Convention. There is no specific guidance on content and format for data reported under article 21 of the Convention at this time, nor does the data allow for assessing collective progress. Furthermore, monitoring of the global levels could be complemented by observations on the local and regional scale.[100] There is a general lack of knowledge regarding local situations, especially in developing countries, due to the dearth of data and the high cost of sampling and analysis.[101] It can also be argued that there is a need to collect and compile better export and import data in support of the Convention's trade provisions.[102]

34. Simultaneously addressing mercury supply and demand in a coordinated way presents an essential governance challenge.[103] It might be necessary to identify other sources of mercury emissions and releases, develop and update guidance on best available techniques and best environmental practices and/or introduce new provisions to account for cross-media mercury management. In addition, the Conference of the Parties to the Minamata Convention may wish to expand its focus to additional mercury-containing products and processes. The implementation of the Minamata Convention also intersects with other multilateral environmental agreements, thereby raising the issue of coordination. In this regard, the environmentally safe handling and disposal of mercury wastes creates policymaking and management linkages with parallel efforts under the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, since the Basel and Stockholm Convention Regional Centres also assist countries with mercury abatement.[104] As mercury is a by-product of fossil fuel combustion, implementation of the Minamata Convention will also significantly contribute to mitigating climate change.[105]

Transboundary air pollution

35. Air pollution is a major global environmental problem, with various adverse effects on health and the environment. Transboundary air pollution is addressed by various sectoral and regional instruments, most prominent among them the

[97] UNEP, *Global Mercury Assessment* (2002); UNEP, *The Global Atmospheric Mercury Assessment: Sources, Emissions and Transport* (2008).

[98] Adopted in Kumamoto, Japan, on 10 October 2013, entry into force 16 August 2017.

[99] Henrik Hallgrim Eriksen and Franz Xaver Perez, "The Minamata Convention: a comprehensive response to a global problem", *Review of European, Comparative and International Law*, vol. 23, No. 2 (July 2014).

[100] David C. Evers and others, "Evaluating the effectiveness of the Minamata Convention on Mercury: principles and recommendations for next steps", *Science of the Total Environment*, vol. 569–570, No. 1 (November 2016).

[101] Henrik Selin and others, "Linking science and policy to support the implementation of the Minamata Convention on Mercury", Ambio, vol. 47, No. 2 (March 2018).

[102] UNEP, *Global Mercury: Supply, Trade and Demand* (2017).

[103] Ibid.

[104] Henrik Selin, *Global Governance of Hazardous Chemicals: Challenges of Multilevel Management* (MIT Press, 2010).

[105] Sands and others, *Principles of International Environmental Law*, p. 276.

Convention on Long-Range Transboundary Air Pollution of 1979[106] and its eight supplementary protocols, the Stockholm Convention on Persistent Organic Pollutants of 2001 and the Association of Southeast Asian Nations (ASEAN) Agreement on Transboundary Haze Pollution of 2002.[107] The fragmented state of international law on air pollution results in significant gaps in "geographical coverage, regulated activities, regulated substances and, most importantly, applicable principles and rules".[108]

36. The Convention on Long-Range Transboundary Air Pollution addresses the problem of acid rain and other dispersed pollutants.[68] The Convention is restricted in regional scope to Europe and North America in a world where rapid economic growth occurs in many other regions. It does not stipulate specific limits on emissions of industrial pollutants or targets or timetables. However, it has evolved from addressing single pollutants (e.g., sulphur dioxide (SO_2)) and single problems to a more comprehensive, more detailed approach of eight protocols addressing multi-pollutants through multi-effect instruments.[109] Moreover, it has served as a model for subsequent treaties adopted at the global level to address climate change and ozone depletion, and serves as a precedent for other regions to address transboundary air pollution. Compliance by parties with their obligations under the protocols to the Convention is reviewed by the Implementation Committee. There are, however, significant gaps: there are no rules on liability, some of the protocols have not entered into force and the geographical scope is limited.

37. As rapid economic development takes place in other regions, there is an urgent need to address the challenge of air pollution in those regions. Efforts are under way to expand and/or replicate the Convention on Long-Range Transboundary Air Pollution regime beyond the European and North American regions.[110]

38. The ASEAN Agreement on Transboundary Haze Pollution addresses transboundary haze pollution from land and forest fires. Nevertheless, it has been suggested that the Agreement's effectiveness is limited by the principle of non-interference, as it does not set national targets for emission reductions and was described as a regime for cooperation and prevention.[111] The Agreement lacks provisions for liability and compliance and does not address air pollution from sources other than land and forest fires, such as combustion engines, household pollution and industrial solid fuel combustion. In addition, and similar to the Convention on Long-Range Transboundary Air Pollution, the Agreement contains no specific provisions on State responsibility and/or compensation for transboundary haze pollution.

39. The International Law Commission is currently developing a set of draft guidelines on the protection of the atmosphere in relation to atmospheric pollution

[106] Adopted in Geneva on 13 November 1979, entry into force on 16 March 1983.

[107] Adopted in Kuala Lumpur, on 10 June 2002, entry into force 25 November 2003.

[108] For a list of binding multilateral and bilateral agreements relevant to atmospheric problems, see A/CN.4/667, para. 30.

[109] Adam Byrne, "The 1979 Convention on Long-Range Transboundary Air Pollution: assessing its effectiveness as a multilateral environmental regime after 35 years", *Transnational Environmental Law*, vol. 4, No. 1 (April 2015); Adam Byrne, "Trouble in the air: recent developments under the 1979 Convention on Long-Range Transboundary Air Pollution", *Review of European, Comparative and International Environmental Law*, vol. 26, No. 3 (November 2017).

[110] Sands and others, *Principles of International Environmental Law*, p. 293.

[111] Shawkat Alam and Laely Nurhidayah, "The international law on transboundary haze pollution: what can we learn from the Southeast Asia region?", *Review of European, Comparative and International Environmental Law*, vol. 26, No. 3 (November 2017).

and atmospheric degradation[112] which, inter alia, purports to recognize the existence of an international legal obligation to protect the atmosphere. Work on the draft guidelines is expected to be concluded in 2020, at which time they will be referred to the General Assembly for action.

C. Conservation of biological diversity and protection of soils

Biological diversity

40. Biological diversity is the variability of living systems. It comprises genetic, species and ecosystem diversity. Its usage in international environmental law is relatively new, as older international treaties dealt with single species or referred to "nature" or "wildlife". There is scientific consensus that, globally, biodiversity is being lost at an alarming rate.[113] Threats to biodiversity come from a multitude of direct and indirect sources and activities, ranging from habitat fragmentation, pollution and the introduction of alien invasive species to climate change.[114] Drivers of biodiversity loss are often complex, multiple and interlinked, and require the interplay of many different instruments.[115] Many of the threats, as well as the habitats, ecosystems or species to which they apply, do not respect national boundaries or are found in areas beyond national jurisdiction. At the same time, in the light of the complexity of the issue, the science is incomplete or lacking in some aspects.

41. The legal instruments for the conservation of biodiversity have developed without an overall strategy and have no coherent structure. This situation leaves some issues without specific, legally binding regulation, including on the conservation and sustainable use of forests,[116] the pollution of marine areas by land-based plastic waste, the protection of soil, the use of pesticides, noise pollution, human rights and biodiversity,[117] the Arctic area, nanomaterials and some geo-engineering processes.

42. The Convention on Biological Diversity[118] is the central international legal instrument for the conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of benefits arising out of the utilization of genetic resources.[119] Unlike earlier nature conservation instruments, the Convention takes a more holistic approach that addresses direct and indirect causes of biodiversity loss and seeks to "mainstream" biodiversity considerations into all relevant policy areas.[120] A main requirement for parties is the development of national biodiversity strategies and action plans.[121] It is widely recognized, however, that insufficient progress has been made on their implementation as well as on integrating biodiversity considerations into other sectors or cross-sectoral policies. The establishment of protected areas is a primary tool to implement in situ conservation, though its effectiveness is a concern. While target 11 of the Aichi Biodiversity Targets

[112] See A/73/10, para. 78.

[113] Secretariat of the Convention on Biological Diversity, *Global Biodiversity Outlook 3* (2010); Millennium Ecosystem Assessment, *Ecosystems and Human Well-Being: Synthesis* (Island Press, 2005).

[114] Ibid.

[115] Secretariat of the Convention on Biological Diversity, *Global Biodiversity Outlook* 3.

[116] In 1992, the United Nations Conference on Environment and Development adopted the Non-legally Binding Authoritative Statement of Principles for a Global Consensus on the Management, Conservation and Sustainable Development of All Types of Forests (see A/CONF.151/26/Rev.1 (Vol. I)).

[117] See CBD, art. 8 (j).

[118] Adopted in Rio de Janeiro, Brazil, on 5 June 1992, entry into force on 29 December 1993.

[119] CBD, art. 1.

[120] Sands and others, *Principles of International Environmental Law*, p. 387.

[121] CBD, art. 5.

provides for protected areas, it does not impose legal obligations. Instead, parties are urged to develop national and regional plans with a view to contributing to efforts to reach the global Aichi Targets. This approach may not be sufficient to address the interconnectedness of ecosystems activities or uses that take place outside the protected area.[122] Binding commitments, or voluntary action combined with stronger monitoring, reporting and verification, should be considered.[123] In addition, one of the major deficiencies of the Convention is the limitation of its jurisdictional scope to areas within national jurisdiction.[124]

43. The effective implementation of the Convention on Biological Diversity also depends on cooperation with and mutual support among agreements dealing with climate change, the protection of the marine environment, freshwater resources and hazardous wastes. Cooperation is also required with international agreements in other fields such as trade, intellectual property rights and plant genetic resources for food and agriculture.[125] The complex regulatory environment dealing with invasive alien species, comprising the Convention on Biological Diversity, the International Civil Aviation Organization (ICAO), the International Maritime Organization (IMO), WTO and the World Customs Organization, requires policy coordination and coherence. More recently, the issues of synthetic biology and digital sequence information have garnered significant concern and raised questions about the applicability of the Convention.

44. Although the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity of 2010 establishes specific requirements regarding access and the terms and conditions of such access,[126] including disclosure requirements for the use of genetic resources or traditional knowledge associated with genetic resources, the absence of similar disclosure rules in the international patent system under the Patent Cooperation Treaty of the World Intellectual Property Organization (WIPO) is likely to undermine the effectiveness of the regime. There may be a need to develop measures of cooperation with and mutual support between the two regimes.

45. The conservation and effective management of migratory species is the objective of the Convention on the Conservation of Migratory Species of Wild Animals of 1979. Parties that are range states of migratory species listed in appendix I of the Convention must endeavour to conserve and restore habitats and to prevent or minimize adverse effects of activities that seriously impede or prevent migration.[127] For species that have an “unfavourable conservation status” the Convention requires that range states conclude agreements to benefit those species.[128] So far, seven legally binding agreements have been adopted,[129] but there remains ample scope for further

[122] Froukje Maria Platjouw, *Environmental Law and the Ecosystem Approach: Maintaining Ecological Integrity through Consistency in Law* (Routledge, 2016).

[123] Secretariat of the Convention on Biological Diversity, *Global Biodiversity Outlook 4* (2014).

[124] CBD, art. 4. The Convention also applies to areas beyond national jurisdiction, but only for processes and activities carried out under the jurisdiction or control of a party.

[125] Sands and others, *Principles of International Environmental Law*, pp. 388 and 405.

[126] Entry into force on 12 October 2014; see also UNEP/CBD/COP/DEC/X/1.

[127] Convention on the Conservation of Migratory Species of Wild Animals, art. III (4).

[128] Ibid., art. IV.

[129] Agreement on the Conservation of Seals in the Wadden Sea; Agreement on the Conservation of Populations of European Bats; Agreement on the Conservation of Small Cetaceans of the Baltic, North East Atlantic, Irish and North Seas; Agreement on the Conservation of African-Eurasian Migratory Waterbirds; Agreement on the Conservation of Cetaceans of the Black Sea, Mediterranean Sea and Contiguous Atlantic Area; Agreement on the Conservation of Albatrosses and Petrels; Agreement on the Conservation of Gorillas and Their Habitats.

range state agreements. Several cooperative arrangements between the Convention and other multilateral environmental agreements and environmental institutions have been established. It has been noted, however, that the collaboration with the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services lacks any institutional arrangements to make the biodiversity-related decisions and resolutions of those multilateral environmental agreements a priority of the Platform. Such a link could also ensure that the Platform's outputs are considered by other biodiversity-related multilateral environmental agreements as a basis for their decision-making processes, thereby avoiding parallel processes.

46. The Convention on International Trade in Endangered Species of Wild Fauna and Flora[130] regulates trade with regard to approximately 36,000 species, which are included in three appendices to the Convention.[131] The implementation and enforcement of the Convention relies on national laws and effective administration, inspections and border controls of permits by competent national authorities. Compliance and enforcement, including addressing illegal trade,[132] remain significant challenges. There is a general need to strengthen enforcement through training as well as a need for additional support and closer collaboration between national enforcement agencies and intergovernmental organizations such as the World Customs Organization and the International Criminal Police Organization (INTERPOL). Better coordination and a clarification of the role of the Convention and its relationship with those agreements might be needed, especially with respect to some endangered, or potentially endangered, commercial fisheries species that are regulated under different agreements, such as the United Nations Convention on the Law of the Sea, the United Nations Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (the 1995 Fish Stocks Agreement) and regional fisheries management organizations.

47. The Convention on Wetlands of International Importance especially as Waterfowl Habitat of 1971 was the first international agreement to protect a particular habitat, rather than a species. The Convention is not part of the United Nations system, and that fact is considered to have imposed some constraints on its operation as well as its participation in some of United Nations processes.

Land degradation and soil protection

48. Land and soil degradation has long been identified as a global challenge.[133] Despite the potentially severe impacts on agriculture and food security, international legal responses are limited. Apart from conventions that establish general obligations,[134] and the 1998 Protocol to the Convention on the Protection of the Alps, which addresses soil protection, no legally binding instruments exist that have as their primary objective the conservation, improvement and rehabilitation of soil.

49. The United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, of 1994[135] is the only legally binding international agreement linking environment and development to sustainable land management. National action programmes are key

[130] Adopted in Washington, D.C., on 3 March 1973, entry into force on 1 July 1975.

[131] See http://cites.org/eng/app/appendices.php.

[132] See Rosalind Reeve, *Policing International Trade in Endangered Species: The CITES Treaty and Compliance* (Routledge, 2002).

[133] World Resources Institute, *World Resources: 1992-93* (Oxford University Press, 1992).

[134] African Convention; ASEAN Agreement.

[135] Adopted in Paris on 14 October 1994.

instruments in the implementation of the Convention. Identified gaps relate to the lack of effective implementation, the setting of standards and an enforcement mechanism.

D. Protection of freshwater resources

Regulatory framework

50. Current international law largely aims to protect freshwater resources, including groundwaters,[136] through a patchwork of global, regional and basin agreements, with certain general principles and customary rules applicable to the normative and institutional gaps therein. The global convention which most directly governs the uses of fresh water is the Convention on the Law of the Non-Navigational Uses of International Watercourses (the Watercourses Convention) of 1997. The Watercourses Convention promotes the optimal and sustainable utilization of international watercourses through a number of provisions that establish broad duties for States with respect to freshwater governance.[137]

51. The transversal nature of fresh water as an object of legal regulation is evident in the patchwork of other treaties and instruments governing aspects of its use, which differ substantially in their focus. This range of treaties includes multilateral environmental agreements of a universal scope.[138] Further diversity of obligations relating to fresh water arises from a range of binding instruments at the regional or basin levels.[139] While some treaties governing fresh water may codify or operationalize general principles relevant to environmental protection,[140] this patchwork is also supplemented by a number of non-binding instruments that aim to codify or progressively develop customary rules at the universal level, such as Sustainable Development Goal 6.[141]

Normative and institutional gaps

52. The Watercourses Convention is insufficient as a global governance mechanism for the protection of freshwater resources. Article 1 expressly excludes from the Convention's scope "the uses of international watercourses for navigation".[142]

[136] In 2008, ILC adopted the draft articles on the law of transboundary aquifers aimed at ensuring the equitable and reasonable utilization of transboundary aquifers or aquifer systems. See *Yearbook of the International Law Commission, 2008*, vol. II, Part Two, para. 53. See also resolution 63/124, annex. While, as of the time of writing, the General Assembly has not yet decided on the future form of the draft articles, they have inspired at least one regional agreement on the utilization of groundwater resources.

[137] See Convention on the Law of the Non-Navigational Uses of International Watercourses (Watercourses Convention), preamble (recalling arts. 1, 2, and 13 (1) (a) of the Charter of the United Nations, Rio Declaration and Agenda 21), and Watercourses Convention, arts. 5 and 6 (advancing beyond the Helsinki Rules on the Uses of the Waters of International Rivers).

[138] See Convention on Wetlands of International Importance especially as Waterfowl Habitat; Convention Concerning the Protection of the World Cultural and Natural Heritage; Convention on the Conservation of Migratory Species of Wild Animals (Bonn Convention); CBD; UNCCD; UNFCCC; POPs Convention; Paris Agreement.

[139] See European agreement (Convention on the Protection of the Rhine, 1999), African agreement (Niger Basin Water Charter, 2008), Asian agreement (Agreement on the Cooperation for the Sustainable Development of the Mekong River Basin, 1995), and bilateral treaty in the Americas (Great Lakes Water Quality Agreement, 1972).

[140] See, for example, Watercourses Convention, arts. 5 and 6.

[141] See, generally, Leila M. Harris, Lucy Rodina and Cynthia Morinville, "Revisiting the human right to water from an environmental justice lens", *Politics, Groups and Identities Journal*, vol. 3, No. 4 (2015), p. 660.

[142] See also commentary on the draft articles of the Watercourses Convention, para 4, in *Yearbook of the International Law Commission, 1994*, vol. II, Part Two, pp. 89–90.

Pollution of fresh water from vessels falls within a complex arrangement of legal regimes, giving rise to normative gaps. Moreover, as a framework convention, its prescriptions are inherently broad and sometimes merely encouraging in nature. This ensures maximum flexibility for States when they adopt implementing agreements with respect to individual watercourses, but in so doing sacrifices the benefits of more specific guidance as to the resulting form of freshwater protection. In particular, despite the aspirations of article 3, the Convention does not provide any binding directives as to the establishment of joint enforcement or dispute settlement mechanisms to ensure that the principle of equitable and reasonable utilization is given effect.[143] The list of factors to be assessed in this utilization, found in article 6, paragraph 1, is non-exhaustive, leaving to States the difficult task of reaching subsequent agreement as to specific factors applicable to the use of their shared watercourses.

53. The interaction of provisions such as articles 6 (“Factors relevant to equitable and reasonable utilization”) and 7 (“Obligation not to cause significant harm”) of the Convention is to be interpreted taking into consideration the development of international environmental law. Taking into account the relevant legal context may allow for an adaptive and dynamic interpretation and application of water agreements.[144] Yet it must be recalled that this analytical process arises directly from the fragmented nature of the current framework of freshwater governance and the need to fill gaps resulting from this relative lack of legal integration.

54. The gaps in the current mosaic of binding and non-binding instruments relating to the protection of freshwater resources are further complicated by the multidirectional manner in which these instruments interact. In other words, while the gaps in the Watercourses Convention may be supplemented by subsequent agreements between riparian States (i.e., States with freshwater resources), so too may the Convention serve to fill gaps in existing agreements between these States.[145] Ambiguity in the aforementioned provisions may therefore pose particular problems for regions where river or aquifer systems have not yet been the subject of binding and specific legal agreements among riparian States.

55. Such fragmentation weakens the normative scope of environmental principles in the field of water resources protection.[146] This gap leads to uncertainties in the applicability of these principles. In this respect, the International Court of Justice’s conservative vision of the precautionary approach in the *Pulp Mills on the River Uruguay* case[147] reflects the legal uncertainties surrounding the application of such principles in the field of freshwater resources.

E. Protection of oceans and seas

56. Oceans comprise approximately 70 per cent of the Earth’s surface. The health of the ocean is of vital importance to marine ecosystem functioning and productivity, which includes ensuring sustainable fisheries, coastal protection and carbon sequestration and achieving food security. A number of instruments have been adopted to address various pressures on the marine environment.

[143] See also Watercourses Convention, arts. 8 (2), 24 and 32 (2).

[144] See Laurence Boisson de Chazournes, *Fresh Water in International Law* (Oxford University Press, 2013), p. 143.

[145] See Watercourses Convention, art. 3.

[146] See Statute of the River Uruguay, chap. X; Charter of Waters of the Senegal River.

[147] *Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment, I.C.J. Reports 2010*, p. 14.

57. The most comprehensive of these instruments is the United Nations Convention on the Law of the Sea of 1982, which sets out the legal framework within which all activities in the oceans and seas must be carried out.[148] The regime established by the Convention is based on a zonal approach, under which the rights and obligations of flag, coastal and port States, and applicable rules, depend on the particular maritime zone in which an activity is taking place as well as the type of activity in question. The Convention provides for the general obligation to protect and preserve the marine environment and requires States to take all measures necessary to prevent, reduce and control the pollution of the marine environment from any source. These measures must include those necessary to protect and preserve rare or fragile ecosystems as well as the habitats of depleted, threatened or endangered species and other forms of marine life. The Convention includes provisions on enforcement with respect to the various sources of pollution, as well as provisions on cooperation and coordination for the protection and preservation of the marine environment. It also codifies, inter alia, the duty not to transfer damage or hazards or transform one type of pollution into another,[149] as well as the obligation of notification of imminent or actual damage,[150] and includes obligations to monitor the risks or effects of pollution and assess the potential effects of activities.[151]

58. Part XII of the Convention specifically refers to six sources of pollution, in addition to the introduction of alien or new species: pollution from land-based sources; pollution from seabed activities subject to national jurisdiction; pollution from activities in the International Seabed Area; pollution from dumping; pollution from vessels; and pollution from or through the atmosphere. A number of global and regional instruments applying to these sources and activities, some of which are legally binding, have been adopted by competent international organizations.[152] Other complementary instruments encompass in their scope marine biodiversity[153] or address the management of marine living resources.[154] These instruments have tended to reflect a sectoral approach to the development and enforcement of rules for the protection and preservation of the marine environment. In that context, each sector focuses on its unique issues, priorities and interests, which hampers the implementation of integrated approaches such as ecosystem approaches, and the application of cross-sectoral environmental principles and concepts that have developed since the Convention was negotiated. Furthermore, with regard to land-based sources of pollution, legal and institutional responses are at both the global and regional levels, with the latter consisting of 18 regional seas programmes. The regional seas framework does not have a centralized governance: 7 of the programmes are administered by the United Nations Environment Programme (UNEP) while 11 operate independently.[155] Regional seas treaties reveal normative gaps concerning the

[148] See also resolution 72/73.
[149] UNCLOS, art. 195.
[150] Ibid., art. 198.
[151] Ibid., arts. 204–206.
[152] See, for example, Convention on the Prevention of Marine Pollution by Dumping of Waster and Other Matter (1972 London Convention) and its 1996 Protocol; International Convention for the Prevention of Pollution from Ships and its 1978 Protocol; Agreement relating to the Implementation of Part XI of the United Nations Convention on the Law of the Sea; Global Programme of Action for the Protection of the Marine Environment from Land-based Activities.
[153] See, for example, Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES); Bonn Convention; CBD.
[154] See, for example, Code of Conduct for Responsible Fisheries (FAO Code of Conduct).
[155] These include, for example, the Baltic Marine Environment Protection Commission and the Regional Programme of Action for the Protection of the Marine Environment from Land-based Activities in the Red Sea and the Gulf of Aden. See also UNEP, "Why does working with regional seas matter?", available at www.unenvironment.org/explore-topics/oceans-

control of pollution from seabed activities subject to national jurisdiction, as such treaties contain only very general and often limited obligations regarding the environmental impact assessment of proposed activities.[156] In addition, coordination and cooperation among the regional seas frameworks and relevant global multilateral environmental agreements could be further enhanced.

59. The conservation and management of marine living resources are governed by a range of instruments in addition to the United Nations Convention on the Law of the Sea.[157] Most fishing takes place in areas under national jurisdiction. In this regard, the Convention provides coastal States with sovereign rights over marine living resources in their respective exclusive economic zones and sets out the duty to conserve and manage such resources to ensure their sustainable use. On the high seas, the principal responsibilities of conservation and management fall upon flag States. States are also required to cooperate with each other in the conservation and management of living resources in the areas of the high seas, including through the establishment of regional fisheries management organizations. This model has had varying levels of success in meeting the objectives of sustainable fish stock management in the face of threats such as unsustainable and/or destructive fishing practices, climate change and environmental pollution from various sources, in particular marine debris, including in the form of abandoned, lost or otherwise discarded fishing gear. The general duty of precaution in the face of scientific uncertainty is being increasingly acknowledged in this regard.[158]

60. The Secretary-General has stressed the importance of the effective implementation of the legal framework established by the Convention and its implementing agreements in order to achieve Sustainable Development Goal 14.[159] Continued efforts have been made to strengthen this framework, including through additional instruments to address emerging challenges. In particular, the General Assembly decided to develop a legally binding instrument under the Convention on the conservation and sustainable use of marine biodiversity beyond national jurisdiction.[160] There have also been increased efforts to enhance international cooperation and coordination, including of a cross-sectoral nature, in support of the implementation of relevant instruments, for example through UN-Oceans. At the global level, the Assembly, through its annual review of developments in ocean affairs and the law of the sea, provides a global mechanism for further enhancing integrated and coordinated approaches.

61. As noted in the context of the United Nations Conference to Support the Implementation of Sustainable Development Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development (the Ocean Conference), held in 2017,[161] a number of challenges remain to be addressed, in particular those resulting from predominantly sectoral approaches to ocean

seas/what-we-do/working-regional-seas/why-does-working-regional-seas-matter.

[156] See, for example, Framework Convention for the Protection of the Marine Environment of the Caspian Sea, art. 17.

[157] See, for example, Agreement to Promote Compliance with International Conservation and Management Measures by Fishing Vessels on the High Seas; FAO Code of Conduct; Agreement for the Implementation of the Provisions of the United Nations Convention on the Law of the Sea of 10 December 1982 relating to the Conservation and Management of Straddling Fish Stocks and Highly Migratory Fish Stocks (FSA); Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing.

[158] See *Southern Bluefin Tuna (New Zealand v. Japan; Australia v. Japan), Provisional Measures, Order of 27 August 1999*, p. 280, paras. 77 and 79.

[159] See A/71/733, paras 15–19.

[160] See resolution 69/292, para. 2.

[161] See also https://oceanconference.un.org/commitments/?id=16758.

management and the ineffective implementation and compliance that partly stems from a lack of coordination and capacity. The effectiveness of applicable international legal instruments is affected by the level of participation by States. Gaps also exist with regard to the material or geographical scope of relevant instruments; for example, while some aspects of marine debris, plastics and microplastics are covered by several global, regional and national instruments, none of them, other than some regional action plans on marine litter, are specifically dedicated to these issues. Some geographic areas remain unaddressed by regional instruments relevant to the implementation of aspects of the United Nations Convention on the Law of the Sea and the 1995 Fish Stocks Agreement. Implementation of legal and policy instruments is further affected by regulatory and administrative structures at the national level. Policies and national legislation related to ocean affairs are still largely fragmented in many States, and their implementation suffers from insufficient intersectoral coordination and the constraints resulting from competing interests. Assessments of implementation remain incomplete owing to a low level of responses to reporting requirements and limited available information on how States have followed up on their obligations and commitments. Formal, multilateral compliance committees, as seen under multilateral environmental agreements, are not common with regard to the law of the sea.

F. Regulation of hazardous substances, wastes and activities

62. Over the years, industrial and technological developments have resulted in the production and use of hazardous substances, the generation of hazardous wastes as a by-product and the undertaking of activities that pose potential risks to human health and the environment. High-level political concern has been reflected in Principle 6 of the Stockholm Declaration,[162] Principle 14 of the Rio Declaration, Agenda 21: Programme of Action for Sustainable Development,[163] the outcome document of the United Nations Conference on Sustainable Development (the Rio+20 Conference), entitled “The future we want”, and Sustainable Development Goal 12.[164]

Hazardous substances

63. Hazardous substances include industrial chemicals and pesticides. International legal instruments have addressed the matter through a listing system of substances deemed hazardous because of their inherent characteristics,[165] through the regulation of specific substances[166] or through the regulation of trade,[167] and have focused on accident prevention, preparedness and response; the control of production and use; the provision of information, including registration, classification, labelling and packaging; transportation and transboundary movements; and exposure in the working environment.

64. The existing instruments addressing accident prevention, preparedness and response are largely regional, covering Europe and North America,[168] and were

[162] Stockholm Declaration.

[163] Agenda 21, chaps. 19 and 20.

[164] Sustainable Development Goals, targets 12.4 and 12.5.

[165] Directive 85/337/EEC of the European Parliament and of the Council of 27 June 1985 on the assessment of the effects on certain public and private projects on the environment; Espoo Convention.

[166] Vienna Ozone Convention and its 1987 Montreal Protocol; Kyoto Protocol; Cartagena Protocol; POPs Convention; Minamata Convention on Mercury.

[167] Rotterdam Convention.

[168] Except for ILO Convention No. 174 on the prevention of major industrial accidents, see for example, Directive 2012/18/EU of the European Parliament and of the Council of 4 July

developed in response to major industrial accidents.[169] Three global instruments regulate or prohibit the production and use of specific chemicals, namely, the Montreal Protocol on Substances that Deplete the Ozone Layer, the Stockholm Convention on Persistent Organic Pollutants[170] and the Minamata Convention on Mercury.[171] International rules for the registration, classification, labelling and packaging of hazardous substances are critical to addressing the associated human health and environmental risks. Labelling and packaging requirements are contained in the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade of 1998, the Convention concerning Safety in the Use of Chemicals at Work of 1990[172] and Regulation (EC) No. 1272/2008 of the European Union on classification, labelling and packaging of substances and mixtures.[173] The international framework for the regulation of international trade in chemicals and pesticides is composed of non-binding guidelines developed by the Food and Agriculture Organization of the United Nations (FAO) and the Organization for Economic Cooperation and Development (OECD) in the 1980s[174] and binding legal instruments such as the previously mentioned Montreal Protocol, the Minamata Convention on Mercury and the Stockholm Convention, as well as the Rotterdam Convention,[175] which establishes a prior informed consent procedure applicable to banned or severely restricted chemicals and severely hazardous pesticide formulations.[176] The international rules governing the transport of hazardous substances by different modes of transport are underdeveloped and mostly apply to the European region, except for the International Convention for the Prevention of Pollution from Ships, 1973, as modified by the Protocol of 1978 relating thereto (MARPOL), annex 18 to the Convention on International Civil Aviation: The Safe Transport of Dangerous Goods by Air, and the Regulations for the Safe Transport of Radioactive Material of the International Atomic Energy Agency (IAEA).[177] The use

2012 on the control of major-accident hazards involving dangerous substances, amending and subsequently repealing Council Directive 96/82/EC; Convention on the Transboundary Effects of Industrial Accidents; Agreement of Cooperation Between the United States of America and United Mexican States Regarding Pollution of the Environment Along the Inland International Boundary by Discharges of Hazardous Substances.

[169] Such as those in Seveso, Italy (1976), Bhopal, India (1984), Basel, Switzerland (1986) and Baia Mare, Romania (2000).

[170] It initially targeted twelve chemicals but provided for subsequent additions through the Persistent Organic Pollutants Review Committee, see POPs Convention, art. 8.

[171] Minamata Convention on Mercury, art. 4 (1), annex A, part I.

[172] ILO Convention No. 170 on safety in the use of chemicals at work.

[173] See Rotterdam Convention, art. 13 (2). Other instruments such as the Globally Harmonized System of Classification and Labelling of Chemicals (GHS), the schemes developed by UNEP, ILO and the World Health Organization (WHO) under the International Programme for Chemical Safety (IPCS), including WHO, *The WHO Recommended Classification of Pesticides by Hazard and Guidelines to Classification: 2009* (2009) and WHO and FAO, *International Code of Conduct on the Distribution and Use of Pesticides: Guidelines for Registration of Pesticides* (2010); WHO and FAO, *Guidelines on Good Labelling Practice for Pesticides* (2015) are voluntary.

[174] FAO, International Code of Conduct on Pesticides Management (Conference resolution 10/85); Organization for Economic Cooperation and Development (OECD), Recommendation on the Council concerning Information Exchange related to Export of Banned or Severely Restricted Chemicals OECD/Legal/0210, 1984.

[175] Rotterdam Convention.

[176] See ibid., arts. 3 (1), 10, 11 and annex III.

[177] Several legally binding instruments have been adopted within the European region dealing with transport by air, rail and inland waterways – see, for example, European Agreement concerning the International Carriage of Goods by Road; Convention Concerning the International Carriage of Goods by Rail and its 2015 Regulations concerning the International Carriage of Dangerous Goods by Rail; Economic Commission for Europe, European Agreement concerning International Carriage of Dangerous Goods by Inland Waterways.

of certain hazardous substances in the working environment is strictly regulated through several legally binding instruments adopted under the auspices of the International Labour Organization (ILO).[178]

Hazardous wastes

65. The current international regime governing hazardous wastes focuses mainly on their disposal and transboundary movements and trade. It is acknowledged, however, that an approach that includes the minimization or prevention of the generation of waste at the source would provide a more holistic and effective response to the problem.[179] Of note, the European Union, at the regional level, has established quantitative targets regarding the generation of certain categories of wastes.[180]

66. The Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal of 1989 is the most comprehensive global treaty dealing with hazardous wastes and other wastes (household wastes). The Convention focuses primarily on the control of transboundary movements but also aims at ensuring the minimization of waste generation as well as its environmentally sound management. International focus on the transboundary movement of and trade in hazardous wastes arose out of incidents of illegal trafficking in toxic substances and wastes and the dumping of such products in developing and Eastern European countries in the late 1980s.[181] Several regional agreements were subsequently adopted to complement the Basel Convention.[182] The Basel Convention establishes a strict regime for transboundary movements of wastes, based on a prior informed consent procedure requiring the notification of concerned States, the provision of specified information in the notification and the receipt of consent before movement.[183] An amendment seeking to ban hazardous waste exports for final disposal and recycling from Annex VII parties (members of the European Union, OECD and Liechtenstein) to non-Annex VII parties (mainly developing countries), adopted in 1995,[184] has yet to enter into force at the international level, although it has been implemented by many parties. The Convention's liability and compensation protocol adopted in 1999 also has yet to enter into force.[185]

67. The disposal of wastes into specific environmental media is regulated by several global and regional legal instruments, with disposal at sea being more extensively

[178] See, for example, ILO Convention No. 170 on safety in the use of chemicals at work, ILO Convention No. 155 on occupational safety and health and the working environment and ILO Convention No. 148 on working environment (air pollution, noise and vibration). Specific instruments address hazards arising from substances such as ionizing radiation, benzene, asbestos and carcinogenic substances.

[179] Agenda 21 and the Sustainable Development Goals.

[180] Directive 2008/98/EC of the European Parliament and of the Council of 19 November 2008. The decisions of the Conference of Parties to the Basel Convention have since underlined the need for future action to focus, inter alia, on prevention and minimization of generation at source as well as recycling, recovery and the active promotion and use of clean technologies, see decision V/33 (UNEP/CHW.5/29) and decision BC-10/2 (UNEP/CHW.10/BC-10/2).

[181] See, for example, A/44/362.

[182] These include Basel Convention, Bamako Convention on the Ban of the Import into Africa and the Control of Transboundary Movement and Management of Hazardous Wastes within Africa (Bamako Convention), Convention to Ban the Importation into the Forum Island Countries of Hazardous and Radioactive Wastes and to Control the Transboundary and Management of Hazardous Wastes within the South Pacific Region (Waigani Convention).

[183] Basel Convention, art. 6.

[184] Amendment to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, see amendments to art. 4 (A) and annex VII.

[185] See Basel Protocol on Liability and Compensation for Damage resulting from the Transboundary Movements of Hazardous Wastes and Their Disposal (Basel Protocol).

regulated compared with other media,[186] but legal intervention in the areas of land-based disposal as well as recycling and reuse is either minimal or non-existent. In addition, important gaps remain with respect to regional coverage as well as the regulation of the disposal of marine plastic litter and microplastics, mine tailings and associated wastes from mining operations, and wastes from deep seabed mining.[187] Land-based disposal is sparsely regulated at both the regional and global levels.[188] With regard to recovery, recycling and reuse, only the European Union, in particular through Directive 2006/12/EC and Directive 2008/98/EC, has established any legal requirements.

Hazardous activities

68. With regard to hazardous activities, international regulation has focused primarily on nuclear activities. Treaties adopted under the auspices of IAEA address the physical protection of nuclear material, the early notification of nuclear accidents, assistance in case of accidents and emergencies and nuclear safety.[189] The limitations of the Convention on Nuclear Safety of 1994 were starkly demonstrated by the incident at the Fukushima Daiichi nuclear power station, and in 2015 the non-binding Vienna Declaration on Nuclear Safety was adopted with a view to addressing issues related to the design, siting and safety assessment of nuclear power plants.

Normative and institutional gaps

69. There are significant gaps in the regulatory regimes of hazardous substances, wastes and activities. With regard to hazardous substances, these include the absence of global rules that address accident prevention, preparedness and response; largely non-binding international classification, labelling and packaging systems; and the fact that the frameworks regarding the transport of hazardous substances are mainly regional in nature. With regard to hazardous wastes, international rules have predominantly focused on the disposal and transboundary movements of such wastes rather than minimizing the generation of wastes at the source,[190] and lack any quantitative restrictions within specific time frames. It may be noted, however, that the Basel Convention provides a basis to address the minimization of the generation of wastes at the source. The absence of an operative global liability and compensation regime with respect to the transboundary movements of hazardous wastes is a major gap in the international legal framework. Finally, in the area of hazardous activities, focus has been on nuclear activities, but even here significant gaps exist, especially with respect to non-military nuclear activities, as well as limitations regarding legally binding global rules, principles and standards relating to the design, siting and safety of nuclear power plants.

[186] See Bamako Convention, art. 4 (2); South Pacific Nuclear Free Zone Treaty (Rarotonga Treaty), art. 7; Convention for the Protection of the Natural Resources and Environment of the South Pacific Region (Noumea Treaty), art. 10 (1); OSPAR Convention, art. 4 and annex II; 1972 London Convention, art. IV and its 1996 Protocol.

[187] See "Report of the thirty-eighth Consultative Meeting of the Contracting Parties to the London Convention and the eleventh Meeting of the Contracting Parties to the London Protocol", document LC 38/16.

[188] There are some instruments such as Regulation (EC) No. 1137/2008 and Council Directive 99/31/EC of the European Parliament and of the Council; Espoo Convention, arts. 2, 3 and 5; POPs Convention, art. 6; Minamata Convention on Mercury, arts. 9, 11 and 12.

[189] See Convention on the Physical Protection of Nuclear Material; Convention on Early Notification of a Nuclear Accident; Convention on Assistance in the Case of Nuclear Accident or Radiological Emergency; Convention on Nuclear Safety; and 1997 Joint Convention on Safety of Spent Fuel Management and the Safety of Radioactive Waste Management (36 ILM 1431).

[190] Sands and others, *Principles of International Environmental Law*, p. 613.

70. The proliferation of instruments and the fragmentation in the regulatory regimes create the need for institutional coordination and cooperation, as well as the implementation of the various legal instruments in a mutually supportive manner. Important steps have been taken to enhance coordination and cooperation among the Basel, Rotterdam and Stockholm Conventions so as to ensure mutual supportiveness. The "synergies process" launched in 2008/09 by the three Conferences of the Parties of the Basel, Rotterdam and Stockholm Conventions aims at strengthening the implementation of the three Conventions at the national, regional and global levels.

IV. Environment-related instruments

A. Trade instruments

71. WTO is the primary focal point at the nexus of trade and environment. The WTO Appellate Body has been called upon to address several disputes concerning environment-related trade measures, and normative gaps have been evident in its reluctance to apply environmental principles to justify measures that are inconsistent with trade obligations (unless expressly prescribed in the relevant WTO agreement).[191] The mutual supportiveness of trade and environment has been referenced in environmental treaties featuring trade components.[192] However, the Doha Round of WTO negotiations has spent 17 years at an impasse over how to apply that principle. The significant challenge of reaching consensus on the implementation of mutual supportiveness of trade and environment suggests a widening gap between these two normative regimes.

B. Investment instruments

72. Clauses referring to environmental concerns are rare in bilateral investment treaties, but more common in multilateral pacts that include investment provisions. State practices regarding environmental clauses in treaties vary widely: many States do not employ such clauses in investment treaties; a few developed States have systematically begun including environmental clauses in all of their investment treaties; and several States appear to permit the inclusion of environmental clauses in investment treaties concluded with States that express a preference for such clauses.[193] Newly concluded investment treaties now tend to include environmental clauses, with such evolution particularly evident in Africa.[194] From a global perspective, however, in recent years the frequency of approaches that include references to environmental concerns in investment agreements has declined, including the use of clauses that reserve policy space for environmental regulation and broader references in treaty preambles.[195] Normative gaps arise because the specific environmental concerns

[191] See, for example, *European Communities – Measures concerning Meat and Meat Products (Hormones)*, WT/DS26/AB/R, 16 January 1998 (concerning the precautionary principle and the agreement on the application of sanitary and phytosanitary measures).

[192] See, for example, Rotterdam Convention; Cartagena Protocol; POPs Convention; Minamata Convention on Mercury.

[193] See Kathryn Gordon and Joachim Pohl, "Environmental concerns in international investment agreements: a survey", OECD Working Paper on International Investment 2011/01 (2011), p. 5.

[194] See, for example, Supplementary Act A/SA.3/12/08 Adopting Community Rules on Investment and the Rules on Investment and the Modalities for their Implementation with the Economic Community of West African States; 2012 Southern African Development Community Model Bilateral Investment Treaty; Pan-African Investment Code.

[195] See Gordon and Pohl, "Environmental concerns in international investment agreements", p. 6.

explicitly addressed in these agreements are limited, and have generally not evolved to include more recent concerns such as climate change and biodiversity.[196]

C. Intellectual property instruments

73. Exclusive rights conferred by patents, plant variety rights and utility models can cover renewable energy technologies,[197] medicines for new illnesses that arise as a result of new climates and new crops bred to flourish in places no longer suitable for traditional plants.[198] The patenting of plants and plant varieties has caused major changes in farming practices, inhibiting the rights of farmers to sow, save, reuse and sell their seeds and demonstrating a normative gap between patent law and the plant-breeders' rights regimes which promote these rights.[199] The privatization of plant and animal germ plasm through patents and other forms of intellectual property has highlighted a gap between WIPO institutional norms that promote innovation and the provisions of the Convention on Biological Diversity regarding access and benefit-sharing, the rights of traditional knowledge holders and biodiversity conservation.[200] The requirement under the Agreement on Trade-Related Aspects of Intellectual Property Rights (the TRIPS Agreement) of 1994 to protect property rights regarding new plant varieties may also promote the innovation of genetically modified organisms.[201] Such developments raise questions concerning gaps between the regimes of the TRIPS Agreement and the Convention on Biological Diversity, including the latter's requirement to recognize the value of the knowledge, innovations and practices of local communities relevant to the sustainable use of biodiversity.[202] Gaps are also apparent in the links between the TRIPS Agreement and the provisions of the Convention on Biological Diversity that establish principles for access to and the sharing of the benefits from genetic resources.[203]

D. Human rights instruments

74. Environmental degradation interferes with the enjoyment of a broad range of human rights, including those related to housing, water and sanitation, food, health, development and an adequate standard of living. Under international human rights law, States have an obligation to prevent foreseeable human rights harms, including

[196] Ibid., p. 24.
[197] See Eric L. Lane, "Legal aspects of green patents", in Adree Kirchner and Iris Kirchner-Freis, eds., *Green Innovations and IPR Management* (Kluwer Law International, 2013), p. 5021.
[198] See Claudio Chiarolla, *Intellectual Property, Agriculture and Global Food Security: The Privatization of Crop Diversity* (Edward Elgar Publishing, 2011), pp. 60–74.
[199] See Center for International Environmental Law, *A Citizen's Guide to WIPO* (2007), p. 3. Available at www.ciel.org/wp-content/uploads/2015/03/CitizensGuide_WIPO_Oct07.pdf.
[200] Ibid., p. 4.
[201] Ibid., p. 33. See also Simon Walker, *The TRIPS Agreement, Sustainable Development and the Public Interest*, Environmental Policy and Law Paper No. 41 (IUCN, 2001), p. xii. Available at https://portals.iucn.org/library/sites/library/files/documents/EPLP-041.pdf.
[202] Referring to article 8 (j) of CBD, see David Downes, "Using intellectual property as a tool to protect traditional knowledge: recommendations for next steps", discussion paper prepared for the Convention on Biological Diversity Workshop on Traditional Knowledge (Madrid, November 1997), p. 9. See also A. Gupta, "Securing traditional knowledge and contemporary innovations: can global trade links help grassroots innovations?", paper presented at the World Trade Forum, University of Bern, 1999.
[203] See also Marci Baranski, "International Treaty on Plant Genetic Resources for Food and Agriculture (2001)", Arizona State University Embryo Project Encyclopedia, 7 October 2013. Available at https://embryo.asu.edu/pages/international-treaty-plant-genetic-resources-food-and-agriculture-2001.

those caused by environmental degradation. Human rights instruments further reflect a wide array of principles applied in the context of environmental law, including solidarity, accountability, transparency, participation, access to information and remedies, the precautionary principle, equality and equity. In his report setting out a framework of principles on human rights and the environment, the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment articulates the application of existing human rights norms in the environmental context.[204]

75. Importantly, many human rights instruments explicitly reference the environment or environmental concerns. The Convention on the Rights of the Child refers to environmental pollution and environmental sanitation as issues that must be addressed to ensure the right to health, and also calls for education to help children develop a respect for the natural environment.[205] Numerous regional human rights treaties include the right to a healthy environment,[206] as do some environmental democracy treaties.[207] General Assembly resolution 70/169 and general comment No. 15 (2002) of the Committee on Economic, Social and Cultural Rights articulate a right to water and sanitation that derives from but is not explicitly present in the International Covenant on Economic, Social and Cultural Rights.[208]

76. In a series of resolutions, the Human Rights Council has addressed the issues of human rights and the environment generally, and also has focused specifically on environment, toxic substances and climate change, among other issues, explicitly noting the connections between a healthy environment and the effective enjoyment of human rights.[209] Such resolutions, in tandem with the work of other treaty bodies,[210] have raised awareness of environmental health and sustainability as a fundamental prerequisite to the enjoyment of human rights and the realization of gender equality and the empowerment of women. Regional courts may fill gaps between sources of human rights law and environmental law, as seen in the finding of the Inter-American Court of Human Rights in 2017 that States must take measures to prevent significant environmental harm to individuals inside and outside their territory.[211]

[204] See A/HRC/37/59.

[205] See Convention on the Rights of the Child, arts. 24 and 29.

[206] See for example, African Charter on Human and Peoples' Rights, Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights (San Salvador Protocol), Arab Charter on Human Rights, and ASEAN Human Rights Declaration.

[207] The Aarhus Convention and the Escazú Agreement.

[208] See resolution 70/169 and the Committee on Economic, Social and Cultural Rights, general comment No. 15 (2002) on the right to water.

[209] See, for example, Human Rights Council resolutions 38/4 on human rights and climate change; 37/8 on human rights and the environment; 27/23 on the Mandate of the Special Rapporteur on the implications for human rights of the environmentally sound management and disposal of hazardous substances and wastes. See also Dinah Shelton, "Human rights, health and environmental protection: linkages in law and practice", Health and Human Rights Working Paper Series, No. 1 (World Health Organization, 2002).

[210] See, for example, HRI/GEN/1/Rev.3; Committee on Economic, Social and Cultural Rights, general comment No. 12 (1999) on the right to adequate food; general comment 4 (1991) on the right to adequate housing, para. 5; CEDAW/C/2000/II/Add.7, para. 38.

[211] Inter-American Court of Human Rights, *The Environment and Human Rights (State Obligations in Relation to the Environment in the Context of the Protection and Guarantee of the Rights to Life and to Personal Integrity (Interpretation and Scope of Articles 4 (1) and 5 (1) of the American Convention on Human Rights)*, Advisory Opinion OC-23/18, (Ser. A) No. 23, 15 November 2017.

V. Gaps relating to the governance structure of international environmental law

77. The structure of international environmental governance is characterized by institutional fragmentation and a heterogeneous set of actors. Although States remain the primary actors, international environmental governance is a multi-actor governance system that includes international institutions, treaty bodies, non-governmental organizations, the scientific community and the private sector.

78. A multiplicity of global and regional international institutions participate in the task of international environmental law-making and implementation. They comprise entities of the United Nations system and treaty bodies established by multilateral environmental agreements. In the aftermath of the United Nations Conference on the Human Environment (the Stockholm Conference), UNEP was established to promote international cooperation in the field of the environment and to provide general policy guidance for the direction and coordination of environmental programmes within the United Nations system.[212] The role of UNEP as the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system and serves as the authoritative advocate for the global environment was reaffirmed in Agenda 21, the Nairobi Declaration on the Role and Mandate of UNEP [213] and the outcome document of the Rio+20 Conference, entitled "The future we want".[214] World leaders at the Rio+20 Conference and the General Assembly in 2012 decided to strengthen and upgrade UNEP and to establish universal membership in its Governing Council, which was subsequently renamed the United Nations Environment Assembly by the General Assembly in 2013. Many other United Nations system institutions have acquired considerable environmental responsibilities since UNEP was established. These include United Nations programmes and funds such as the United Nations Development Programme and the United Nations Human Settlements Programme (UN-Habitat) as well as specialized agencies such as FAO, IMO, IAEA, ICAO and ILO. In addition, the World Bank and the regional development banks have established substantial environmental portfolios.[215]

79. After the Stockholm Conference, international environmental law-making saw the proliferation of multilateral environmental agreements and the emergence of treaty-based bodies. According to the Environmental Law Information Service (ECOLEX), there are currently more than 500 multilateral environmental agreements,[216] and it has been estimated that some 200 or so treaty-based institutions were established in the two decades after the Stockholm Conference.[217] Such treaty bodies include supreme policymaking organs, which are invariably Conferences of the Parties or Meetings of the Parties that are responsible for the further development of the treaty regime as well as for the supervision and review of treaty implementation; secretariats that carry out administrative and support functions; and, in some cases, quasi-judicial and compliance mechanisms and procedures aimed at promoting compliance and addressing cases of non-compliance with treaty obligations. Moreover, several multilateral environmental agreements have been

[212] See resolution 2997 (XXVII), para. 2.

[213] *Official Records of the General Assembly, Fifty-second Session, Supplement No. 25* (A/52/25), annex, decision 19/1, annex.

[214] See resolution 66/288, para. 88.

[215] See A/61/583, para. 37.

[216] See www.ecolex.org.

[217] Biermann, "The emerging debate on the need for a world environment organization", p. 10.

negotiated under the auspices of and are administered by UNEP and other institutions of the United Nations system.

80. The proliferation of multilateral environmental agreements and the resultant distinct and separate mandates ignore the unity, interconnectedness and interdependence of the Earth's ecosystem. They also create potential for overlap and conflict, institutional and policy incoherence and increased financial and administrative burdens on States parties.[218] Significant efforts, however, are made to ensure mutual supportiveness among such agreements either in their texts (e.g., through cross references with other agreements or clarification of respective scopes) or in the way they are further developed and implemented (e.g., through decisions and/or resolutions regarding coordination and cooperation among agreements). More efforts could be made to establish or strengthen mechanisms to harness interlinkages and promote synergies for more effective implementation.[219] The clustering of related multilateral environmental agreements, for example those dealing with atmosphere, or biodiversity, or chemicals and wastes, would improve policy coherence and ensure mutually supportive implementation. The "synergies process" launched by the Conferences of the Parties of the Basel, Rotterdam and Stockholm Conventions in 2008/09, as well as the UNEP project entitled "Environmental treaties programme – realizing synergies for biodiversity" launched in November 2017, are commendable initiatives in this regard.[220]

81. The significant increase in the number of institutions with environmental responsibilities in the United Nations system, the imperative of integrating the environment and development and the proliferation of treaty-based institutions established by multilateral environmental agreements have created the need for effective coordination among relevant United Nations system institutions as well as the institutions created by the agreements. Indeed, the High-level Panel on United Nations System-wide Coherence in the Areas of Development, Humanitarian Assistance and the Environment underlined the fact that fragmented institutional structures do not offer an operational framework to address global issues.[221] Institutional fragmentation and a lack of coordination are key challenges with regard to the current international environmental governance. Previous and current institutional arrangements for coordination within the United Nations system, such as the Administrative Committee on Coordination, which was subsequently renamed the United Nations System Chief Executives Board for Coordination, the Inter-Agency Committee on Sustainable Development and the Environment Management Group, have proved limited in effectiveness or scope.[222] There have been concerted efforts, however, through the Environment Management Group, to build coherence among the biodiversity and chemicals regimes.

82. Enhanced coordination might be necessary not only within the field of international environmental law, but also between multilateral environmental

[218] See for example, B. L. Hicks, "Treaty congestion in international environmental law: the need for greater international coordination", *University of Richmond Law Review*, vol. 32, No. 5 (1999), p. 1659.

[219] A study by Oberthur and Gehring noted that institutional interaction led to synergy and the improved institutional effectiveness in more than 60 per cent of the case studies of international and European environmental policy, see Sebastian Oberthur and Thomas Gehring, eds., *Institutional Interaction in Global Environmental Governance: Synergy and Conflict among International and EU Policies* (MIT Press, 2006).

[220] See United Nations Environment Assembly resolution 2/17; CBD COP decision XIII/24.

[221] See A/61/583, para. 35.

[222] See, generally, Adil Najam, Mihaela Papa and Nadaa Taiyab, eds., *Global Environmental Governance: A Reform Agenda* (International Institute for Sustainable Development, 2006); Sands and others, *Principles of International Environmental Law*.

agreements and other instruments that directly or indirectly affect the environment, such as trade law, investment law and intellectual property rights regimes.

83. Institutional fragmentation and weak coordination between treaties can be addressed through various means, such as: (a) creating clusters and synergies between conventions; (b) mapping existing global and regional action plans and agreements to create an overview of coverage and identify interlinkages; (c) avoiding duplication of reporting and/or monitoring processes by using the same reporting channels and not creating additional burdens ("integrated reporting"); (d) sharing lessons learned and best practices; (e) developing implementation guidelines for multilateral environmental agreements; and (f) sharing information among the different scientific bodies that support the work of related multilateral environmental agreements. Potential conflicts between treaty regimes can be managed by using legal means, including conflict clauses, mutual supportiveness or the application of the general rule of treaty interpretation contained in article 31, paragraph 3 (c), of the Vienna Convention on the Law of Treaties.[223]

84. The trend in international environmental governance is increasingly towards broadening the range of actors recognized as having a legitimate role in governance.[224] Principle 10 of the Rio Declaration, Agenda 21 and the outcome document of the Rio+20 Conference, entitled "The future we want", have underlined the important role of non-State actors such as major groups, women, children and youth, indigenous peoples, non-governmental organizations, local authorities, workers and trade unions, business and industry, the scientific and technological community and farmers, as well as other stakeholders in the development and implementation of sustainable development policies. However, the scope and space for the participation of non-State actors in the international environmental legal process varies with the different treaty regimes. The preponderant mode of engagement of non-State actors is participation as observers in the negotiations that take place during the conferences of the parties to the multilateral environmental agreements, but no clear and effective rules have been developed to facilitate their input regarding the negotiation process. In specific instances, observers can participate in subsidiary bodies on an equal footing with parties, such as in partnerships structures.[225] In regimes such as climate change and ozone, the scientific community has direct input into policy development through dedicated institutional mechanisms that provide independent and authoritative information upon which decisions can be based. Very few regimes provide for public participation in the non-compliance procedures established to monitor, review and verify compliance with international obligations. The Convention on Access to Information, Public Participation in Decision-Making and Access to Justice in Environmental Matters (the Aarhus Convention) of 1998 provides the broadest latitude for public participation through procedural rights granted to non-State actors by States parties as well as the opportunity to participate in the Convention's non-compliance mechanism. A similar approach was adopted in the Regional Agreement on Access to Information, Public Participation and Justice in Environmental Matters in Latin America and the Caribbean (the Escazú Agreement) of 2018.[226] Nevertheless, compared to the international human rights mechanisms there exists a significant gap in international environmental law regarding effective participation by non-State actors in international law-making and implementation.

[223] See A/CN.4/L.682, paras. 410–480.

[224] Sands and others, *Principles of International Environmental Law*, p. 52.

[225] See the various partnerships established under the Basel Convention: the Partnership for Action on Computing Equipment (PACE), the Mobile Phone Partnership Initiative (MPPI), the Household Waste Partnership.

[226] Adopted in Escazú, Costa Rica, on 4 March 2018.

VI. Gaps relating to the implementation and effectiveness of international environmental law

A. National implementation

85. To be effective, international environmental norms must be implemented.[227] That occurs when national laws that contain measures to implement international commitments are adopted or adapted, when it is ensured that those national measures correspond to the requirements of international law and are complied with by actors under parties' jurisdiction and control and when obligations to relevant international institutions, such as reporting, are fulfilled.[228]

86. The lack of effective implementation of many multilateral environmental agreements has been identified as a major gap in addressing environmental challenges.[229] Many countries face challenges associated with the implementation of multiple agreements. Implementation deficits arise for different reasons, including knowledge gaps; a lack of adequate means of implementation, such as finance, capacity-building or technology; the need for facilitation for compliance; a lack of coordination between relevant government departments as well as with other sectors; insufficient monitoring and law enforcement; a lack of political will; and the inadequate engagement of different stakeholders, such as civil society and women's organizations.[230] Coherence, synergy and coordination at the international level could ease implementation at the national level, as demonstrated by the "synergies process" under the Basel, Rotterdam and Stockholm Conventions, but is largely limited.[231] The same challenge applies at the national level, where different ministries may be responsible for the implementation of different multilateral environmental agreements.

B. Means of implementation: financial resources, technology transfer and capacity-building

87. Access to means of implementation, such as financial resources, environmentally sound technologies and technical and institutional capacities, is an important variable in the effective implementation of commitments and compliance with treaty obligations, especially for developing countries and, in some instances, countries with economies in transition. The establishment of financial mechanisms and the provision of technical and technological assistance and capacity-building to enable compliance and implementation are integral to many multilateral environmental agreements.[232] Moreover, many international organizations also

[227] Bodansky, *The Art and Craft of International Environmental Law*, p. 223.

[228] Sands and others, *Principles of International Environmental Law*, p. 147.

[229] UNEP, "Future shape of international law to address pollution of global significance affecting the Earth's ecosystems: consolidated report of initial consideration by experts", 6 April 2018.

[230] David Victor, Kal Raustiala and Eugene B. Skolnikoff, eds., *The Implementation and Effectiveness of International Environmental Commitments: Theory and Practice* (MIT Press, 1998).

[231] UNEP, "Future shape of international law to address pollution of global significance affecting the Earth's ecosystems".

[232] See, for example, UNFCC, art. 11; CBD, arts. 16, 18, 20 and 21; Montreal Protocol, arts. 10 and 11; Basel Convention, arts. 10 and 14; Paris Agreement, arts. 9–11; and Minamata Convention on Mercury, arts. 13 and 14. Special Funds have also been established under the

engage in financial and technical support and capacity-building efforts as part of their programmes.[233]

88. A number of studies have noted the difficulties relating to the provision of public finance and the mobilization of private finance across multilateral environmental agreements.[234] Generally, funding for implementation remains insufficient, unpredictable and incoherent, and varies considerably among the different regimes.[235] On the other hand, the barriers facing the effective transfer of environmentally sound technologies include the limited information and decision-support tools required for transfer; inadequate arrangements for the protection of patents and other intellectual property rights; the lack of cooperation among governments, corporations and the financial community with regard to investing in and making available environmentally sound technologies; and the inadequacy of systems for collecting, synthesizing and reporting back information and knowledge on such technologies.[236]

89. Limited reporting by developed countries regarding the resources that have been provided and mobilized, the technologies that have been transferred and any other support that has been provided, as well as the lack of processes to monitor and review compliance with financial, technology transfer and capacity-building obligations, have constituted important constraints to the effective implementation of relevant treaty provisions.[237] The reporting and review processes of multilateral environmental agreements play a significant role in determining whether developed countries are meeting their commitments relating to technological, technical and financial support, and failure by treaty parties to provide relevant information in national reports has a negative impact on the evaluation of the effectiveness of relevant treaty provisions.[238] Recent developments in treaty-making have demonstrated deliberate efforts by governments to address this gap.[239]

climate and ozone regimes (Green Climate Fund and the Multilateral Fund for the Implementation of the Montreal Protocol).

[233] The Global Environment Facility, jointly administered by the World Bank, the United Nations Development Programme (UNDP) and UNEP, not only acts as the financial mechanism for a number of multilateral environmental agreements but also provides financial resources on the basis of its own mandate such as the Capacity 21 programme of UNDP and the technical assistance and capacity-building programmes of UNEP.

[234] Kamleshan Pillay, Stine Aakre and Asbjørn Torvanger, "Mobilizing adaptation finance in developing countries", 23 March 2017; Aaron Atteridge, "Will private finance support climate change adaptation in developing countries?", Stockholm Environment Institute Working Paper, No. 2011-05 (November 2011); Tom Conway, "Building capacity for resource mobilization: improving the financial conditions for implementation of the Basel Convention at the national and regional levels", available at www.slideserve.com/rozene/building-capacity-for-resource-mobilization.

[235] See Ole Kristian Fauchald, *International Environmental Governance: A Legal Analysis of Selected Options*, FNI Report 16/2010 (Fridtjof Nansen Institute, 2010).

[236] See Steve Halls, "Barriers to technology transfer: environmentally sound technologies and implementation of the Kyoto Protocol", available at http://unfccc.int/ttclear/events/2002_event2; United Nations, Department of Economic and Social Affairs, *Climate Change: Technology Development and Technology Transfer*, background paper prepared for the Beijing High-level Conference on Climate Change, November 2008.

[237] See, generally, Marc Pallemaerts and Jonathan Armstrong, "Financial support to developing countries for climate mitigation and adaptation: is the EU meeting its commitments", November 2009.

[238] Tullio Treves and others, eds., *Non-Compliance Procedures and Mechanisms and the Effectiveness of International Environmental Agreements* (T.M.C. Asser Press, 2009), p. 109; Pallemaerts and Armstrong, "Financial support to developing countries for climate mitigation and adaptation".

[239] See Minamata Convention on Mercury, art. 22; Paris Agreement, art. 13.

C. Dispute settlement, compliance and enforcement mechanisms

90. Gaps relating to the implementation and effectiveness of international environmental law have appeared in several aspects of inter-State dispute settlement. In the absence of an international environmental court, disputes relating to the environment have been addressed by a variety of international courts and tribunals. In *Gabčíkovo-Nagymaros*, the International Court of Justice faced the difficult task of weighing the rights of parties under circumstances where the likelihood and extent of environmental harm remained unknown. This highlighted the paucity of rules or principles addressing unrealized harm, which is a problematic status quo in the light of the often-significant gap in time between acts and their effects on the environment.[240] A more recent case heard by the International Court of Justice reveals some gaps in the Court's application of scientific data in environmental dispute settlement. In *Whaling in the Antarctic*, the Court's limited analysis regarding the meaning of "scientific research" has been lamented as a gap in its approach to resolving the dispute.[241] Data-intensive environmental cases before the Court have also revealed gaps in judicial practices concerning the use of experts.[242]

91. The practice of other intergovernmental institutions also suggests certain gaps in the settlement of environmental disputes. For example, while the Permanent Court of Arbitration designed procedural rules in 2001 specifically to facilitate the arbitration of disputes relating to the environment and natural resources, these were adopted by parties in only six cases as of November 2017, all of which related exclusively to climate law.[243]

92. Compliance mechanisms and procedures established within a multilateral environment agreement provide a multilateral avenue for addressing party-specific compliance challenges. At the intersection between diplomacy and law, compliance bodies do not render judicial decisions, nor do they generally enforce their findings, per se. However, they have at their disposal a variety of tools that enable them to better tailor their responses to a specific case. While some treaties have established mechanisms to monitor compliance and address cases of non-compliance,[244] overall there remains a need to strengthen these procedures in order to promote the effective implementation of international environmental law.[245] In addition, gaps in this context

[240] See Mari Nakamichi, "The International Court of Justice decision regarding the Gabčíkovo-Nagymaros Project", *Fordham Environmental Law Journal*, vol. 9, No. 2 (Spring 1998), pp. 337 and 364.

[241] See also Michaela Young, "Whaling in the Antarctic (*Australia v. Japan: New Zealand intervening*): progressive judgment or missed opportunity for the development of international environmental law?", *Comparative and International Law Journal of Southern Africa*, vol. 48, No. 1 (March 2015), pp. 59 and 70.

[242] See, for example, Joint dissenting opinion of judges Al-Khasawneh and Simma, in *Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment, I.C.J. Reports 2010*, p. 107.

[243] See Judith Levine, "A rising tide of cases: what role for arbitration and conciliation in the climate change context?", presentation for the IBA/ICC/PCA/SCC side event, Bonn, 16 November 2017, p. 10, available at https://sccinstitute.com/media/225404/cop23-slides-judith-levine.pdf; Permanent Court of Arbitration, "PCA participation in COP21 and Conference on Climate Change Disputes", press release, 8 December 2015, note 11; Tamar Meshel, "Optional rules for arbitration of disputes relating to natural resources and/or the environment", MPILux Working Paper, No. 1 (2017), para. 14, available at www.mpi.lu/research/working-paper-series/2017/wp-2017-1/.

[244] See Montreal Protocol on Substances that Deplete the Ozone Layer; Kyoto Protocol.

[245] Outlining several such means under CITES, see CITES secretariat, "CITES compliance and enforcement regime", presentation for the expert meeting on compliance with the Nagoya Protocol to CBD, Montreal, March 2012). Available at www.cbd.int/doc/meetings/abs/absem-comp-01/other/absem-comp-01-presentation-cites-en.pdf.

may be viewed in participatory terms, inasmuch as non-compliance bodies do not generally permit non-State actors to raise complaints.[246]

93. Gaps also persist in the enforcement of rights and obligations regarding the global commons and shared natural resources, such as the high seas, Antarctica[247] and outer space.[248] In terms of disputes concerning natural resources which do not originate from environmental treaties, practices under international trade[249] and investment[250] regimes also reveal gaps in the implementation and effectiveness of environmental norms. Such gaps in regime interaction may also arise insofar as many environmental treaties do not address their relationships with economic treaties, which may give rise to distinct sources of applicable law or jurisdiction in a given dispute.

D. Liability and redress for transboundary environmental damage

94. The Stockholm and Rio Declarations underlined the importance of liability and redress for transboundary environmental harm as well as the paucity of international norms on the subject.[251] This is a concern precisely because a liability and redress regime for transboundary environmental harm serves several policy objectives: first, it serves as an instrument for the internalization of the environmental costs of polluting activities by making the polluters pay; second, it incentivizes compliance with international environmental norms and standards and ensures the implementation of the precautionary and preventive principles; and finally, it ensures the redress of environmental damage through the implementation of restorative measures.[252] Whereas there has been a remarkable proliferation of multilateral environmental agreements since the Stockholm Conference, there has been only limited development in the area of liability and redress for transboundary environmental harm. State responsibility and international liability on the one hand, and civil liability on the other, represent the two broad categories of liability in international environmental law.

State responsibility and international liability

95. It is a basic principle of international law that a breach of an international obligation by a State constitutes an internationally wrongful act which results in the State's international responsibility.[253] This fundamental principle was restated by the

[246] A notable exception exists under the Aarhus Convention. See also Tullio Treves, "Introduction", in Tullio Treves and others, eds., *Civil Society, International Courts and Compliance Bodies* (Cambridge University Press 2005), pp. 1 and 7.

[247] See the Antarctic Treaty, art. XI (conditioning ICJ review on consent from all concerned States). See also (with relatively limited ratifications) Protocol on Environmental Protection to the Antarctic Treaty, art. 18.

[248] No space law instruments provide for binding and compulsory dispute settlement.

[249] See *European Communities – Measures concerning Meat and Meat Products (Hormones)*, WT/DS26/AB/R, 16 January 1998 (demonstrating reluctance to apply environmental principles to justify trade measures).

[250] See International Centre for Settlement of Investment Disputes, *Compañía del Desarrollo de Santa Elena S.A. v. the Republic of Costa Rica*, Case No. ARB/96/1, Final Award, 17 February 2000, paras. 71–72 (finding that environmental justifications do not affect compensation duties).

[251] Stockholm Declaration, principle 22; Rio Declaration, principle 13.

[252] See Jutta Brunnée, "Of sense and sensibility: reflections on international liability regimes as tools for environmental protection", *International Comparative Law Quarterly*, vol. 53, No. 2, p. 351; Sands and others, *Principles of International Environmental Law*, p. 735.

[253] See, generally, James Crawford, Alain Pellet and Simon Olleson, eds., *The Law of*

International Law Commission in article 1 of its articles on the responsibility of States for international wrongful acts.[254] The act must not only be attributable to the State under rules of international law but must also constitute a breach of an international obligation under either general international law or a treaty in force.[255] A number of arbitral and judicial decisions have affirmed the existence of an international obligation for every State to ensure that activities within its territory or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction.[256] This general obligation was reaffirmed in Principle 21 of the Stockholm Declaration and Principle 2 of the Rio Declaration and has been incorporated into a number of multilateral environmental agreements.[257] State responsibility entails the obligation, in the first instance, to take measures to cease transboundary environmental harm, and in the second instance to provide reparation by, inter alia, redressing the damage if such harm occurs.[258]

96. The rules of State responsibility may need to be further developed if they are to play any significant role as a tool for redressing transboundary environmental harm.[259] Currently there are some important constraints. In particular, the "due diligence" standard of care implies a demonstration of fault on the part of the State concerned since it denotes an obligation of conduct and not of result.

97. On the other hand, international liability for transboundary environmental harm is not based on the existence of an internationally wrongful act.[260] It is a product of treaty practice and focuses on the provision of compensation for transboundary harm arising from lawful but risk-intensive activities.[261] Only a handful of treaties provide for international liability for transboundary environmental damage.[262] In 1978, the International Law Commission launched work on the topic "International liability for injurious consequences arising from acts not prohibited by international law". Owing

International Responsibility (Oxford University Press, 2010).

[254] See resolution 56/83, annex.

[255] Ibid., art. 2.

[256] See *Trail Smelter Case (United States, Canada)*, pp. 1906–1982; *Corfu Channel Case, Judgment of April 9th 1949, I.C.J. Reports 1949*; Arbitral Tribunal, *Lake Lanoux Arbitration (France v. Spain)*, 16 November 1957; *Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, I.C.J. Reports 1996*; Permanent Court of Arbitration, *Iron Rhine Arbitration (Belgium/Netherlands)*, Final Award, 24 May 2005.

[257] See for example, CBD, art. 3; UNCLOS, art. 194; Vienna Ozone Convention, preamble.

[258] See resolution 56/83, annex, arts. 30 and 31; Permanent Court of International Justice, *Chorzów Factory Case*, Ser. A, No. 13, 46–48, 1927; *Gabčíkovo-Nagymaros Project (Hungary/Slovakia), Judgment, I.C.J. Reports 1997;* I.C.J., *Certain Activities Carried Out By Nicaragua in the Border Area (Costa Rica v. Nicaragua),* General list No. 150 of 2 February 2018; Makane Moise Mbengue, "Critical assessment of reparation in international environmental law", *Proceedings of the ASIL Annual Meeting*, vol. 110 (2016), p. 293.

[259] See Brunnée, "Of sense and sensibility", p. 354; T. Scovazzi, "State responsibility for environmental harm", *Yearbook of International Environmental Law*, vol. 12, No. 1 (January 2001), p. 55; Sands and others, *Principles of International Environmental Law*, p. 803.

[260] See Teresa A. Berwick, "Responsibility and liability for environmental damage: a roadmap for international environmental law regimes", *Georgetown International Environmental Law Review*, vol. 10, No. 2 (1998), p. 257; Brunnée, "Of sense and sensibility", p. 352; Malgosia Fitzmaurice, "International responsibility and liability", in Bodansky, Brunnée and Hey, eds., *The Oxford Handbook of International Environmental Law*.

[261] Berwick, "Responsibility and liability for environmental damage", p. 259.

[262] See Convention on International Liability for Damage Caused by Space Objects (primary and absolute State liability); UNCLOS, art. 139, and *Responsibilities and Obligations of States Sponsoring Persons and Entities with Respect to Activities in the Area, Advisory Opinion* (with respect to activities in the area); Convention on the Regulation of Antarctic Mineral Resource Activities (which has not entered into force); Madrid Protocol (which, in annex VI, article 10, imposes State liability).

to a lack of support for the concept of international liability on the part of some governments, the Commission shifted its focus to "prevention" and "allocation of loss".[263] In 2001, the Commission adopted the draft articles on the prevention of transboundary harm from hazardous activities, which purport to recognize an international obligation to take appropriate measures to prevent significant transboundary harm or to minimize it. This work was supplemented in 2006 by a set of draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous activities[264] with the twin objectives of ensuring prompt and adequate compensation to victims of transboundary harm and preserving and protecting the environment through the mitigation of damage and its restoration or reinstatement. By requiring States to impose liability on those who conduct hazardous activities, the draft principles marked a clear shift from any notions of international liability.[265]

Civil liability

98. There have been remarkable developments in treaty law relating to civil liability for transboundary environmental damage. Issue-specific treaty regimes cover diverse areas such as nuclear energy,[266] oil pollution,[267] the transport of dangerous goods and substances, living modified organisms[268] and industrial accidents.[269] Earlier treaties dealing with nuclear energy and oil pollution were originally designed to ensure compensation for injury to person and property, and liability for transboundary environmental damage was subsequently added through specific amendments.[270]

99. There exist some notable deficiencies with respect to these regimes. First, the valuation of environmental damage and its reparation has proved problematic. While it is agreed that, for liability to arise, environmental damage should exceed a de minimis threshold, there is no agreed international standard for that threshold. The instruments refer variously to "significant", "substantial" or "serious" damage or damage "above tolerable levels".[271] Most of the civil liability regimes restrict

[263] See A/CN.4/531, para. 152.

[264] See A/61/10.

[265] The General Assembly has continued to consider, most recently in its resolution 71/143, the possible future form of both the draft articles and draft principles.

[266] The civil liability regime for nuclear damage comprises three interrelated treaties, with their respective amendments and supplementary instruments: Convention on Third Party Liability in the Field of Nuclear Energy (Paris Convention) and its 2004 Protocol to Amend the Paris Convention; Vienna Convention on Civil Liability for Nuclear Damage (Vienna Convention); Convention Relating to Civil Liability in the Field of Maritime Carriage of Nuclear Material (Brussels Convention).

[267] The oil pollution regime comprises: International Convention on Civil Liability for Oil Pollution Damage (Oil Pollution Convention), and its 1992 Protocol; International Convention on the Establishment of an International Fund for Compensation for Oil Pollution Damage (Oil Fund Convention); Convention on Civil Liability for Oil Pollution Damage Resulting from Exploration for and Exploitation of Seabed Mineral Resources.

[268] Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety.

[269] Protocol on Civil Liability and Compensation for Damage Caused by Transboundary Effects of Industrial Accidents on Transboundary Waters to the 1992 Convention on the Protection and Use of Transboundary Watercourses and International Lakes and to the 1992 Convention on the Transboundary Effects of Industrial Accidents.

[270] See, for example, Protocol to Amend the Vienna Convention on Civil Liability for Nuclear Damage, art. 2; Convention on Supplementary Compensation for Nuclear Damage, art. 1; 2004 Protocol to Amend the Paris Convention, sect. B; Protocol to Amend the Oil Pollution Convention.

[271] ILC, on the other hand, has settled on the term "significant" in both its draft articles on prevention of transboundary harm from hazardous activities (arts. 1 and 2) and its draft principles on the allocation of loss in the case of transboundary harm arising out of hazardous

compensation to “costs of measures of reinstatement of the impaired environment undertaken or to be undertaken”. A number of courts and tribunals have, however, awarded compensation for pure environmental damage. In many cases, environmental damage in areas beyond the limits of national jurisdiction is not covered. However, the costs of measures undertaken to prevent or mitigate environmental damage outside national jurisdiction are covered by a number of the treaties.[272] Finally, liability is limited in terms of the amount of compensation payable. It may also be noted that several of the civil liability instruments have not entered into force.[273]

VII. Conclusions

100. The above review and analysis of the state of international environmental law and environment-related instruments reveals gaps and deficiencies at multiple levels. There are significant gaps and deficiencies with respect to the applicable principles of environmental law; the normative and institutional content of the sectoral regulatory regimes, as well as their articulation with environment-related regimes; the governance structure of international environmental law; and the effective implementation of, compliance with and enforcement of international environmental law.

101. Environmental principles inform the way in which environmental treaties can be interpreted, and may fill gaps between the rules laid out in treaties. Such principles include the duty of States to prevent significant environmental harm beyond their national boundaries, exercise precaution in making decisions which may harm the environment, provide reparation for environmental harm, provide public access to information and decision-making involving potentially significant environmental harm and cooperate in environmental protection. Some of the principles have been incorporated into the issue-specific contexts of many multilateral environmental agreements. In addition, several international courts and tribunals have confirmed the existence of rules of customary international law relating to environmental protection, in particular the obligation to prevent environmental harm beyond national jurisdiction, the performance of due diligence, the duty to conduct an environmental impact assessment and the obligation of reparation for environmental damage.

102. There are important deficiencies with respect to principles of international environmental law, in particular with respect to their content and legal status. There are instances where there is no clarity as to the nature and content of a principle, or no judicial consensus as to its applicability, or no recognition in binding legal instruments, or all of the above. The degree of legal uncertainty surrounding many of these principles has a direct and indirect impact on the predictability and implementation of sectoral environmental regimes. Some principles, such as access to information, participation in decision-making and access to justice, have only

activities (principle 2).

[272] See, for example, International Convention on Liability and Compensation for Damage in Connection with the Carriage of Hazardous and Noxious Substances by Sea (HNS Convention), and Convention on Civil Liability for Damage caused During Carriage of Dangerous Goods by Road, Rail and Inland Navigation Vessel (CRTD).

[273] These include the HNS Convention and its 2010 Protocol, the Basel Protocol on Liability and Compensation for Damage Resulting from Transboundary Movement of Hazardous Wastes and their Disposal, the Nagoya-Kuala Lumpur Supplementary Protocol on Liability and Redress to the Cartagena Protocol on Biosafety, the Protocol on Civil Liability and Compensation for Damage Caused by Transboundary Effects of Industrial Accidents, the Convention on Civil Liability for Damage Resulting from Activities Dangerous to the Environment and the 1988 Convention on the Regulation of Antarctic Mineral Resource Activities.

regional application. Others, such as a right to a clean and healthy environment and the principles of non-regression and progression, have only recently, and only in a limited number of legal instruments, been recognized and have not yet been fully developed. Although the principles of sustainable development and common but differentiated responsibilities and respective capabilities are inherently dynamic and flexible enough to allow international law to grow and respond to new challenges, their general application is hardly evident. There is a need to further clarify the principles of environmental law, without prejudice to the legal developments already achieved in the issue-specific contexts of various multilateral environmental agreements. A comprehensive and unifying international instrument that gathers all the principles of environmental law could provide for better harmonization, predictability and certainty.

103. International environmental law is characterized by fragmentation and a general lack of coherence and synergy among a large body of sectoral regulatory frameworks. This fragmentation is inevitable given the piecemeal, incremental and reactive nature of international environmental law-making. However, deliberate efforts will be required to harness the interlinkages and synergies inherent in specific areas such as biodiversity, atmosphere or chemicals and wastes. The governance structure of international environmental law corresponds to its fragmentation. A multiplicity of institutions have responsibilities and mandates with respect to the environment, including institutions of the United Nations system, treaty-based bodies established by multilateral environmental agreements and specialized agencies, as well as regional institutions. This institutional fragmentation requires better coordination at both the law-making and implementation levels in order to ensure policy coherence, mutual supportiveness and synergies in implementation. There is, however, an important coordination deficit within the United Nations system, between United Nations system institutions and multilateral environmental agreements, among multilateral environmental agreements and between multilateral environmental agreements and other environment-related instruments. Strengthened coordination and coherence could enhance the effectiveness of international environmental law.

104. There are important gaps and deficiencies in specific sectoral regulatory regimes. In general, the sectoral approach has also meant that some issues remain without specific, legally binding regulation, including regulations on the conservation and sustainable use of forests, the pollution of marine areas by land-based plastic waste, the protection of soil, human rights and climate change, biodiversity, nanomaterials and some geo-engineering activities. Some of these issues can, subject to political will, find a home in existing multilateral environmental agreements. With regard to the climate change regime, an important challenge is the articulation between multiple treaties that have different memberships and contain different, sometimes overlapping, obligations. There may be a need for the harmonization of various aspects of the treaties, such as reporting, in order to pre-empt potential tensions among them. In treaties that deal with the protection of the atmosphere, such as ozone and mercury regimes, challenges relate to implementation, monitoring, reporting and verification. On the other hand, air pollution has largely been framed as a regional issue, notwithstanding the growing evidence of its global effects. Regional approaches leave significant gaps in coverage in terms of countries and of pollutants or pollution sources. Some regional approaches show weak implementation and poor compliance with existing rules. A global approach to air pollution through a global air pollution treaty or the linking of regional treaties might be desirable.

105. The biodiversity cluster of treaties is also characterized by issues of ineffective implementation; ineffectual processes relating to monitoring, reporting, review and verification; and the absence of or inadequate procedures and mechanisms to promote and enforce compliance. The growing focus on the concept of ecosystem-services,

which attaches economic value to biodiversity, could help better integrate and mainstream biodiversity into other policy and law-making arenas. Several more narrowly focused regional and subregional instruments exist, but there is scope for further developments that would allow for the adjustment of rules pertaining to specific transboundary ecological areas or species. More attention needs to be given to direct and indirect drivers of biodiversity loss, as well as to cooperation and coherence with other areas of international law that govern those drivers, such as trade, food security, climate change and marine use.

106. Freshwater resources are regulated through a patchwork of global, regional and basin agreements which often utilize ambiguous terms, leading to uncertainty and a lack of uniformity as to how they are applied. Environmental principles could fill the resulting normative and institutional gaps in these instruments, and may serve to harmonize their application.

107. With regard to the marine environment, while the United Nations Convention on the Law of the Sea provides a comprehensive set of rules for the protection and preservation of the marine environment, different complementary instruments apply to various activities depending upon the subject matter and the geographical location concerned. This sectoral approach creates challenges to the implementation of integrated approaches. Compliance mechanisms are not common and disparities remain in terms of assessing implementation. No specific instruments comprehensively address the modern challenges of marine debris, plastics and microplastics. While the Convention provides a unifying legal framework to address fragmentation, its potential role in that regard has not yet been fully realized.

108. There are significant gaps in the regulatory regimes of hazardous substances, wastes and activities. With regard to hazardous substances, these gaps lie in the absence of global rules that address accident prevention, preparedness and response, as well as binding rules regarding classification, labelling, packaging and transport. International rules governing hazardous wastes do not impose quantitative restrictions on the generation of such wastes within specific time frames. The absence of an operative global liability and compensation regime with respect to the transboundary movements of hazardous wastes is a major gap in the international legal framework. Finally, in the area of hazardous activities, international regulation has focused mainly on nuclear activities. However, there are critical deficiencies with respect to legally binding global rules, principles and standards relating to the design, siting and safety of nuclear power plants.

109. The articulation between multilateral environmental agreements and environment-related instruments remains problematic owing to the lack of clarity, content-wise and status-wise, of many environmental principles. There is a need for greater mutual supportiveness of rules concerning trade and environment. Environmental concerns addressed in investment treaties have not generally evolved to include issues such as climate change and biodiversity. Intellectual property instruments have not interacted harmoniously with agricultural concerns, the rights of indigenous and local communities or access to genetic resources and benefit-sharing. Regional courts are left to integrate environmental considerations and human rights on a case-by-case basis.

110. International courts and tribunals often stress the lack of international consensus concerning environmental principles. Non-specialized courts and tribunals have faced obstacles related to assessing environmental data, situations where environmental harm has not yet occurred and applying general rules to environmental damage. Compliance regimes are largely inadequate and need to be strengthened to promote the effective implementation of multilateral environmental agreements. Outside the realm of oil pollution and nuclear damage, liability and redress regimes are either

non-existent or consist of adopted instruments that have not entered into force. Implementation gaps also remain with respect to the enforcement of rights and obligations regarding the high seas and shared natural resources.

111. The implementation of international environmental law remains problematic at both the national and international levels. National implementation is constrained in many countries by a lack of appropriate national legislation, financial resources, environmentally sound technologies and institutional capacities. National implementation could be improved through the mainstreaming of environmental considerations into other sectors and the enhanced participation of non-State actors in decision-making and implementation.

112. At the international level, implementation is also constrained by the lack of clarity of many environmental principles. Nevertheless, implementation at this level could be strengthened through more effective reporting, review and verification processes, as well as robust compliance and enforcement procedures and mechanisms. The role of non-State actors in international environmental law-making, implementation monitoring and compliance procedures needs to be enhanced in most sectoral regulatory regimes.

113. Building upon the creative approaches that States have thus far adopted to protect the environment, it is essential that States and the United Nations work together to address gaps in international environmental law. We must collectively seize the opportunity to use international environmental law in new and dynamic ways to provide a strong and effective governance regime with a view to better safeguarding the environment for future generations.

United Nations A/RES/73/333

General Assembly

Distr.: General
5 September 2019

Seventy-third session
Agenda item 14

Resolution adopted by the General Assembly on 30 August 2019

[*without reference to a Main Committee (A/73/L.108 and A/73/L.108/Add.1)*]

73/333. Follow-up to the report of the ad hoc open-ended working group established pursuant to General Assembly resolution 72/277

The General Assembly,

Recalling its resolution 72/277 of 10 May 2018, entitled "Towards a Global Pact for the Environment",

Reaffirming the purposes and principles of the Charter of the United Nations,

Recalling the Declaration of the United Nations Conference on the Human Environment,[1] the Rio Declaration on Environment and Development,[2] Agenda 21,[3] the Programme for the Further Implementation of Agenda 21,[4] the Johannesburg Declaration on Sustainable Development[5] and the Plan of Implementation of the World Summit on Sustainable Development (Johannesburg Plan of Implementation)[6] and the outcome document of the United Nations Conference on Sustainable Development, entitled "The future we want",[7] as well as the outcomes of all the major United Nations conferences and summits in the economic, social and environmental fields,

[1] *Report of the United Nations Conference on the Human Environment, Stockholm, 5–16 June 1972* (A/CONF.48/14/Rev.1), part one, chap. I.
[2] *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3–14 June 1992*, vol. I, *Resolutions Adopted by the Conference* (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution 1, annex I.
[3] Ibid., annex II.
[4] Resolution S-19/2, annex.
[5] *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August–4 September 2002* (United Nations publication, Sales No. E.03.II.A.1 and corrigendum), chap. I, resolution 1, annex.
[6] Ibid., resolution 2, annex.
[7] Resolution 66/288, annex.

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Recognizing existing obligations and commitments under international environmental law,

Reaffirming all the principles of the Rio Declaration,

Reaffirming also its resolution 70/1 of 25 September 2015, entitled "Transforming our world: the 2030 Agenda for Sustainable Development", in which it adopted a comprehensive, far-reaching and people-centred set of universal and transformative Sustainable Development Goals and targets, its commitment to working tirelessly for the full implementation of the Agenda by 2030, its recognition that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development, its commitment to achieving sustainable development in its three dimensions – economic, social and environmental – in a balanced and integrated manner, and to building upon the achievements of the Millennium Development Goals and seeking to address their unfinished business,

Stressing the need to continue to address, in a comprehensive and coherent manner, the challenges posed by environmental degradation in the context of sustainable development,

1. *Welcomes* the work of the ad hoc open-ended working group established pursuant to General Assembly resolution 72/277, as well as its report,[8] and endorses all its recommendations, as set out in the annex to the present resolution;

2. *Decides* that costs associated with the implementation of the present resolution and with the facilitation of the participation of representatives from developing countries, in particular the least developed countries, landlocked developing countries and small island developing States, in any future meeting related to the implementation of the recommendations on the consideration of further work as set forth in the annex, shall be met from voluntary contributions, requests the Secretary-General to continue to make use of the special voluntary trust fund established pursuant to paragraph 10 of resolution 72/277 for this purpose, and invites Member States, international financial institutions, donor agencies, intergovernmental organizations, non-governmental organizations and natural and juridical persons to make financial contributions to the voluntary trust fund.

103rd plenary meeting
30 August 2019

Annex

Recommendations of the ad hoc open-ended working group established pursuant to General Assembly resolution 72/277

Objectives guiding the recommendations

(1) Reinforce the protection of the environment for present and future generations;

(2) Uphold the respective obligations and commitments under international environmental law of States Members of the United Nations and members of specialized agencies;

(3) Contribute to the strengthening of the implementation of international environmental law and environment-related instruments;

[8] A/AC.289/6/Rev.2.

(4) Support the full implementation of the 2030 Agenda for Sustainable Development,[9] as well as the outcome document of the United Nations Conference on Sustainable Development, entitled "The future we want",[10] including paragraphs 88 and 89 thereof;

(5) Not undermine existing relevant legal instruments and frameworks and relevant global, regional and sectoral bodies;

Substantive recommendations

(6) Reaffirm the role of the United Nations Environment Programme as the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system and serves as an authoritative advocate for the global environment, and also reaffirm the role of the United Nations Environment Assembly;

(7) Call for renewed efforts at all levels to enhance the implementation of existing obligations and commitments under international environmental law, stressing the importance of enhanced ambition regarding means of implementation, including the provision and mobilization of all types and sources of means of implementation, consistent with the Addis Ababa Action Agenda of the Third International Conference on Financing for Development[11] and the 2030 Agenda for Sustainable Development;

(8) Recognize the role of discussions on principles of international environmental law in enhancing the implementation of international environmental law, also noting the ongoing work in the International Law Commission on general principles of law;

(9) Invite the scientific community to further its work on interconnected and cross-cutting issues by sharing information among the leading scientific, technical and technological bodies that inform the work of multilateral environmental agreements and environmental processes, and encourage the scientific, technical and technological bodies to strengthen cooperation among themselves;

(10) Invite the governing bodies of the multilateral environmental agreements, while preserving their independence and respective mandates, to increase their efforts to promote policy coherence across environmental instruments at all relevant levels and to consider identifying and addressing implementation challenges in their regimes, with a view to strengthening implementation at the national and international levels;

(11) Invite the governing bodies and secretariats of multilateral environmental agreements to enhance cooperation and collaboration among themselves within the scope of their respective mandates, as well as between themselves and the United Nations Environment Programme and the United Nations Environment Assembly, building on work already done;

(12) Encourage the governing bodies of multilateral environmental agreements and scientific, technical and technological bodies to exchange information and experiences, including with a view to considering the streamlining of reporting and/or monitoring processes;

[9] Resolution 70/1.
[10] Resolution 66/288, annex.
[11] Resolution 69/313, annex.

(13) Encourage all that have not yet done so to consider ratifying multilateral environmental agreements and to effectively implement them;

(14) Encourage States Members of the United Nations and all members of the specialized agencies to strengthen, where needed, environmental laws, policies and regulatory frameworks at the national level, as well as capacities across all sectors for the effective implementation of international environmental law, including in the administrative and justice sectors in accordance with national legal systems, while acknowledging the importance of international cooperation in supporting and complementing national actions;

(15) Encourage States Members of the United Nations and all members of the specialized agencies to mainstream environment into sectoral policies and programmes at all levels, including into national development and sustainable development plans, to enhance the implementation of international environmental law and applicable environment-related instruments;

(16) Encourage the active and meaningful engagement of all relevant stakeholders at all levels in the different forums related to the implementation of international environment law and environment-related instruments;

(17) Encourage the exploration of further ways for States Members of the United Nations and all members of the specialized agencies to support and make full use of the fifth Programme for the Development and Periodic Review of Environmental Law (Montevideo Programme V), adopted at the fourth session of the United Nations Environment Assembly,[12] in order to foster environmental rule of law and advance the implementation of environmental law at all levels;

(18) Encourage the United Nations Environment Programme, as chair of the Environment Management Group, in collaboration with the other members of the Group, to continue to strengthen system-wide inter-agency coordination on the environment and to call for the active involvement and support of all members of the Group in the implementation of system-wide strategies on the environment.

Further work

(a) Circulate the above-mentioned recommendations and make them available to States Members of the United Nations, the members of specialized agencies and the governing bodies of multilateral environment agreements for their consideration and action, as appropriate;

(b) Forward these recommendations to the United Nations Environment Assembly for its consideration, and to prepare, at its fifth session, in February 2021, a political declaration for a United Nations high-level meeting, subject to voluntary funding, in the context of the commemoration of the creation of the United Nations Environment Programme by the United Nations Conference on the Human Environment, held in Stockholm from 5 to 16 June 1972, with a view to strengthening the implementation of international environmental law and international environmental governance, in line with paragraph 88 of the outcome document of the United Nations Conference on Sustainable Development, entitled “The future we want”.

[12] See UNEP/EA.4/Res.20 and UNEP/EA.4/19, annex I.

United Nations A/RES/76/208

General Assembly

Distr.: General
6 January 2022

Seventy-sixth session
Agenda item 20 (g)
Sustainable development: report of the United Nations Environment Assembly of the United Nations Environment Programme

Resolution adopted by the General Assembly on 17 December 2021

[*on the report of the Second Committee (A/76/533/Add.7, para. 7)*]

76/208. Report of the United Nations Environment Assembly of the United Nations Environment Programme

The General Assembly,

Reaffirming the mandate contained in its resolution 2997 (XXVII) of 15 December 1972, by which it established the United Nations Environment Programme, and other relevant resolutions that reinforce its mandate, as well as the 1997 Nairobi Declaration on the Role and Mandate of the United Nations Environment Programme of 7 February 1997,[1] the Malmö Ministerial Declaration of 31 May 2000[2] and the Nusa Dua Declaration of 26 February 2010,[3]

Reaffirming also its commitment to strengthening the role of the United Nations Environment Programme as the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system and serves as an authoritative advocate for the global environment,

Recalling the outcome document of the United Nations Conference on Sustainable Development, held from 20 to 22 June 2012 in Rio de Janeiro, Brazil, entitled "The future we want",[4] and noting the follow-up on paragraph 88, subparagraphs (a) to (h), of the outcome document, including through General Assembly resolution 67/213 of 21 December 2012,

[1] *Official Records of the General Assembly, Fifty-second Session, Supplement No. 25* (A/52/25), annex, decision 19/1, annex.
[2] Ibid., *Fifty-fifth Session, Supplement No. 25* (A/55/25), annex I, decision SS.VI/1, annex.
[3] Ibid., *Sixty-fifth Session, Supplement No. 25* (A/65/25), annex I, decision SS.XI/9.
[4] Resolution 66/288, annex.

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Recalling also the establishment of universal membership in the Governing Council of the United Nations Environment Programme, as well as other measures to strengthen its governance and its responsiveness and accountability to Member States, the attendant change of its designation to the United Nations Environment Assembly of the United Nations Environment Programme and the evolution in the periodicity of its sessions,

Recalling further its resolutions 68/215 of 20 December 2013, 69/223 of 19 December 2014, 71/231 of 21 December 2016, 73/260 of 22 December 2018 and 74/222 of 19 December 2019,

Reaffirming the Rio Declaration on Environment and Development[5] and its principles,

Taking into account Agenda 21[6] and the Plan of Implementation of the World Summit on Sustainable Development,[7]

Recalling the 2005 World Summit Outcome[8] and the outcome document of the special event of the General Assembly to follow up efforts made towards achieving the Millennium Development Goals,[9]

Recalling also the Bali Strategic Plan for Technology Support and Capacity-building,[10]

Reaffirming its resolution 70/1 of 25 September 2015, entitled "Transforming our world: the 2030 Agenda for Sustainable Development", in which it adopted a comprehensive, far-reaching and people-centred set of universal and transformative Sustainable Development Goals and targets, its commitment to working tirelessly for the full implementation of the Agenda by 2030, its recognition that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development, its commitment to achieving sustainable development in its three dimensions – economic, social and environmental – in a balanced and integrated manner, and to building upon the achievements of the Millennium Development Goals and seeking to address their unfinished business,

Reaffirming also its resolution 69/313 of 27 July 2015 on the Addis Ababa Action Agenda of the Third International Conference on Financing for Development, which is an integral part of the 2030 Agenda for Sustainable Development, supports and complements it, helps to contextualize its means of implementation targets with concrete policies and actions, and reaffirms the strong political commitment to address the challenge of financing and creating an enabling environment at all levels for sustainable development in the spirit of global partnership and solidarity,

Reaffirming further the Paris Agreement[11] and its early entry into force, and encouraging all its parties to fully implement the Agreement, and parties to the United

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[5] *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3–14 June 1992*, vol. I, *Resolutions Adopted by the Conference* (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution 1, annex I.

[6] Ibid., annex II.

[7] *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August–4 September 2002* (United Nations publication, Sales No. E.03.II.A.1 and corrigendum), chap. I, resolution 2, annex.

[8] Resolution 60/1.

[9] Resolution 68/6.

[10] United Nations Environment Programme, document UNEP/GC.23/6/Add.1 and UNEP/GC.23/6/Add.1/Corr.1, annex.

[11] Adopted under the UNFCCC in FCCC/CP/2015/10/Add.1, decision 1/CP.21.

Nations Framework Convention on Climate Change[12] that have not yet done so to deposit their instruments of ratification, acceptance, approval or accession, where appropriate, as soon as possible,

Highlighting the synergies between the implementation of the 2030 Agenda, the Addis Ababa Action Agenda, the Paris Agreement and other relevant major intergovernmental outcomes of United Nations conferences and summits in economic, social and environmental fields,

Welcoming the holding of the first part of the fifteenth meeting of the Conference of the Parties to the Convention on Biological Diversity, in Kunming, China, from 11 to 15 October 2021, under the theme proposed by the host "Ecological civilization: building a shared future for all life on Earth", welcoming also the holding of the twenty-sixth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, in Glasgow, United Kingdom of Great Britain and Northern Ireland, from 31 October to 13 November 2021, and looking forward to the twenty-seventh session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, to be held in Egypt in November 2022,

Looking forward to the second part of the fifteenth meeting of the Conference of the Parties to the Convention on Biological Diversity, to be held in 2022, and the adoption of an ambitious, balanced, practical, effective, robust and transformative post-2020 global biodiversity framework that contributes to the 2030 Agenda, the special session of the United Nations Environment Assembly to commemorate the fiftieth anniversary of the creation of the United Nations Environment Programme, UNEP@50, to be held in Nairobi on 3 and 4 March 2022, the high-level meeting to assess progress on the implementation of the New Urban Agenda, to be held on 28 April 2022, the United Nations Conference to Support the Implementation of Sustainable Development Goal 14: Conserve and sustainably use the oceans, seas and marine resources for sustainable development, to be held in 2022, the international meeting entitled "Stockholm+50: a healthy planet for the prosperity of all – our responsibility, our opportunity", to be held on 2 and 3 June 2022, and the fifteenth session of the Conference of the Parties to the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, to be held in 2022,

Taking note of the contribution of the United Nations Environment Assembly to addressing the challenge of, inter alia, climate change, biodiversity loss and pollution, within its mandate and in collaboration with other relevant organizations and stakeholders,

Committed to strengthening international environmental governance within the context of the institutional framework for sustainable development in order to promote a balanced integration of the economic, social and environmental dimensions of sustainable development as well as coordination within the United Nations system,

Committed also to enhancing the voice of the United Nations Environment Programme and its ability to fulfil its coordination mandate within the United Nations system by strengthening its engagement in key United Nations coordination bodies and empowering it to lead efforts to formulate United Nations system-wide strategies on the environment,

Recognizing the important contribution of the United Nations Environment Assembly to the high-level political forum on sustainable development, which met under the auspices of the Economic and Social Council in New York in 2020 and 2021

[12] United Nations, *Treaty Series*, vol. 1771, No. 30822.

and undertook an in-depth review of progress on the implementation of the 2030 Agenda and the Sustainable Development Goals,

Reiterating the need for secure, stable, adequate and predictable financial resources for the United Nations Environment Programme, and, in accordance with resolution 2997 (XXVII), underlining the need to consider the adequate reflection of all the administrative and management costs of the Programme in the context of the United Nations regular budget, as well as the need to realize efficiency gains,

Reaffirming the commitments, as contained in the ministerial outcome document of the first session of the United Nations Environment Assembly of the United Nations Environment Programme, held in Nairobi from 23 to 27 June 2014,[13] inter alia, to ensure the full integration of the environmental dimension, especially throughout the sustainable development agenda, acknowledging that a healthy environment is an essential requirement and key enabler for sustainable development,

Reiterating the need to develop and expand partnerships, including between Governments, the private sector, academia, relevant United Nations entities and programmes, indigenous peoples and local communities, civil society and individuals,

Noting with great concern the severe negative impact on human health, safety and well-being caused by the coronavirus disease (COVID-19) pandemic, as well as the severe disruption to societies and economies and the devastating impact on lives and livelihoods, and that the poorest and most vulnerable are the hardest hit by the pandemic, reaffirming the ambition to get back on track to achieve the Sustainable Development Goals by designing and implementing sustainable and inclusive recovery strategies to accelerate progress towards the full implementation of the 2030 Agenda for Sustainable Development and to help to reduce the risk of and build resilience to future shocks, crises and pandemics, including by strengthening health systems and achieving universal health coverage, and recognizing that equitable and timely access for all to safe, quality, effective and affordable COVID-19 vaccines, therapeutics and diagnostics are an essential part of a global response based on unity, solidarity, renewed multilateral cooperation and the principle of leaving no one behind,

Noting the decision of the United Nations Environment Assembly to hold its fifth session in two parts, comprising an online meeting, held on 22 and 23 February 2021, and a resumed in-person meeting, to be held from 28 February to 2 March 2022, owing to the exceptional circumstances associated with the COVID-19 pandemic,

1. *Welcomes* the holding of the online meeting of the fifth session of the United Nations Environment Assembly of the United Nations Environment Programme on 22 and 23 February 2021, also welcomes the decisions of the session, including on the medium-term strategy for the period 2022–2025 and the programme of work and budget for the biennium 2022–2023,[14] takes note of the outcome message[15] and the summary of key messages from the leadership dialogue,[16] and looks forward to the convening of the resumed meeting of the fifth session of the United Nations Environment Assembly from 28 February to 2 March 2022;

2. *Reiterates* the ministerial declaration entitled “Innovative solutions for environmental challenges and sustainable consumption and production”,[17] adopted by the United Nations Environment Assembly of the United Nations Environment

[13] *Official Records of the General Assembly, Sixty-ninth Session, Supplement No. 25* (A/69/25), annex, resolution 1/1.
[14] Ibid., *Seventy-sixth session, Supplement No. 25* (A/76/25), annex I.
[15] Ibid., annex II.
[16] UNEP/EA.5/25, annex III.
[17] UNEP/EA.4/HLS.1.

Programme at its fourth session, and reaffirms that embracing innovative solutions for environmental challenges and sustainable consumption and production are important elements for implementing the 2030 Agenda for Sustainable Development[18] and achieving the Sustainable Development Goals;

3. *Encourages* Member States to advance innovative pathways to achieve sustainable consumption and production, in line with resolution 4/1 of 15 March 2019 of the United Nations Environment Assembly of the United Nations Environment Programme;[19]

4. *Invites* the Statistical Commission, the Commission on Science and Technology for Development and other relevant United Nations entities to support the Executive Director of the United Nations Environment Programme in the development of a global environmental data strategy by 2025, as referred to in the ministerial declaration adopted by the United Nations Environment Assembly at its fourth session;

5. *Invites* Member States and all relevant United Nations bodies and partners to contribute to the delivery of the implementation plan "Towards a pollution-free planet" as set out in United Nations Environment Assembly resolution 4/21 of 15 March 2019;[20]

6. *Welcomes* the continued commitment of the United Nations Environment Assembly to contributing to the effective implementation of the environmental dimension of the 2030 Agenda in an integrated manner, as reflected in its resolutions 2/5 of 27 May 2016[21] and 3/3 of 6 December 2017[22] on the contributions of the United Nations Environment Assembly to the high-level political forum on sustainable development;

7. *Commends* the President and the Bureau of the Economic and Social Council for supporting and facilitating the effective integration of the contributions of the United Nations Environment Assembly into the preparation, work and proceedings of, and the participation of the President of the Environment Assembly in, the high-level political forum on sustainable development under the auspices of the Economic and Social Council;

8. *Encourages* the President of the United Nations Environment Assembly to continue to convey the main messages agreed upon by the Environment Assembly at its sessions during the high-level political forum on sustainable development under the auspices of the Economic and Social Council, as appropriate, taking into account the integrated nature of the 2030 Agenda, as well as General Assembly resolutions 67/290 of 9 July 2013 and 70/299 of 29 July 2016;

9. *Welcomes* the contributions of the United Nations Environment Assembly to the lead-up, inputs and meetings of the high-level political forum on sustainable development under the auspices of the Economic and Social Council in 2020 and 2021, and looks forward to further contributions to the high-level political forum under the auspices of the General Assembly and the Economic and Social Council;

10. *Reiterates* that capacity-building and technology support to developing countries in environment-related fields are important components of the work of the United Nations Environment Programme, and in this regard calls for the continued

[18] Resolution 70/1.
[19] UNEP/EA.4/Res.1.
[20] UNEP/EA.4/Res.21.
[21] *Official Records of the General Assembly, Seventy-first Session, Supplement No. 25* (A/71/25), annex, resolution 2/5.
[22] UNEP/EA.3/Res.3.

and focused implementation of the Bali Strategic Plan for Technology Support and Capacity-building adopted by the Programme;

11. *Recalls* the sixth flagship *Global Environment Outlook* report and its summary for policymakers, which was reviewed and approved by Member States from 21 to 24 January 2019 and welcomed with appreciation by the United Nations Environment Assembly at its fourth session, and reiterates the continuing need for the United Nations Environment Programme to conduct up-to-date, comprehensive, scientifically based and policy-relevant global environmental assessments, in close consultation with Member States, in order to support decision-making processes at all levels;

12. *Acknowledges* the contribution of the International Resource Panel, including through its report, *Global Resources Outlook 2019: Natural Resources for the Future We Want*;

13. *Expresses concern* about the findings of relevant global environmental assessments which indicate that, despite the availability of solutions to our common environmental challenges, our planet is increasingly polluted, affected by the adverse effects of climate change, quickly losing its biodiversity and experiencing widespread environmental degradation, and recalls the request by the United Nations Environment Assembly to the Executive Director of the United Nations Environment Programme to continue to promote greater coherence and coordination of global assessments undertaken within the United Nations system;[23]

14. *Recognizes* the devastating global effects of the COVID-19 pandemic, which has created new and serious health, socioeconomic and environmental challenges, compounded existing ones, especially in developing countries, and undermined our common efforts to eradicate poverty and achieve the 2030 Agenda, and urges support for a sustainable, resilient and inclusive recovery that protects the planet, stimulates sustainable consumption and production patterns, including through sustainable economic models and the promotion of life-cycle approaches, promotes the One Health approach, among other holistic approaches, revitalizes our economies and creates decent and sustainable jobs and makes real progress in eradicating poverty, while enhancing our future resilience to similar challenges;

15. *Takes note with appreciation* of the preparations to commemorate the fiftieth anniversary of the creation of the United Nations Environment Programme by the United Nations Conference on the Human Environment, held in Stockholm from 5 to 16 June 1972,[24] looks forward to the special session to commemorate UNEP@50, to be held in Nairobi on 3 and 4 March 2022, decides that UNEP@50 will be the appropriate United Nations high-level meeting for the adoption of the political declaration pursuant to General Assembly resolution 73/333 of 30 August 2019, encourages participation at the highest possible level, requests the Secretary-General to support the commemoration, and encourages Member States and other donors in a position to do so to make voluntary contributions, generously and as soon as possible, for the preparation of the event and to support the participation of developing countries;

16. *Expresses concern* about the sustainability, predictability and stability of the funding of the United Nations Environment Programme governing body, and reiterates its request to the Secretary-General to make proposals, as appropriate;

[23] UNEP/EA.4/Res.23, para. 10.
[24] Ibid., para. 7.

17. *Notes* the request by the United Nations Environment Assembly to the Executive Director of the United Nations Environment Programme to provide options to secure the participation of developing countries in the Environment Assembly;[25]

18. *Decides* to include in the provisional agenda of its seventy-seventh session, under the item entitled "Sustainable development", the sub-item entitled "Report of the United Nations Environment Assembly of the United Nations Environment Programme".

54th plenary meeting
17 December 2021

[25] See *Official Records of the General Assembly, Sixty-ninth Session, Supplement No. 25* (A/69/25), annex, resolution 1/15.

United Nations A/RES/77/170

General Assembly

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28 December 2022

Seventy-seventh session
Agenda item 18 (i)
Sustainable development: ensuring access to affordable, reliable, sustainable and modern energy for all

Resolution adopted by the General Assembly on 14 December 2022

[*on the report of the Second Committee (A/77/443/Add.9, para. 8)*]

77/170. Ensuring access to affordable, reliable, sustainable and modern energy for all

The General Assembly,

Recalling its resolutions 53/7 of 16 October 1998, 54/215 of 22 December 1999, 55/205 of 20 December 2000, 56/200 of 21 December 2001, 58/210 of 23 December 2003, 60/199 of 22 December 2005, 62/197 of 19 December 2007, 64/206 of 21 December 2009, 66/206 of 22 December 2011, 69/225 of 19 December 2014, 70/201 of 22 December 2015, 71/233 of 21 December 2016, 72/224 of 20 December 2017, 73/236 of 20 December 2018, 74/225 of 19 December 2019, 75/221 of 21 December 2020 and 76/210 of 17 December 2021, as well as its resolutions 65/151 of 20 December 2010 on the International Year of Sustainable Energy for All and 67/215 of 21 December 2012, in which it decided to declare 2014–2024 the United Nations Decade of Sustainable Energy for All,

Reaffirming its resolution 70/1 of 25 September 2015, entitled "Transforming our world: the 2030 Agenda for Sustainable Development", in which it adopted a comprehensive, far-reaching and people-centred set of universal and transformative Sustainable Development Goals and targets, its commitment to working tirelessly for the full implementation of the Agenda by 2030, its recognition that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development, its commitment to achieving sustainable development in its three dimensions – economic, social and environmental – in a balanced and integrated manner, and to building upon the achievements of the Millennium Development Goals and seeking to address their unfinished business,

Reaffirming also its resolution 69/313 of 27 July 2015 on the Addis Ababa Action Agenda of the Third International Conference on Financing for Development, which is an integral part of the 2030 Agenda for Sustainable Development, supports

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and complements it, helps to contextualize its means of implementation targets with concrete policies and actions, and reaffirms the strong political commitment to address the challenge of financing and creating an enabling environment at all levels for sustainable development in the spirit of global partnership and solidarity,

Reaffirming further the Paris Agreement[1] and its early entry into force, and encouraging all its parties to fully implement the Agreement and parties to the United Nations Framework Convention on Climate Change[2] that have not yet done so to deposit their instruments of ratification, acceptance, approval or accession, where appropriate, as soon as possible,

Recalling the Climate Action Summit convened by the Secretary-General on 23 September 2019 and the multi-partner initiatives and commitments presented during the Summit,

Noting the establishment by the Secretary-General of the Global Crisis Response Group on Food, Energy and Finance,

Highlighting the synergies between the 2030 Agenda for Sustainable Development and the Paris Agreement,

Recalling the ministerial declaration of the high-level political forum on sustainable development[3] held in 2022, which took note of the Secretary-General's proposed global road map for accelerated Sustainable Development Goal 7 action and reaffirmed the need to continuously engage on the implementation of Goal 7,

Expressing concern that, at current rates of progress, none of the global energy targets of the Sustainable Development Goals will be achieved by 2030,

Reaffirming the United Nations Millennium Declaration,[4] the Rio Declaration on Environment and Development[5] and Agenda 21[6] and the principles set out therein, and recalling the recommendations and conclusions contained in the Plan of Implementation of the World Summit on Sustainable Development (Johannesburg Plan of Implementation)[7] and the outcome documents of the United Nations Conference on Sustainable Development, entitled "The future we want",[8] the third International Conference on Small Island Developing States, entitled "SIDS Accelerated Modalities of Action (SAMOA) Pathway",[9] the second United Nations Conference on Landlocked Developing Countries, entitled "Vienna Programme of Action for Landlocked Developing Countries for the Decade 2014–2024",[10] the Fourth United Nations Conference on the Least Developed Countries, entitled "Istanbul Programme of Action for the Least Developed Countries for the Decade 2011–2020",[11] and the Fifth United Nations Conference on the Least Developed

[1] Adopted under the UNFCCC in FCCC/CP/2015/10/Add.1, decision 1/CP.21.

[2] United Nations, *Treaty Series*, vol. 1771, No. 30822.

[3] See *Official Records of the General Assembly, Seventy-seventh Session, Supplement No. 3* (A/77/3), chap. VI, sect. D.

[4] Resolution 55/2.

[5] *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3–14 June 1992*, vol. I, *Resolutions Adopted by the Conference* (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution 1, annex I.

[6] Ibid., annex II.

[7] *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August–4 September 2002* (United Nations publication, Sales No. E.03.II.A.1 and corrigendum), chap. I, resolution 2, annex.

[8] Resolution 66/288, annex.

[9] Resolution 69/15, annex.

[10] Resolution 69/137, annex II.

[11] *Report of the Fourth United Nations Conference on the Least Developed Countries, Istanbul, Turkey, 9–13 May 2011* (A/CONF.219/7), chap. II.

Countries, entitled "Doha Programme of Action for the Least Developed Countries"[12] for the decade 2022–2031, as well as the New Urban Agenda, adopted at the United Nations Conference on Housing and Sustainable Urban Development (Habitat III), held in Quito from 17 to 20 October 2016,[13] which underlines, inter alia, the importance of energy for cities,

Reaffirming also that each country must take primary responsibility for its own development and that the role of national policies and development strategies cannot be overemphasized in the achievement of sustainable development, and recognizing the need for the creation of an enabling environment at all levels and across all sectors for the achievement of sustainable development,

Reaffirming further the sovereign rights of countries over their energy resources and their right to define appropriate policies for the production and use of energy, recognizing that the 2030 Agenda shall be implemented for the full benefit of all, for today's generation and for future generations,

Emphasizing that universal access to affordable, reliable, sustainable and modern energy for all is an integral part of poverty eradication and the achievement of the 2030 Agenda, and that the increased use and promotion of new technologies and renewable energy, including in off-grid and decentralized systems, and energy efficiency could make a significant contribution in that regard,

Deeply concerned that, while progress towards the achievement of Goal 7 has been made in some regions of the world, efforts remain well below the scale required to meet the Goal by 2030,[14]

Deeply concerned also that 2.4 billion people in developing countries, especially in rural areas, rely on traditional biomass, coal and kerosene for cooking and heating, with disproportionate health and workload impacts on women, children and people in vulnerable situations, including an estimated 4 million premature deaths annually, that, while the global population without access to electricity has fallen below 1 billion, close to 733 million people are still without access to electricity, that reliability and affordability remain challenges in many countries, even as the number of household connections increases, that Africa accounts for more than half of both access figures and that, even when energy services are available, millions of poor people are unable to pay for them,

Noting with concern that energy represents less than 1 per cent of overall United Nations expenditure on the Sustainable Development Goals, despite its critical importance also in achieving other goals,

Noting with great concern the severe negative impact on human health, safety and well-being caused by the coronavirus disease (COVID-19) pandemic, as well as the severe disruption to societies and economies and the devastating impact on lives and livelihoods, and that the poorest and most vulnerable are the hardest hit by the pandemic, reaffirming the ambition to get back on track to achieve the Sustainable Development Goals by designing and implementing sustainable and inclusive recovery strategies to accelerate progress towards the full implementation of the 2030 Agenda for Sustainable Development and to help to reduce the risk of and build resilience to future shocks, crises and pandemics, including by strengthening health systems and achieving universal health coverage, and recognizing that equitable and timely access for all to safe, quality, effective and affordable COVID-19 vaccines, therapeutics and diagnostics

[12] Resolution 76/258, annex.
[13] Resolution 71/256, annex.
[14] See A/77/211.

are an essential part of a global response based on unity, solidarity, renewed multilateral cooperation and the principle of leaving no one behind,

Emphasizing the critical socioeconomic benefits of affordable, reliable, sustainable and modern energy and the need to reframe the understanding of energy from a technical unit to a requirement for basic social services, including health care, economic development and poverty eradication,

Recognizing that affordable, reliable, sustainable and modern energy services are essential for effectively responding to and achieving sustainable, inclusive and resilient recovery from the COVID-19 pandemic and socioeconomic crises, including for powering health-care and educational facilities, supplying safe drinking water and water for sanitation, including hand-washing, as well as water for agriculture and food production, supporting sustainable food systems and providing communications and digital services to connect people, share information and facilitate education, and further recognizing that ensuring access to affordable, reliable, sustainable and modern energy for all contributes to the achievement of the 2030 Agenda and the implementation of other relevant intergovernmentally agreed frameworks in the economic, social and environmental fields and that reaching Sustainable Development Goal 7 by the end of the decade requires an urgent and steep rise in investment in and financing of affordable, reliable, sustainable and modern energy and energy efficiency, while noting that the unprecedented crisis caused by the COVID-19 pandemic will have serious impacts on progress towards fulfilling the commitment on ensuring access to affordable, reliable, sustainable and modern energy for all by 2030, and economic disruptions related to the COVID-19 crisis have made it even harder for developing countries to reach Goal 7, noting the announcement of Governments aiming to achieve net-zero emissions, and taking note of the findings, in the report of the Secretary-General,[15] to put the world on track for reaching this objective,

Highlighting the importance of the empowerment of developing countries to achieve universal access through the rapid expansion of affordable, reliable, sustainable and modern energy worldwide,

Highlighting also the significant efforts made in developing countries that contributed to an increase in the global electrification rate to 91 per cent in 2020, and stressing the need to further close the electrification gap in many difficult-to-reach populations, in particular in sub-Saharan Africa,

Recognizing that each country has primary responsibility for its own economic and social development and that this will include the mobilization of financial resources, as well as capacity-building and the transfer of environmentally sound technologies to developing countries on mutually agreed terms, including concessional and preferential terms,

Noting with concern that lack of energy access has remained a challenge for developing countries and that sustainable and resilient and inclusive development would be unachievable without ensuring access to affordable, reliable, sustainable and modern energy for all,

Welcoming the increase in the share of renewable energy as a part of total final energy consumption over the past decade and the significant reductions in the cost of renewable energy, the sector's net positive job contributions and the rapid expansion of renewable energy capacity additions, which are now greater than those of other resources in the electricity sector, and noting that the levelized cost of solar and wind energy in many regions of the world is fully competitive with or undercuts traditional energy resources,

[15] A/77/211.

Noting with appreciation the work of the International Renewable Energy Agency, which facilitates the widespread and increased adoption and sustainable use of all forms of renewable energy,

Noting the work of multi-stakeholder partnerships, including Sustainable Energy for All, which has given strong momentum to the promotion of renewable energy and energy efficiency, the initiatives of the Global Climate Action Agenda, the Small Island Developing States Lighthouses Initiative, SIDS DOCK, the Energy Efficiency Hub and others that can contribute to reaching the objective of ensuring access to affordable, reliable, sustainable and modern energy for all,

Noting with appreciation that the transformation of the world's energy systems is being accelerated by advances in technology, rapid declines in the cost of renewable energy, the deployment of least-cost decentralized solutions, policy support, new business models and the sharing of best practices, and noting the continuing work of the International Renewable Energy Agency and the International Solar Alliance,

Stressing the need for a coherent, integrated approach to energy issues and the promotion of synergies across the global energy agenda, with a focus on eradicating poverty and achieving the Sustainable Development Goals,

Reiterating the pledge that no one will be left behind, reaffirming the recognition that the dignity of the human person is fundamental, and the wish to see the Goals and targets met for all nations and peoples and for all segments of society, and recommitting to endeavour to reach the furthest behind first,

Noting that the transitions to affordable, reliable, sustainable and modern energy for all should be just, inclusive, equitable and secure, in line with national circumstances, in order to achieve universal access by 2030, while recognizing the need to increase the share of renewable and clean energy, including as a cooking source in urban areas, to significantly reduce negative health impacts and contribute to decreased greenhouse gas emissions and to achieving the goals of the Paris Agreement,

1. *Takes note* of the report of the Secretary-General;[16]

2. *Also takes note* of the role and activities of the International Renewable Energy Agency, encouraging the Agency to continue to support its members in the achievement of their renewable energy objectives, as well as the contributions of the International Solar Alliance, including in its capacity as an observer of the General Assembly in accordance with resolution 76/123 of 9 December 2021, and encouraging its work to collectively address key common challenges to the scaling up of solar energy, as well as the contributions of other international and regional organizations and forums to the global energy agenda;

3. *Notes with concern* the two-year[17] decline in international financial flows to developing countries in support of clean, sustainable, affordable, reliable, just and inclusive energy transitions, recognizes that the achievement of Sustainable Development Goal 7 requires an urgent and steep rise in energy investment and finance, including investments in clean technologies and quality infrastructure with a priority focus on the needs of the world's least developed countries and on universal access to electricity, and in that regard calls upon countries, public and private financial institutions and other stakeholders to scale up the provision of finance for developing countries;

4. *Strongly encourages* Governments and other relevant stakeholders to take actions to achieve universal access to affordable, reliable, sustainable and modern

[16] A/77/211.

[17] 2018 and 2019.

energy, increase the global share of renewable energy, improve the inclusion of developing countries in energy sector cooperation, where relevant, and increase the rate of improvement in energy efficiency for a clean, low-emission, low-carbon, climate-resilient, safe, efficient, modern, affordable, reliable and sustainable energy system, given the systemic sustainable development benefits, while taking into consideration the diversity of national situations, priorities, policies, specific needs and challenges and capacities of developing countries, including their energy mix and energy systems;

5. *Calls for* ensuring access to affordable, reliable, sustainable and modern energy for all, as such services are an integral part of poverty eradication measures, human dignity, quality of life, economic opportunity, the combating of inequality, the promotion of health and the prevention of morbidity and mortality, access to education, safe drinking water and sanitation, food security, nutrition, disaster risk reduction and resilience, climate change mitigation and adaptation, environmental impact reduction, social inclusion and gender equality, including for persons affected by humanitarian emergencies;

6. *Underscores* the importance of access to cleaner and more efficient and sustainable cooking and heating methods, welcomes ongoing efforts, and in this regard calls for the promotion of an enabling environment at the national and international levels for the increased usage of sustainable, cleaner and more efficient cooking and heating methods in all countries, in particular developing countries;

7. *Acknowledges* that means of implementation must be significantly strengthened, to enable decisive action and focusing in particular on additional finance and investment in line with target 7.a of the Sustainable Development Goals, and agrees that, without a strong push on innovation, new technologies, capacity-building and quality data, global efforts to achieve Goal 7 are bound to fail;

8. *Encourages* Governments, the United Nations system and relevant stakeholders to leverage the cost-competitiveness of renewable energy, especially in off-grid areas, in order to achieve universal energy access, such as by establishing policy frameworks, including for metering and payment systems, cost comparisons between grid extension and off-grid solutions, facilitating investment by domestic and foreign banks and educating students, communities, investors and entrepreneurs on renewable energy, energy efficiency and conservation, among other activities, where feasible and appropriate;

9. *Recognizes* the role that natural gas can play in supporting transitions towards lower-emission energy systems, and calls upon Governments to enhance and collaborate on energy security, including through the sharing of best practices and knowledge for the security of gas supply and demand, in the broader context of the transition towards lower-emission energy systems;

10. *Supports* energy access in accordance with the national needs of developing countries, in particular the least developed countries and small island developing States, to tackle their energy access challenges according to the specific needs of each country by mobilizing technical and financial assistance and tools to deploy affordable, reliable, sustainable and modern energy solutions to tackle the energy access deficit;

11. *Calls upon* Governments to expand the use of renewable energy beyond the power sector, taking into account national priorities and constraints, to industry, heating and cooling, construction and infrastructure and, in particular, the transport sector, including through sustainable sector coupling and sustainable and modern bioenergy and hydrogen in the context of sustainable development, including climate

change, and calls for supportive policy initiatives and investments at the national and international levels;

12. *Recognizes* that current global progress in improving energy efficiency falls well below the pace necessary to double the global rate of improvement in energy efficiency by 2030, and encourages, in accordance with national laws and regulations, the promotion of widespread energy efficiency initiatives in all economic sectors, the adoption and updating of building performance codes and standards, energy efficiency labelling, the promotion of energy management systems, the retrofitting of existing buildings and public procurement policies on energy, among other modalities, as appropriate, as well as the prioritization of smart grid systems, district energy systems and community energy plans to improve synergies among clean and effective use of traditional resources, renewable energy and energy efficiency, which aim to promote the interconnectivity of clean and renewable energy infrastructure and improve energy efficiency;

13. *Calls for* strengthened cooperation at the regional level to promote innovation and facilitate financing, support regional cross-border power grid connectivity, as appropriate, to advance economic integration and sustainable development and share best practices that are responsive to regional needs with regard to Sustainable Development Goal 7 and its interlinkages with the other Goals, and in this regard encourages Governments to reinforce their energy interconnections, connecting regional energy markets and increasing energy security at the global level;

14. *Calls upon* Governments, as well as relevant international and regional organizations and other relevant stakeholders, to combine, as appropriate, the increased use of new technologies and renewable energy resources, other low- or zero-emissions solutions, more efficient use of energy and greater reliance on advanced energy technologies, including technologies that avoid, abate and remove greenhouse gas emissions;

15. *Encourages* Governments, relevant international and regional organizations and other relevant stakeholders to promote investments in developing sustainable, reliable, modern, inclusive and equitable energy systems, inter alia, by strengthening energy systems through cross-border grid connections, as appropriate, and to consider incorporating decentralized renewable energy solutions in energy planning, as appropriate, and recognizes that energy transitions will take different paths in different parts of the world;

16. *Encourages* Governments and all relevant stakeholders to increase investment and actions to support the implementation of Sustainable Development Goal 7, and to integrate affordable, reliable, sustainable and modern energy solutions to enhance responses to and recovery from COVID-19, in line with resilient, inclusive and sustainable development pathways, and to ensure energy security, and urges developed countries, relevant international and regional organizations and other relevant stakeholders to support the efforts of developing countries, especially the poorest and most vulnerable, taking into consideration the different national circumstances and in line with the national development priorities of developing countries, including through multi-stakeholder partnerships, in order to fulfil the commitment on ensuring access to affordable, reliable, sustainable and modern energy for all by 2030, recognizing that increased investments in affordable, reliable, sustainable and modern energy solutions and accelerated action beyond a business-as-usual recovery will aid countries in responding to the pandemic and economic crisis, for a sustainable, resilient and inclusive recovery, including by reducing emissions, creating jobs and promoting resource efficiency, and in advancing long-term resilience and the Sustainable Development Goals, which are integrated and interrelated;

17. *Encourages* Governments, relevant international organizations and other relevant stakeholders to use and promote an integrated resource planning and management approach in their energy strategies that considers energy choices in the context of linked sectors, inter alia, water, waste, air quality and food, taking into account national circumstances;

18. *Recognizes* that sustainable energy access and its deployment can be both improved and accelerated by gender equality and the empowerment of all women and girls, and calls upon Governments, the United Nations development system and other stakeholders to increase educational and capacity-building programmes for women in the sector, further advance equal pay and leadership and other opportunities for women in the energy sector, promote women's full, equal and effective participation and leadership in the design and implementation of energy policies and programmes, mainstream a gender perspective in such policies and programmes and ensure women's full and equal access to and use of sustainable energy to enhance their economic and social empowerment, including employment and other income-generating opportunities;

19. *Encourages* Governments, with the support of relevant stakeholders, as appropriate, to accelerate the transition towards sustainable economies, according to national policies and plans, through mitigation and adaptation strategies that improve energy efficiency and create more and better employment opportunities for all, including young people, in wage and self-employment;

20. *Emphasizes* the potential of sustainable energy use to contribute to climate change mitigation and adaptation, recognizes that increasing the deployment of renewable energy and enhancing energy efficiency are components of many countries' nationally determined contributions under the Paris Agreement adopted under the United Nations Framework Convention on Climate Change, and urges effective and timely support for the full implementation of all those contributions, as applicable;

21. *Notes* that the impacts of climate change can also threaten access to and the supply of energy, and also notes the importance of increasing the resilience of the energy sector to climate change, which can be facilitated by the expansion of renewable energy;

22. *Emphasizes*, while noting progress, that the large-scale deployment of clean energy technologies has been insufficient and uneven, and that support is required to realize their potential, along with appropriate policy initiatives and investments at the national and international levels, with Governments working in collaboration with relevant stakeholders, including the private sector;

23. *Also emphasizes* the value of regional and interregional approaches, which can, among other advantages, enhance the deployment of renewable and sustainable energy by facilitating the sharing of experiences, reduce transaction costs, leverage economies of scale, enable greater cross-border interconnectivity to promote energy system reliability and resilience and augment domestic capacity-building, and recognizes the work of organizations and initiatives in that regard;

24. *Invites* all relevant funding institutions and bilateral and multilateral donors, as well as regional funding institutions, the private sector and non-governmental organizations, to continue ongoing efforts and take further action to provide financial resources, as appropriate, to support efforts aimed at ensuring access to affordable, reliable, sustainable and modern energy in developing countries and countries with economies in transition, including low-emission, low-carbon and climate-resilient new technologies and renewable resources of energy of demonstrated viability, especially focused on energy access and economic development in both urban and rural areas, while noting the potential catalytic effect

of concessional and other finance and taking fully into account the development structure of energy-based economies of developing countries;

25. *Encourages* the development, dissemination, diffusion and transfer of environmentally sound technologies to developing countries on mutually agreed terms, including concessional and preferential terms, and highlights the importance of integrating sustainable energy in the Technology Facilitation Mechanism;

26. *Stresses* the importance of strategies and contributions by Governments and relevant stakeholders to multi-stakeholder partnerships in ensuring access to affordable, reliable, sustainable and modern energy for all, and encourages coordination and collaboration between the United Nations and relevant multi-stakeholder partnerships and international organizations, such as Sustainable Energy for All;

27. *Recognizes* the catalytic effect of the sharing of knowledge and experience, capacity-building and technical assistance on sustainable energy deployment, and encourages existing and new efforts to enable Governments of developing countries and relevant stakeholders to plan, finance, implement and monitor sustainable energy projects to further strengthen their national institutions and capacities;

28. *Encourages* the development of viable market-oriented strategies that could result in further rapid reductions in the cost of new technologies and renewable resources of energy and could further increase the competitiveness of those technologies, including through the adoption, as appropriate, of public policies for research, development and market deployment, including phasing out inefficient fossil fuel subsidies that encourage wasteful consumption while providing targeted support to the poor and most vulnerable, in accordance with national circumstances;

29. *Emphasizes* the value of education, academia, technology and entrepreneurship in developing solutions to face energy challenges and achieve energy sustainability, as well as the importance of investing in research and development and demonstrations in sustainable and clean energy technologies, and also emphasizes in this context the urgent need to enhance international cooperation to facilitate access to clean energy research and technology, including renewable energy, energy efficiency, hydrogen, energy storage, carbon capture, utilization and storage, bioenergy with carbon capture and storage, and advanced and cleaner fossil-fuel technologies, including technologies that avoid, abate and remove greenhouse gas emissions, and improved infrastructures for supplying affordable, reliable, sustainable and modern energy for all;

30. *Calls for* national efforts to promote access to affordable, reliable, sustainable and modern energy for all and strengthened local engagement to complement current approaches, and reaffirms the commitment to supporting subnational and local efforts, taking advantage of their direct control, where applicable, of local infrastructure and codes to foster uptake in end-use sectors, such as residential, commercial and industrial buildings, industry, agriculture, transport, waste and sanitation;

31. *Encourages* the Secretary-General to continue efforts to promote the provision of stable, adequate and predictable financial resources and technical assistance for sustainable energy and to enhance the effectiveness, coordination and full utilization of appropriate international funds for the effective implementation of national and regional high-priority projects for ensuring access to affordable, reliable, sustainable and modern energy for all, and recalls the convening of the high-level dialogue on the midpoint review of the United Nations Decade of Sustainable Energy for All (2014–2024), held on 23 and 24 May 2019;

32. *Takes note* of the high-level dialogue on energy held on 24 September 2021 to promote the implementation of the energy-related goals and targets of the 2030

Agenda for Sustainable Development[18] in support of the implementation of the United Nations Decade of Sustainable Energy for All and the voluntary commitments in the form of 200 energy compacts, and also takes note of the Secretary-General's proposed road map for accelerated action on Goal 7, as described in the report of the Secretary-General, and the high-level political forum on sustainable development;

33. *Requests* the Secretary-General to continue engagement with Member States on the implementation of Sustainable Development Goal 7, in a comprehensive and evidence-based manner, as a follow-up to the high-level dialogue on energy and the United Nations Decade of Sustainable Energy for All;

34. *Requests* the President of the General Assembly to convene a global stocktaking, funded from extrabudgetary resources, to be held in 2024, marking the completion of the ongoing efforts to implement the plan of action of the Decade, and building on the follow-up to the high-level dialogue on energy, to further accelerate the implementation of Sustainable Development Goal 7 of the 2030 Agenda;

35. *Calls upon* the United Nations development system to work through existing initiatives and resources and within its mandate with relevant stakeholders, such as international financial institutions, along with development partners, such as multilateral and regional development banks and the private sector, to address capacity and funding gaps, particularly in developing countries, to scale up energy-related investments and to provide support to countries in need so as to ensure access to affordable, reliable, sustainable and modern energy for all;

36. *Encourages* UN-Energy to support coherence and coordination among the energy-related activities of the entities of the United Nations development system, within their respective mandates, and with existing resources in line with the implementation of resolutions 71/243 of 21 December 2016, 72/279 of 31 May 2018 and 74/297 of 11 August 2020 and Economic and Social Council resolution 2019/15 of 8 July 2019, in order to assist countries, in particular at the country level, inter alia through normative support and expertise to the resident coordinator system, upon request by their Governments, by leveraging partnerships with other international organizations, donors and relevant stakeholders, including in their efforts to achieve universal access to affordable, reliable, sustainable and modern energy for all and to accelerate its deployment;

37. *Reaffirms* the commitment at the very heart of the 2030 Agenda to leave no one behind and commit to taking more tangible steps to support people in vulnerable situations and the most vulnerable countries and to reach the furthest behind first;

38. *Calls upon* the Secretary-General to promote renewable energy, energy efficiency and related sustainable practices in all United Nations facilities and operations around the world, where appropriate and economically viable;

39. *Requests* the Secretary-General to submit to the General Assembly at its seventy-eighth session a report on the implementation of the present resolution, including activities carried out to mark the United Nations Decade of Sustainable Energy for All, and decides to include in the provisional agenda of its seventy-eighth session, under the item entitled "Sustainable development", the sub-item entitled "Ensuring access to affordable, reliable, sustainable and modern energy for all".

53rd plenary meeting
14 December 2022

[18] Resolution 70/1.

United Nations A/RES/77/171

General Assembly

Distr.: General
28 December 2022

Seventy-seventh session
Agenda item 18 (j)
Sustainable development: combating sand and dust storms

Resolution adopted by the General Assembly on 14 December 2022

[*on the report of the Second Committee (A/77/443/Add.10, para. 7)*]

77/171. Combating sand and dust storms

The General Assembly,

Recalling its resolutions 70/195 of 22 December 2015, 71/219 of 21 December 2016, 72/225 of 20 December 2017, 73/237 of 20 December 2018, 74/226 of 19 December 2019, 75/222 of 21 December 2020 and 76/211 of 17 December 2021 on combating sand and dust storms,

Reaffirming its resolution 70/1 of 25 September 2015, entitled "Transforming our world: the 2030 Agenda for Sustainable Development", in which it adopted a comprehensive, far-reaching and people-centred set of universal and transformative Sustainable Development Goals and targets, its commitment to working tirelessly for the full implementation of the Agenda by 2030, its recognition that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development, its commitment to achieving sustainable development in its three dimensions – economic, social and environmental – in a balanced and integrated manner, and to building upon the achievements of the Millennium Development Goals and seeking to address their unfinished business,

Reaffirming also its resolution 69/313 of 27 July 2015 on the Addis Ababa Action Agenda of the Third International Conference on Financing for Development, which is an integral part of the 2030 Agenda for Sustainable Development, supports and complements it, helps to contextualize its means of implementation targets with concrete policies and actions, and reaffirms the strong political commitment to address the challenge of financing and creating an enabling environment at all levels for sustainable development in the spirit of global partnership and solidarity,

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Reaffirming further the Paris Agreement[1] and its early entry into force, and encouraging all its parties to fully implement the Agreement, and parties to the United Nations Framework Convention on Climate Change[2] that have not yet done so to deposit their instruments of ratification, acceptance, approval or accession, where appropriate, as soon as possible,

Highlighting the synergies between the implementation of the 2030 Agenda for Sustainable Development, the Addis Ababa Action Agenda and the Paris Agreement, noting with concern the findings contained in the special report of the Intergovernmental Panel on Climate Change entitled *Global Warming of 1.5°C*, noting with concern also the findings of the report of the Asian and Pacific Centre for the Development of Disaster Information Management of the Economic and Social Commission for Asia and the Pacific entitled *Sand and Dust Storms Risk Assessment in Asia and the Pacific* and the report of the United Nations Environment Programme entitled *Impacts of Sand and Dust Storms on Oceans: A Scientific Environmental Assessment for Policy Makers*, in addition to the World Health Organization global air quality guidelines and the World Meteorological Organization report entitled *2020 State of Climate Services: Risk Information and Early Warning Systems*, noting the holding of the twenty-sixth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, hosted by the Government of the United Kingdom of Great Britain and Northern Ireland in Glasgow, in partnership with Italy, from 31 October to 13 November 2021, welcoming the holding of the twenty-seventh session of the Conference of the Parties in Egypt from 6 to 20 November 2022, and looking forward to the twenty-eighth session of the Conference of the Parties, to be held in the United Arab Emirates in November 2023,

Recalling United Nations Environment Assembly resolutions 1/7 of 27 June 2014 on strengthening the role of the United Nations Environment Programme in promoting air quality,[3] 2/21 of 27 May 2016 on sand and dust storms[4] and 4/10 of 15 March 2019 on innovation on biodiversity and land degradation,[5]

Acknowledging the work done by the secretariat of the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa,[6] towards mitigating sand and dust storm issues at source, and acknowledging also the continuing support of the Food and Agriculture Organization of the United Nations for countries affected by sand and dust storms through the promotion of sustainable land use management, agroforestry, shelter belts, afforestation/reforestation and land restoration programmes, which all contribute to sand and dust storm source mitigation,

Welcoming the convening of the fifteenth session of the Conference of the Parties to the United Nations Convention to Combat Desertification, held in Abidjan, Côte d'Ivoire, from 9 to 20 May 2022, noting the adoption of the Abidjan Call as well as the Abidjan Legacy Programme, to address drought and preserve and restore the terrestrial ecosystem, reverse land degradation and halt the loss of biodiversity, noting also decision 26/COP.15 of 20 May 2022,[7] in which the Conference urged a proactive approach to enhance cooperation at all levels to address the causes and impacts of sand and dust storms and called for the organization of a science-policy dialogue to develop guidance and policies to address sand and dust storms, welcoming the offers

[1] Adopted under the UNFCCC in FCCC/CP/2015/10/Add.1, decision 1/CP.21.
[2] United Nations, *Treaty Series*, vol. 1771, No. 30822.
[3] See *Official Records of the General Assembly, Sixty-ninth Session, Supplement No. 25* (A/69/25), annex.
[4] Ibid., *Seventy-first Session, Supplement No. 25* (A/71/25), annex.
[5] UNEP/EA.4/Res.10.
[6] United Nations, *Treaty Series*, vol. 1954, No. 33480.
[7] See ICCD/COP(15)/23/Add.1.

made by the Government of Saudi Arabia and the Government of Mongolia to host the sixteenth and seventeenth sessions, in 2024 and 2026, respectively, looking forward to the convening of the second part of the fifteenth meeting of the Conference of the Parties to the Convention on Biological Diversity, as well as the meetings of the Conference of the Parties serving as the Meetings of the Parties to the Protocols to the Convention, to be held in Montreal, Canada, with the presidency of China, from 7 to 19 December 2022, looking forward also to the post-2020 global biodiversity framework that contributes to the 2030 Agenda, and looking forward further to the sixteenth meeting of the Conference of the Parties and the meetings of the Conference of the Parties serving as the Meetings of the Parties to the Protocols to the Convention, to be held in Türkiye,

Noting the adoption, by the Economic and Social Commission for Asia and the Pacific at its seventy-second session, of resolution 72/7 of 19 May 2016 on regional cooperation to combat sand and dust storms in Asia and the Pacific,

Noting also the endorsement by the Economic and Social Commission for Asia and the Pacific at its seventy-fifth session of the recommendation by the Governing Council of the Asian and Pacific Centre for the Development of Disaster Information Management to establish a subregional cooperation mechanism for slow-onset hazards with a focus on sand and dust storms in South-West and Central Asia, and noting the endorsement by the Commission at its seventy-eighth session of the Regional Plan of Action on Sand and Dust Storms in Asia and the Pacific, which provides a strategic framework and reference for countries in the region to take action at the national and regional levels, in the context of multi-hazard disaster risk reduction, to reduce the negative impact of sand and dust storms and identify anthropogenic measures that could contribute to or mitigate their formation and intensity,

Recalling its resolution 66/288 of 27 July 2012, in which it endorsed the outcome document of the United Nations Conference on Sustainable Development, entitled “The future we want”,

Recalling also its resolutions 71/229 of 21 December 2016, 72/220 of 20 December 2017, 73/233 of 20 December 2018, 74/220 of 19 December 2019, 75/218 of 21 December 2020 and 76/206 of 17 December 2021 on the implementation of the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa,

Taking note of the Regional Programme to Combat Sand and Dust Storms of the United Nations Environment Programme, and of other initiatives, including the ministerial meeting on sand and dust storms held in Nairobi on 21 February 2013 on the margins of the twenty-seventh session of the Governing Council/Global Ministerial Environment Forum of the United Nations Environment Programme,

Recalling the Sendai Declaration and the Sendai Framework for Disaster Risk Reduction 2015–2030, adopted at the Third United Nations World Conference on Disaster Risk Reduction and endorsed by the General Assembly in its resolution 69/283 of 3 June 2015, and recognizing that one of the priorities for action of the Framework is an understanding of disaster risk for prevention and mitigation and for the development and implementation of appropriate preparedness and effective response to disasters, which continue to undermine efforts to achieve sustainable development,

Acknowledging that, based on the notion of hazards as defined in the Hyogo Framework for Action 2005–2015: Building the Resilience of Nations and

Communities to Disasters,[8] addressing multidimensional hazards, including those posed by sand and dust storms, contributes towards the achievement of the goals, targets and priorities for action set out in the Sendai Framework for Disaster Risk Reduction 2015–2030,

Noting with great concern the severe negative impact on human health, safety and well-being caused by the coronavirus disease (COVID-19) pandemic, as well as the severe disruption to societies and economies and the devastating impact on lives and livelihoods, and that the poorest and most vulnerable are the hardest hit by the pandemic, reaffirming the ambition to get back on track to achieve the Sustainable Development Goals by designing and implementing sustainable and inclusive recovery strategies to accelerate progress towards the full implementation of the 2030 Agenda for Sustainable Development and to help to reduce the risk of and build resilience to future shocks, crises and pandemics, including by strengthening health systems and achieving universal health coverage, and recognizing that equitable and timely access for all to safe, quality, effective and affordable COVID-19 vaccines, therapeutics and diagnostics are an essential part of a global response based on unity, solidarity, renewed multilateral cooperation and the principle of leaving no one behind,

Stressing the need for cooperation at the global and regional levels with a view to managing and mitigating the effects of sand and dust storms through the enhancement of early warning systems and the sharing of climate and weather information to forecast sand and dust storms, and affirming that resilient action to combat and prevent sand and dust storms requires a better understanding of the severe multidimensional impacts of sand and dust storms, including the deterioration of the health, well-being and livelihood of people, increased desertification and land degradation, deforestation, loss of biodiversity and land productivity, and their impact on sustainable economic growth,

Recognizing that sand and dust storms are an issue of international concern, the costs of which are measured in economic, social and environmental terms, and that sand and dust storms continue to grow and negatively affect the achievement of 11 of the 17 Sustainable Development Goals and their means of implementation, expressing deep concern about the devastating impacts of COVID-19 on human health and well-being, while taking into consideration that the COVID-19 pandemic has exacerbated the challenges faced by people in vulnerable situations, noting with concern that sand and dust storms may exacerbate the symptoms of respiratory diseases such as COVID-19 and may complicate and prolong the recovery from the disease, in addition to the other negative impacts that can be associated with respiratory disorders such as asthma, tracheitis, pneumonia and silicosis, which may lead to chronic obstructive pulmonary disease and cardiovascular and heart disorders, in addition to eye and skin irritation, and can also spread other diseases, such as meningitis, and taking into account that a reduction in cardiovascular and respiratory disease, as comorbidities linked to COVID-19-related deaths, can produce significant health benefits, when mitigating measures are taken,

Emphasizing the relevance of the efforts and cooperation of Member States at the regional and international levels to control and reduce the negative impacts of sand and dust storms on human settlements in vulnerable regions, recalling its resolution 72/225, in which it noted the International Conference on Combating Sand and Dust Storms, held in Tehran from 3 to 5 July 2017, welcoming the holding of other meetings with the active participation of all countries, and taking note with

[8] A/CONF.206/6 and A/CONF.206/6/Corr.1, chap. I, resolution 2.

appreciation of other ongoing initiatives by various countries to combat sand and dust storms, especially at the regional level,

1. *Takes note* of the report of the Secretary-General;[9]

2. *Recognizes* that sand and dust storms and the unsustainable land management, soil, agricultural and livestock practices, among other factors, that can cause or exacerbate these phenomena, including climate change, pose a serious challenge to the sustainable development of affected countries and regions, also recognizes that, in the past few years, sand and dust storms have inflicted substantial economic, social and environmental damage on the inhabitants of the world's arid, semi-arid and dry subhumid areas, especially in Africa and Asia, and underscores the need to treat them and to promptly take measures to address those challenges;

3. *Recalls* the convening of a high-level interactive dialogue on sand and dust storms, held at Headquarters in New York on 16 July 2018, bringing together Member States, observer States and observers of the General Assembly, United Nations system entities, regional commissions and other stakeholders to discuss action-oriented recommendations and address the challenges faced by the affected countries, including ways to improve policy coordination at the global level to tackle those challenges in the context of the Sustainable Development Goals, during which the continuing need to confront the challenges presented by sand and dust storms was highlighted;

4. *Welcomes* the operationalization of the United Nations Coalition on Combating Sand and Dust Storms, which is pursuing efforts, within its mandate and resources, to move to the implementation stage, and aims, inter alia, to promote and coordinate a collaborative United Nations system response to the growing issue of sand and dust storms on a local, regional and global scale, ensuring that unified and coherent action is taken, and to facilitate the capacity-building of Member States, raise their awareness and enhance their preparedness and response to sand and dust storms in critical regions;

5. *Invites* the Secretary-General to consider designating a relevant agency or entity with adequate capacity to act as a focal point on sand and dust storms in the United Nations system to follow up the decisions in the relevant resolutions and the United Nations Coalition on Combating Sand and Dust Storms;

6. *Recognizes* the importance of new and innovative technologies and best practices in combating sand and dust storms, as well as their sharing and transfer on mutually agreed terms;

7. *Encourages* regional, subregional and interregional organizations and processes to continue to share best practices, experiences and technical expertise in combating and preventing sand and dust storms to address the root causes and impacts of sand and dust storms, including through improved implementation of sustainable land management, soil, agricultural and livestock practices, and to promote regional cooperation in this matter to reduce the risks and impact of future sand and dust storms and to provide affected countries with capacity-building and technical support from the relevant United Nations organizations, such as the World Meteorological Organization, the United Nations Environment Programme and the World Health Organization, within their respective mandates, to this end;

8. *Acknowledges* the generous offer by the Government of the Islamic Republic of Iran to host an international conference on combating sand and dust storms, with the cooperation of the United Nations Environment Programme, the United Nations Development Programme, the World Health Organization, the World

[9] A/77/216.

Meteorological Organization, the Food and Agriculture Organization of the United Nations, the Department of Economic and Social Affairs of the Secretariat and the Economic and Social Commission for Asia and the Pacific, as well as other relevant United Nations entities, in 2023;

9. *Invites* all affected Member States as well as relevant entities of the United Nations development system, regional organizations and other relevant stakeholders to endeavour to meet the objectives set out in the present resolution;

10. *Reaffirms* that climate change is one of the greatest challenges of our time and, among other factors, is a serious challenge to the sustainable development of all countries, including those affected by sand and dust storms, and emphasizes that, among other factors, climate change is an important potential contributor to future wind erosion and the risk of sand and dust storms, especially the occurrence of more extreme wind events and the movement towards drier climates, although reverse effects are possible;

11. *Recognizes* that sand and dust storms cause numerous human health problems in different regions around the world, especially in arid, semi-arid and dry subhumid regions, and that there is a need to reinforce protective strategies to reduce the negative impacts of sand and dust storms on human health, invites the World Health Organization, with the cooperation of other relevant United Nations system entities, as appropriate, to support affected countries in combating health problems caused by sand and dust storms, within their respective mandates, recognizes the formation of a working group on sand and dust storms to discuss emerging issues and share information under the technical advisory group on global air pollution and health of the World Health Organization, and also recognizes the publication of a dedicated section on the health effects of sand and dust storms as part of the World Health Organization global air quality guidelines released in September 2021, and the development of standard operating procedures to assess and address the short-term health effects of desert dust by the World Health Organization, in collaboration with experts from the World Meteorological Organization;

12. *Emphasizes* that sand and dust storm issues will continue to constitute important components of the global coalition on health, environment and climate change launched in May 2018 by the World Health Organization, the United Nations Environment Programme and the World Meteorological Organization to improve coordination and reduce the 12.6 million deaths each year that are attributed to environmental risks, such as air pollution;

13. *Commends* the United Nations Environment Assembly on its commitment to addressing sand and dust storms, and in this regard notes Environment Assembly resolution 2/21 on sand and dust storms, adopted during its second session, and resolution 4/10 on innovation on biodiversity and land degradation, adopted during its fourth session;

14. *Takes note* of the convening of the regional ministerial meeting on environmental cooperation for a better future held in the Islamic Republic of Iran on 12 July 2022 to find solutions for regional environmental challenges, especially the issue of sand and dust storms;

15. *Recalls* the convening of the fifth session of the United Nations Environment Assembly in Nairobi from 28 February to 2 March 2022, under the theme “Strengthening actions for nature to achieve the Sustainable Development Goals”, and also recalls its ministerial declaration;[10]

[10] UNEP/EA.5/HLS.1.

16. *Commends* the secretariat of the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, on its efforts to develop both a global base map of sand and dust storm sources, in collaboration with the United Nations Environment Programme and the World Meteorological Organization, and the *Sand and Dust Storms Compendium: Information and Guidance on Assessing and Addressing the Risks*, in collaboration with the Science-Policy Interface of the Convention and other relevant United Nations system entities, as a comprehensive collation of material designed to provide information and guidance on how to assess and address the risks posed by sand and dust storms and plan actions to combat their recurrence and impacts, also commends the World Meteorological Organization for achieving several improvements to the observation and modelling systems that are part of its Sand and Dust Storm Warning Advisory and Assessment System, which provides sand and dust storm forecasts for early warning systems in various countries, and encourages the World Meteorological Organization and all relevant stakeholders to broaden the regional domains of this system to cover the highly affected regions and to continue making technical improvements to it;

17. *Welcomes* the fifteenth session of the Conference of the Parties to the United Nations Convention to Combat Desertification, held in Abidjan from 9 to 20 May 2022, takes note of the Abidjan Call and other relevant decisions adopted by the parties during the Conference, namely decision 26/COP.15, and reaffirms the importance of addressing sand and dust storms under the Convention;

18. *Encourages* the relevant entities of the United Nations, including the World Health Organization, the United Nations Environment Programme, the United Nations Development Programme, the World Meteorological Organization, the Food and Agriculture Organization of the United Nations and the Department of Economic and Social Affairs, within their respective mandates and resources, and donors to continue to provide capacity-building and technical assistance for combating and preventing sand and dust storms and to continue to support the implementation of the national, regional and global action plans of the affected countries;

19. *Decides* to consider during the seventy-seventh session of the General Assembly the measures required to designate a day of each year as the International Day of Combating Sand and Dust Storms, to further raise international awareness of sand and dust storms;

20. *Acknowledges* the global assessment of sand and dust storms prepared by the United Nations Environment Programme in collaboration with other relevant United Nations system entities, including the World Meteorological Organization and the secretariat of the United Nations Convention to Combat Desertification, which sets out proposals for consolidated and coordinated technical and policy options for responding to sand and dust storms;

21. *Takes note with appreciation* of the efforts made by the World Health Organization so far in conducting and its willingness to conduct further studies regarding the common effects of both COVID-19 and sand and dust storms on public health, and invites the United Nations Coalition on Combating Sand and Dust Storms, within its existing mandate and resources, to intensify its efforts to prepare recommendations on mitigating the common effects of both COVID-19 and sand and dust storms on the respiratory systems of infected people, to be included in the report of the Secretary-General to be submitted to the General Assembly at its seventy-eighth session;

22. *Requests* the Secretary-General to further encourage the United Nations Coalition on Combating Sand and Dust Storms to conduct its priority activities as identified by the Coalition’s five working groups, which are knowledge-sharing,

capacity-building, training, awareness-raising and support for the formulation of national, regional and interregional plans, to mitigate and prevent sand and dust storm hazards, and to encourage the Coalition to enhance resource mobilization efforts so as to increase voluntary contributions to the Coalition and its member agencies;

23. *Also requests* the Secretary-General to submit to the General Assembly at its seventy-eighth session a report on the implementation of the present resolution, and decides to include in the provisional agenda of its seventy-eighth session, under the item entitled “Sustainable development”, the sub-item entitled “Combating sand and dust storms”.

53rd plenary meeting
14 December 2022

United Nations A/RES/77/172

General Assembly

Distr.: General
21 December 2022

Seventy-seventh session
Agenda item 18 (k)
Sustainable development: sustainable mountain development

Resolution adopted by the General Assembly on 14 December 2022

[*on the report of the Second Committee (A/77/443/Add.11, para. 7)*]

77/172. Sustainable mountain development

The General Assembly,

Recalling its resolutions 53/24 of 10 November 1998, 55/189 of 20 December 2000, 57/245 of 20 December 2002, 58/216 of 23 December 2003, 59/238 of 22 December 2004, and its resolutions 60/198 of 22 December 2005, 62/196 of 19 December 2007, 64/205 of 21 December 2009, 66/205 of 22 December 2011 and 68/217 of 20 December 2013, 71/234 of 21 December 2016 and 74/227 of 19 December 2019 entitled "Sustainable mountain development",

Reaffirming its resolution 70/1 of 25 September 2015, entitled "Transforming our world: the 2030 Agenda for Sustainable Development", in which it adopted a comprehensive, far-reaching and people-centred set of universal and transformative Sustainable Development Goals and targets, its commitment to working tirelessly for the full implementation of the Agenda by 2030, its recognition that eradicating poverty in all its forms and dimensions, including extreme poverty, is the greatest global challenge and an indispensable requirement for sustainable development, its commitment to achieving sustainable development in its three dimensions – economic, social and environmental – in a balanced and integrated manner, and to building upon the achievements of the Millennium Development Goals and seeking to address their unfinished business,

Recalling that the 2030 Agenda for Sustainable Development, inter alia, recognizes that economic and social development depends on the sustainable management of our planet's natural resources and confirms the determination of the international community to conserve and sustainably use oceans and seas and freshwater resources, as well as forests, mountains and drylands, and to conserve biodiversity, ecosystems and wildlife,

Reaffirming its resolution 69/313 of 27 July 2015 on the Addis Ababa Action Agenda of the Third International Conference on Financing for Development, which

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is an integral part of the 2030 Agenda for Sustainable Development, supports and complements it, helps to contextualize its means of implementation targets with concrete policies and actions, and reaffirms the strong political commitment to address the challenge of financing and creating an enabling environment at all levels for sustainable development in the spirit of global partnership and solidarity,

Recalling the outcome document of the United Nations Conference on Sustainable Development, entitled "The future we want",[1] Agenda 21,[2] the Plan of Implementation of the World Summit on Sustainable Development (Johannesburg Plan of Implementation)[3] and the Aichi Biodiversity Targets of the Strategic Plan for Biodiversity 2011–2020,

Reaffirming the Paris Agreement[4] and its early entry into force, encouraging all the parties to the Agreement to fully implement the Agreement, and parties to the United Nations Framework Convention on Climate Change[5] that have not yet done so to deposit their instruments of ratification, acceptance, approval or accession, where appropriate, as soon as possible, and highlighting the synergies between the full implementation of the 2030 Agenda and the Paris Agreement,

Recalling that the United Nations Framework Convention on Climate Change, inter alia, recognizes that developing countries with fragile mountainous ecosystems are among the countries that are particularly vulnerable to the adverse effects of climate change,

Noting with concern the findings contained in the special reports entitled *Global Warming of 1.5°C*, *The Ocean and Cryosphere in a Changing Climate* and *Climate Change and Land* and the reports of the sixth assessment cycle, including the cross-chapter paper on mountains, of the Intergovernmental Panel on Climate Change,

Noting with concern also the adverse impacts of climate change on high mountains, including the retreat of mountain glaciers, permafrost thaw, mass loss of ice sheets and the decline in the depth, extent and duration of snow cover,

Noting with great concern the severe negative impact on human health, safety and well-being caused by the coronavirus disease (COVID-19) pandemic, as well as the severe disruption to societies and economies and the devastating impact on lives and livelihoods, and that the poorest and most vulnerable are the hardest hit by the pandemic, reaffirming the ambition to get back on track to achieve the Sustainable Development Goals by designing and implementing sustainable and inclusive recovery strategies to accelerate progress towards the full implementation of the 2030 Agenda for Sustainable Development and to help to reduce the risk of and build resilience to future shocks, crises and pandemics, including by strengthening health systems and achieving universal health coverage, and recognizing that equitable and timely access for all to safe, quality, effective and affordable COVID-19 vaccines, therapeutics and diagnostics are an essential part of a global response based on unity, solidarity, renewed multilateral cooperation and the principle of leaving no one behind,

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[1] Resolution 66/288, annex.

[2] *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3–14 June 1992*, vol. I, *Resolutions Adopted by the Conference* (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution 1, annex II.

[3] *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August–4 September 2002* (United Nations publication, Sales No. E.03.II.A.1 and corrigendum), chap. I, resolution 2, annex.

[4] See FCCC/CP/2015/10/Add.1, decision 1/CP.21, annex.

[5] United Nations, *Treaty Series*, vol. 1771, No. 30822.

Acknowledging the severe consequences of the COVID-19 pandemic for the sustainable development of mountain regions, including the far-reaching and enduring consequences for poverty eradication, employment, education, growth, social welfare, the reduction of inequalities, including gender inequality, and for livelihoods, ending hunger, food security and nutrition and access to health-care services, as a result of the unprecedented contraction of the global economy, compounding the challenges posed by climate change,

Recalling the holding of the 2019 Climate Action Summit, convened by the Secretary-General, on 23 September 2019, taking note of the multi-partner initiatives and commitments presented during the Summit, and recalling the Youth Climate Summit, held on 21 September 2019,

Taking note with appreciation of the 2021 United Nations Food Systems Summit, convened by the Secretary-General on 23 and 24 September 2021, as well as its pre-Summit, held from 26 to 28 July 2021 in Rome, Italy,

Recalling the United Nations Decade on Ecosystem Restoration (2021–2030),[6] with its goal of preventing, halting and reversing the degradation of ecosystems worldwide, including in mountain areas,

Recalling also the Convention on Biological Diversity,[7] the Aichi Biodiversity Targets contained in its Strategic Plan for Biodiversity 2011–2020[8] and its programme of work on mountain biodiversity,

Recalling further the Aspen Declaration, adopted at the sixth global meeting of the International Partnership for Sustainable Development in Mountain Regions (Mountain Partnership), convened in Aspen, United States of America, from 26 to 29 September 2022,

Noting with serious concern the findings of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, stressing the urgent need to halt and reverse the unprecedented global decline in biodiversity, in this regard welcoming the first part of the fifteenth meeting of the Conference of the Parties to the Convention on Biological Diversity, held in Kunming, China, from 11 to 25 October 2021, and looking forward to the second part of the fifteenth meeting, in Montreal, Canada, from 7 to 19 December 2022, under the presidency of China, which is to adopt an ambitious, balanced, practical, effective, robust and transformative post-2020 global biodiversity framework,

Recalling the United Nations strategic plan for forests 2017–2030,[9] and noting with appreciation the Bonn Challenge,

Recognizing the Sendai Declaration and the Sendai Framework for Disaster Risk Reduction 2015–2030, adopted at the Third United Nations World Conference on Disaster Risk Reduction,[10] the latter of which, inter alia, identifies a need for focused action in investing in disaster risk reduction for resilience, and in this regard considers it important to promote, at the national and local levels, the mainstreaming of disaster risk assessment, mapping and management into rural development planning and management of, inter alia, mountains, including through the identification of areas that are safe for human settlement, and at the same time preserving ecosystem functions that help to reduce risks,

[6] See resolution 73/284.
[7] United Nations, *Treaty Series*, vol. 1760, No. 30619.
[8] United Nations Environment Programme, document UNEP/CBD/COP/10/27, annex, decision X/2, annex.
[9] See resolution 71/285.
[10] Resolution 69/283, annexes I and II.

Looking forward to the convening of the United Nations Conference on the Midterm Comprehensive Review of the Implementation of the Objectives of the International Decade for Action, "Water for Sustainable Development", 2018–2028, in New York from 22 to 24 March 2023, subsequently referred to as the United Nations 2023 Water Conference, in accordance with General Assembly resolutions 73/226 of 20 December 2018 and 75/212 of 21 December 2020,

Reaffirming its resolution 76/129 of 16 December 2021, in which it proclaimed 2022 the International Year of Sustainable Mountain Development, on the proposal of the Government of Kyrgyzstan, 20 years after the International Year of Mountains, held in 2002, and 20 years after the establishment of the Mountain Partnership,

Recalling its resolution 76/253 of 15 March 2022, in which it decided to declare 2026 the International Year of Rangelands and Pastoralists, on the proposal of Mongolia, to raise awareness and fill knowledge gaps globally about the considerable benefits provided by healthy rangelands and sustainable pastoralism,

Recognizing that the benefits derived from mountain regions are essential for sustainable development and that mountain ecosystems play a crucial role in providing water and other essential resources and services to a large portion of the world's population,

Recognizing also that mountain ecosystems are highly vulnerable to the increasing adverse impacts of climate change, extreme weather events, deforestation, forest fires and forest degradation, land-use change, land degradation and natural disasters, from which they recover slowly, and that mountain glaciers around the world are retreating and getting thinner, with increasing impacts on the environment, sustainable livelihoods and human well-being,

Acknowledging that, despite the progress that has been made in promoting the sustainable development of mountain regions and the conservation of mountain ecosystems, including their biodiversity, the prevalence of poverty, food insecurity, social exclusion, environmental degradation and exposure to the risk of disasters is still increasing, particularly in developing countries, and access to safe and affordable drinking water and basic sanitation as well as to sustainable modern energy services continues to be limited,

Reaffirming that gender equality and the empowerment of all women and girls will make a crucial contribution to progress across all the Sustainable Development Goals and targets, and that the achievement of full human potential and sustainable development is not possible if one half of humanity continues to be denied full human rights and opportunities,

Noting with deep concern that about 340 million people in rural mountain areas in developing countries – 55 per cent of the total rural mountain population – were considered vulnerable to food insecurity in 2017, a steep increase compared with 2012, and in this regard acknowledging the need to prioritize the special and urgent attention needed by mountain areas, including by focusing on the specific challenges that they face and the opportunities that they provide,

Encouraging Member States to advance innovative pathways to achieve sustainable consumption and production in line with United Nations Environment Assembly resolution 5/11 of 2 March 2022,[11]

Noting with appreciation the collaborative efforts of the Mountain Partnership, launched during the World Summit on Sustainable Development as a multi-stakeholder approach benefiting from the committed support of 465 members, including 61

[11] UNEP/EA.5/Res.11.

Governments, 19 intergovernmental organizations, 372 major groups and 13 subnational authorities, and engaged in the promotion of sustainable development in its three dimensions – economic, social and environmental – in mountain regions,

Noting with appreciation also the work of groups of friends aimed at the promotion of sustainable mountain development, such as the Mountain Focus Group, established in 2001, and the Group of Friends of Mountainous Countries, established in 2019, and recalling the high-level meeting on sustainable mountain development, held in New York on 19 September 2022,

1. *Takes note* of the report of the Secretary-General on sustainable mountain development;[12]

2. *Encourages* States to adopt a long-term vision and holistic approaches, including by incorporating mountain-specific policies into national sustainable development strategies, increase efforts to end poverty in all its forms and dimensions, address food insecurity and malnutrition, promote the conservation and sustainable use of biodiversity, traditional crops and diets, and fight against social exclusion, environmental degradation and disaster risk in mountain areas, taking into account that an integrated landscape approach which addresses natural resources management, including watershed and sustainable forest management as well as climate change resilience through multi-stakeholder approaches, can lead to the sustainable development of highland areas, the improvement of the livelihood of the local mountain communities and the sustainable use of mountain resources;

3. *Encourages* Member States, and invites international organizations and other relevant stakeholders, with respect to sustainable mountain development, to reduce and reverse biodiversity loss and the degradation of land and soil, contributing to the achievement of the Sustainable Development Goals;

4. *Takes note with appreciation* of the International Partnership for Sustainable Development in Mountain Regions (Mountain Partnership), the only United Nations voluntary alliance of partners dedicated to improving the lives of people living in mountain areas and protecting mountain environments around the world, and takes note of the Mountain Partnership framework for action for implementing the 2030 Agenda for Sustainable Development for mountains, as well as the work of the Mountain Partnership Products initiative;

5. *Stresses* the special vulnerability of people living in mountain environments, in particular local communities and Indigenous Peoples, often with limited access to health, education and economic systems and particularly at risk because of the negative impact of extreme natural phenomena, and invites States to strengthen cooperative action, with the effective involvement and sharing of knowledge and experience of all relevant stakeholders, including traditional knowledge of Indigenous Peoples and local mountain communities living in mountain areas and their cultures, by strengthening existing arrangements, agreements and centres of excellence for sustainable mountain development, as well as exploring new arrangements and agreements, as appropriate;

6. *Also stresses* the importance of the diversification of livelihoods and income enhancement opportunities for local mountain communities, and in this regard encourages the promotion of innovative solutions and entrepreneurship within local mountain communities, as appropriate, to end poverty and hunger;

7. *Supports* energy access in accordance with the national needs of developing countries, including mountain countries, to tackle their energy access

[12] A/77/217.

challenges by identifying the specific needs of each country by mobilizing technical and financial assistance and tools to deploy affordable, reliable, sustainable and modern energy solutions, and expand the use of renewable energy, to tackle the energy access deficit;

8. *Stresses* the importance of mountain family farming communities and Indigenous Peoples, as one of the custodians of natural and cultural heritage, and encourages Member States to support the activities related to the United Nations Decade of Family Farming (2019–2028), in line with its global action plan, to promote national policies, as appropriate, that support secure land tenure, provide access to resources, ensure gender equality and women's empowerment and empower people in vulnerable situations, and to implement practical actions that can safeguard decent work opportunities, particularly for youth, in rural areas;

9. *Recognizes* the importance of the One Health and other holistic approaches that deliver multiple benefits to the health and well-being of people, animals, plants and ecosystems, including in mountain regions, and would further strengthen the capacity to address biodiversity loss, prevent, prepare for and respond to the emergence of diseases, including zoonotic infections and future health emergencies, and combat antimicrobial resistance;

10. *Stresses* that the traditions and knowledge of Indigenous Peoples and of local mountain communities living in mountain areas, particularly in the fields of agriculture, medicine and the management of natural resources, should be fully considered, respected and promoted in development policy, strategies and programmes in mountain regions, and underlines the need to promote the full participation and involvement of local mountain communities in decisions that affect them and to integrate Indigenous and local knowledge, heritage and values in all development initiatives, in consultation with and with the consent of the Indigenous Peoples and local mountain communities concerned, as appropriate;

11. *Recognizes* the need to increase the adaptive capacity, resilience and sustainability of food and agricultural production with regard to climate change, notes that sustainable production practices, agroforestry and the conservation of agrobiodiversity in mountain areas ensure food security and nutrition and dietary diversity and quality, generate income for smallholder farmers and aid conservation and restoration, addressing the particular vulnerabilities of food production systems to the adverse impacts of climate change, and also notes that mountain farmers and pastoralists play a key role in agroecology;

12. *Also recognizes* that urgent action is needed to reduce poverty in mountain areas, and in this regard encourages Member States and all relevant stakeholders to take concrete and targeted measures to eradicate poverty in mountain areas;

13. *Notes* that women are often the primary managers of mountain resources and the main actors in agriculture, underlines the need for improved access to resources and productive assets, including land and economic and financial services, for women in mountain regions, as well as the need to strengthen the role of women in mountain regions in decision-making processes that affect their communities, cultures and environments, and encourages Governments and intergovernmental organizations to mainstream a gender perspective, including through data disaggregated by sex, in mountain development activities, programmes and projects towards the achievement of gender equality and women's empowerment;

14. *Recognizes* that mountains provide sensitive indications of climate change through phenomena such as modifications to biological diversity, the retreat of mountain glaciers, flash floods and changes in seasonal run-off, which are having an impact on major sources of freshwater in the world, and stresses the need to take

actions to minimize the negative effects of these phenomena, promote adaptation measures and prevent the loss of biological diversity;

15. *Also recognizes* that the mountain cryosphere has an impact on surrounding lowland areas, even far from the mountains, and that widespread cryosphere changes affect physical, biological and human systems in the mountains and surrounding lowlands, with impacts evident even in the ocean;

16. *Further recognizes* the important role of the cryosphere (glaciers, snow, ice and permafrost) in maintaining ecosystems that provide essential services, which are critical foundations for sustainable development and human well-being, especially for the most vulnerable populations;

17. *Encourages* Member States to collect at the local, national and regional levels, as appropriate, disaggregated scientific data on mountain areas through systematic monitoring, including of trends of progress and change, based on relevant criteria, to support interdisciplinary research programmes and projects and to enhance an integrated and inclusive approach to decision-making and planning, and in this regard notes that the Mountain Green Cover Index is included in the global indicator framework for the Sustainable Development Goals and targets of the 2030 Agenda for Sustainable Development[13] as an indicator for target 15.4 of the Sustainable Development Goals, and also notes the need to validate the related national data and improve its data accuracy and analysis at the country level for the implementation of appropriate policies aimed at restoring and protecting mountain environments;

18. *Calls upon* Member States to strengthen cooperation between scientific institutions, including in the field of mountain glacier studies, on the global and regional scales, and to promote the availability of research results and findings to stakeholders to develop public policies and programmes of action at the international, regional, bilateral and national levels;

19. *Encourages* Member States and all relevant stakeholders to continue to increase public awareness, including through the commemoration of International Mountain Day, on 11 December, established in its resolution 57/245, and the International Year of Sustainable Mountain Development, in 2022, proclaimed in its resolution 76/129, with respect to the economic benefits that mountains provide, for instance through ecosystem services or sustainable tourism, not only to highland communities but also to a large portion of the world's population living in lowland areas;

20. *Welcomes*, in this regard, the contribution of sustainable tourism initiatives in mountain regions as a way to enhance environmental protection and generate socioeconomic benefits for local communities, Indigenous Peoples and rural populations, including opportunities for productive employment, economic growth and the promotion of local culture and products;

21. *Expresses its deep concern* at the number and scale of natural and man-made disasters and their increasing impact in recent years, which have resulted in massive loss of life and long-term negative social, economic and environmental consequences for societies throughout the world, and recognizes that disaster risk reduction requires a broader and more people-centred preventive approach, reflecting the 2030 Agenda for Sustainable Development, and an all-of-society engagement and partnership, empowerment and inclusive, accessible and non-discriminatory participation, paying special attention to people disproportionately affected by disasters, many of which are exacerbated by climate change, especially the poorest,

[13] Resolution 70/1.

and also taking into account the vulnerability of people living in mountain environments, especially those in developing countries;

22. *Encourages* States, as appropriate, to strengthen disaster risk governance, to invest in disaster risk reduction for resilience and to develop and improve disaster risk strategies in mountain regions through increased generation and use of climate and disaster risk information, improved risk communication and participation of mountain communities, development of hazard risk maps and platforms, improvement of early warning systems and application of the risk-based approach in all development planning, in order to cope with such extreme events as rockfalls, avalanches, glacial lake outburst floods and landslides, which can be exacerbated by climate change and deforestation, consistent with the Sendai Framework for Disaster Risk Reduction 2015–2030;[14]

23. *Encourages*, in this regard, the increased involvement of local authorities, as well as other relevant stakeholders, in particular the rural population, Indigenous Peoples, civil society and the private sector, in the development and implementation of programmes, land-use planning and land tenure arrangements, and in other relevant activities related to sustainable development in mountains;

24. *Notes with concern* that the access to services and infrastructure is lower in the highlands than in other areas, and encourages Member States to improve basic infrastructure in mountain areas towards achieving the Sustainable Development Goals;

25. *Recognizes* the need for the sustainable management of forests and the conservation and sustainable use of mountains, which, together with other natural ecosystems, act as natural sinks and reservoirs of biodiversity and greenhouse gases, reducing vulnerability to climate change impacts, allowing the continuity of the hydrological cycle, and encourages Member States to adopt nature-based solutions, ecosystem-based approaches, in line with United Nations Environment Assembly resolution 5/5 of 2 March 2022;[15]

26. *Notes* the importance of ensuring the protection, restoration and conservation of mountain ecosystems, including their biodiversity, in order to enhance their capacity to provide benefits that are essential for human well-being, economic activity and sustainable development, and of developing innovative means of implementation for their protection, in this regard recognizes with appreciation the establishment of relevant funds, including the Mountain Facility of the Mountain Partnership Secretariat, focusing on climate resilient business models that enhance mountain biodiversity, and the efforts made by relevant United Nations entities to promote the conservation of mountain ecosystems, and encourages Member States and all relevant stakeholders to financially support it on a voluntary basis;

27. *Encourages* greater efforts by States, all relevant stakeholders and the international community towards the conservation of mountain ecosystems and the enhancement of the well-being of their local populations, including by promoting investment in infrastructure in mountain areas, such as transport and information and communications technologies, and supporting education, culture, extension and capacity-building programmes, especially among local mountain communities and other relevant stakeholders, strengthening the role of youth through education and training on sustainable mountain development and taking into account the extent of the current challenges that they face and bearing in mind the increased economic,

[14] Resolution 69/283, annex II.
[15] UNEP/EA.5/Res.5.

social and environmental costs that inaction might represent for countries and societies;

28. *Underlines* the fact that action at the national level is a key factor in achieving progress in sustainable mountain development, welcomes its steady increase in recent years with a multitude of events, activities and initiatives, and invites the international community to support the efforts of developing countries to develop and implement strategies and programmes, including, where required, enabling policies and laws for the sustainable development of mountains, within the framework of national sustainable development plans, including by building and strengthening institutional capacities, as appropriate;

29. *Encourages* the further undertaking of multi-stakeholder and transboundary initiatives at the national, regional and global levels, where appropriate, such as those supported by all relevant international and regional organizations, to enhance sustainable development in mountain regions, and notes in this regard the numerous initiatives undertaken, including the fifth global meeting of the Mountain Partnership, held in Rome from 11 to 13 December 2017, the fourth World Mountain Forum, held in Bishkek from 23 to 26 October 2018, the High Mountain Summit, held in Geneva from 29 to 31 October 2019, and the sixth global meeting of the Mountain Partnership, held in Aspen from 26 to 29 September 2022, and welcomes the generous offer of the Government of Kyrgyzstan to convene the second Global Mountain Summit in Bishkek from 9 to 11 December 2027;

30. *Decides* to proclaim the period 2023–2027 as Five Years of Action for the Development of Mountain Regions in order to enhance the awareness of the international community of the problems of mountain countries and to give new impetus to the international community's efforts to address the challenges and problems of mountain countries;

31. *Encourages* Member States and all relevant stakeholders to consider, as appropriate, mountain-related issues in the processes of United Nations conventions and other relevant global forums, including the process related to a post-2020 global biodiversity framework, and to implement the programme of work on mountain biodiversity of the Conference of the Parties to the Convention on Biological Diversity, and stresses the importance of regional and transboundary collaboration as means of implementation;

32. *Encourages* Member States to promote ecosystem-based adaptation, bearing in mind the guidelines adopted by the fourteenth meeting of the Conference of the Parties to the Convention on Biological Diversity, in 2018, and climate-smart wildlife conservation as tools for reducing impacts on communities and species, and welcomes the efforts of partners such as the United Nations Environment Programme, the International Union for Conservation of Nature and the Mountain Institute in promoting ecosystem-based adaptation in mountain regions;

33. *Encourages* all relevant entities of the United Nations system, within their respective mandates, to further enhance their constructive efforts to strengthen inter-agency collaboration to promote sustainable mountain development;

34. *Recognizes* that mountain ranges are usually shared among several countries, and in this context encourages transboundary cooperation approaches where the States concerned agree to the sustainable development of mountain ranges and information-sharing in this regard;

35. *Notes with appreciation*, in this context, the Convention on the Protection of the Alps[16] and the Framework Convention on the Protection and Sustainable Development of the Carpathians, and the recent adoption of the Protocol on Sustainable Agriculture and Rural Development and the entry into force of the Protocol on Sustainable Transport, which promote constructive new approaches to integrated, sustainable mountain development and provide a forum for dialogue among stakeholders, and notes other transboundary approaches and initiatives such as the Andean Initiative for mountains, the Scientific Network for the Caucasus Mountain Region and the established Caucasus Mountain Forum, the African Mountains Regional Forum, the European Union Strategy for the Alpine Region and the Zurich process, the Hindu Kush Himalayan Partnership for Sustainable Mountain Development, the Hindu Kush Himalayan Monitoring and Assessment Programme, the International Snow Leopard and Ecosystem Forum of 2017, the fourth World Nomad Games, in 2022, and the Pyrenean Climate Change Observatory, as well as other relevant initiatives promoting transboundary cooperation and dialogue supported by the United Nations Environment Programme and other partners;

36. *Invites* Member States and relevant United Nations agencies, within their mandates, to further enhance support to sustainable mountain development, including through participation in the Five Years of Action for the Development of Mountain Regions;

37. *Stresses* that the costs of all activities that may arise from the implementation of the present resolution should be met from voluntary contributions, and that such activities would be subject to the availability and provision of voluntary contributions;

38. *Calls upon* mountain countries, the United Nations system and other relevant stakeholders, such as academia, the private sector and investors, to improve international cooperation, including by furthering financial mechanisms between mountain countries and attracting investments;

39. *Requests* the Secretary-General to report to the General Assembly at its eightieth session on the implementation of the present resolution, including on the Five Years of Action for the Development of Mountain Regions, under the sub-item entitled “Sustainable mountain development” of the item entitled “Sustainable development”.

53rd plenary meeting
14 December 2022

[16] United Nations, *Treaty Series*, vol. 1917, No. 32724.

Annex

Resolutions and decisions adopted by the United Nations Environment Assembly of the United Nations Environment Programme at its first session

Resolutions

1/1. Ministerial outcome document of the first session of the United Nations Environment Assembly of the United Nations Environment Programme

The United Nations Environment Assembly

Adopts the following ministerial outcome document:

Ministerial outcome document of the first session of the United Nations Environment Assembly of the United Nations Environment Programme

The ministers of environment and heads of delegation gathered at the first session of the United Nations Environment Assembly of the United Nations Environment Programme in Nairobi on 26 and 27 June 2014

Recall General Assembly resolution 2997 (XXVII) of 15 December 1972 establishing the United Nations Environment Programme, the Malmö Ministerial Declaration of 31 May 2000, the 1997 Nairobi Declaration on the Role and Mandate of the United Nations Environment Programme, declaring the United Nations Environment Programme to be the leading global environmental authority that sets the global environmental agenda, that promotes the integrated and coherent implementation of the environmental dimension of sustainable development within the United Nations system and that serves as an authoritative advocate for the global environment, as reinforced in the Nusa Dua Declaration of February 2010;

Also recall that, from the 1972 United Nations Conference on the Human Environment in Stockholm to the United Nations Conference on Environment and Development in Rio de Janeiro, Brazil, in 1992, the adoption of Agenda 21, the adoption of the Plan of Implementation of the 2002 World Summit on Sustainable Development and the United Nations Conference on Sustainable Development (Rio+20), held in Rio de Janeiro in 2012, we have increased our understanding of the importance of the environment in the context of sustainable development, we have strengthened our institutions and we have committed ourselves to action;

Reaffirm, therefore, our commitment to the full implementation of the Rio+20 outcome document, "The future we want",[1] and all the principles of the Rio Declaration on Environment and Development, and call for the implementation of section IV.C of "The future we want", on the environmental pillar in the context of sustainable development, and paragraph 88, on strengthening and upgrading the United Nations Environment Programme;

Emphasize, with the foregoing in mind, the historic importance of convening the first universal session of this lead forum and decision-making body to address

[1] General Assembly resolution 66/288, annex.

global environmental challenges and provide overarching policy guidance within the United Nations system, recognizing the fundamental role of the Environment Assembly in promoting the full integration and coherent implementation of the environmental dimension of sustainable development and its potential to identify opportunities and advance solutions for the global environmental agenda;

Call on the international community, and reaffirm our commitment:

(a) To ensure the full integration of the environmental dimension, especially throughout the sustainable development agenda, acknowledging that a healthy environment is an essential requirement and key enabler for sustainable development;

(b) To achieve an ambitious, universal, implementable and realizable post-2015 development agenda that fully integrates the economic, social and environmental dimensions of sustainable development in a coherent, holistic, comprehensive and balanced manner, including comprehensive and action-oriented sustainable development goals, with the aim of eradicating poverty, protecting the environment and promoting inclusive social and economic development in harmony with nature;

(c) To accelerate and support efforts to promote sustainable consumption and production patterns, including through sustainable lifestyles and resource efficiency, and to accelerate actions, with the support of the United Nations Environment Programme, to implement the 10-year framework of programmes on sustainable consumption and production patterns as a tool for action on sustainable consumption and production, including its section on means of implementation;

(d) To take action to prevent, combat and eradicate the illegal trade in wildlife and wildlife products, which has major economic, social and environmental impacts, contributes to damage to ecosystems and rural livelihoods, undermines good governance and the rule of law and threatens national security;

(e) To undertake urgent actions to address climate change, a persistent crisis that affects all countries, and undermines their ability , in particular developing countries, to achieve sustainable development, which requires cooperation by all countries, in accordance with the objective, principles and provisions of the United Nations Framework Convention on Climate Change;

(f) To continue to work towards the adoption in 2015 of an ambitious outcome in the form of a protocol, other legal instrument or an agreed outcome with legal force under the Framework Convention on Climate Change applicable to all parties in accordance with the Durban Platform for Enhanced Action;

(g) To ensure the full implementation of multilateral environmental agreements and other international and regional environmental commitments in an effective and coordinated manner while promoting synergies among them, acknowledging their positive contribution to sustainable development;

(h) To reinforce efforts to halt biodiversity loss and combat desertification, drought and land degradation, including through the implementation of existing environmental agreements, and to ensure that ecosystems are resilient and continue to provide their services;

(i) To foster and encourage the development of genuine and durable partnerships to address environmental challenges faced by small island developing States, looking forward to the discussion that will take place at the Third International Conference on Small Island Developing States, to be held in Samoa in September 2014;

Underline the importance of the issues addressed in the resolutions adopted by the Environment Assembly at its first session, and invite the international community to join efforts, including those made by the United Nations Environment Programme, to implement such outcomes;

Welcome the richness of the debate that took place in the margins of the first session of the Environment Assembly and the contributions of the academic community and civil society experts in various forums to our understanding of the challenges and opportunities facing us, including with regard to the rule of law on the environment, gender, youth, the role of legislators and financing a green economy, and recommend the continuation of this practice;

Commend the role of the United Nations Environment Programme in facilitating intergovernmental negotiations on multilateral environmental agreements, including the adoption of the Minamata Convention on Mercury, and highlight the important positive contribution of the sound management of chemicals and waste to sustainable development;

Acknowledge that a strengthened science-policy interface is of key importance to more efficient and effective policymaking on sustainable development at all levels and emphasize the role of the United Nations Environment Programme in providing coherent evidence-based knowledge and information on the state of the global environment for decision makers, including in the preparation of the post-2015 development agenda;

Call on the High-level Political Forum on Sustainable Development, the Economic and Social Council and the General Assembly, within their respective mandates, to give appropriate consideration to the present outcome document and to take its messages further with a view to the balanced integration of the three dimensions of sustainable development in the work of the United Nations and its Member States.

1/2. Amendments to the rules of procedure

The United Nations Environment Assembly

Adopts the following amendments to the rules of procedure:

1. Rule 2 as amended reads as follows:

1. Each regular session of the United Nations Environment Assembly shall be held, subject to the provisions of rule 3, at a date fixed by the United Nations Environment Assembly at its previous session in such a way, if practicable, as to enable the Economic and Social Council and the General Assembly to consider the report of the United Nations Environment Assembly in the same year.

2. When setting the date in a given year for the session of the United Nations Environment Assembly, the dates of meetings of other relevant bodies,

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5/5. Nature-based solutions for supporting sustainable development

The United Nations Environment Assembly,

Underlining the importance of strengthening actions for nature for implementing the 2030 Agenda for Sustainable Development and the Sustainable Development Goals, the Rio Declaration on Environment and Development, the Convention on Biological Diversity and other biodiversity-related conventions, the United Nations Framework Convention on Climate Change and the Paris Agreement adopted thereunder, the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, the Sendai Framework for Disaster Risk Reduction 2015–2030, the United Nations Decade on Ecosystem Restoration 2021–2030 and the decade of action and delivery for sustainable development 2020–2030; looking forward to the adoption and implementation of an ambitious, balanced, practical, effective and robust post-2020 global biodiversity framework; and noting the Leaders' Pledge for Nature: United to Reverse Biodiversity Loss by 2030 for Sustainable Development,

Welcoming the report by the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services entitled *Global Assessment Report on Biodiversity and Ecosystem Services*[1] and the contribution of Working Group I, entitled *Climate Change 2021: The Physical Science Basis*,[2] and Working Group II, entitled *Climate Change 2022: Impacts, Adaptation and Vulnerability*,[3] to the sixth assessment report of the Intergovernmental Panel on Climate Change, and taking note of other relevant reports,

Recognizing the interdependencies between biodiversity loss, pollution, climate change, desertification and land degradation and their interlinkages with human well-being, including health, and the importance of ensuring the integrity of all ecosystems,

[1] Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, *Global Assessment Report on Biodiversity and Ecosystem Services* (Bonn, Germany, IPBES secretariat, 2019).

[2] Intergovernmental Panel on Climate Change, *Climate Change 2021: The Physical Science Basis.* Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge University Press, 2021).

[3] Intergovernmental Panel on Climate Change, *Climate Change 2022: Impacts, Adaptation, and Vulnerability*, Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change (Cambridge University Press, 2022).

Recognizing also that a key opportunity for strengthening actions for nature to achieve the Sustainable Development Goals is to enhance cooperation, implementation and the scaling up of nature-based solutions, while ensuring their social and environmental safeguards, given that nature-based solutions are efficient and effective when designed on a context-specific basis to achieve multiple benefits and applied in accordance with the best available science,

Recalling decisions V/6, VI/12, VII/11 and IX/7 of the Conference of the Parties to the Convention on Biological Diversity on the ecosystem approach, and its decision 14/5 on biodiversity and climate change, and recognizing, for the parties to the Convention, the indispensable role of the Convention in the conservation, restoration and sustainable use of biodiversity and in the integrated management of natural resources,

Acknowledging the need for a multilaterally agreed definition of the concept of nature-based solutions, cognizant of and in harmony with the concept of ecosystem-based approaches, and in the light of concerns about the potential misuse of the concept of nature-based solutions,

1. *Decides* that nature-based solutions are actions to protect, conserve, restore, sustainably use and manage natural or modified terrestrial, freshwater, coastal and marine ecosystems which address social, economic and environmental challenges effectively and adaptively, while simultaneously providing human well-being, ecosystem services, resilience and biodiversity benefits, and recognizes that nature-based solutions:

(a) Respect social and environmental safeguards, in line with the three "Rio conventions" (the Convention on Biological Diversity, the United Nations Convention to Combat Desertification and the United Nations Framework Convention on Climate Change), including such safeguards for local communities and indigenous peoples;

(b) Can be implemented in accordance with local, national and regional circumstances, consistent with the 2030 Agenda for Sustainable Development, and can be managed adaptively;

(c) Are among the actions that play an essential role in the overall global effort to achieve the Sustainable Development Goals, including by effectively and efficiently addressing major social, economic and environmental challenges, such as biodiversity loss, climate change, land degradation, desertification, food security, disaster risks, urban development, water availability, poverty eradication, inequality and unemployment, as well as social development, sustainable economic development, human health and a broad range of ecosystem services;

(d) Can help to stimulate sustainable innovation and scientific research;

2. *Recognizes* that nature-based solutions may contribute significantly to climate action, while recognizing the need for analysis of their effects, including in the long term, and acknowledging that they do not replace the need for rapid, deep and sustained reductions in greenhouse gas emissions, but can improve action for adaptation and resilience to and mitigation of climate change and its impact;

3. *Also recognizes* the potential of sustainable and environmentally sound bio-based products, innovation and technologies that result from nature-based solutions, when they contribute to sustainable consumption and production and are beneficial to nature and consistent with international commitments and relevant multilateral agreements on biodiversity, climate, environment and sustainable development, while cognizant of the potential associated risks, including for local communities and indigenous peoples;

4. *Acknowledges* that the concept of nature-based solutions is cognizant of and in harmony with the concept of ecosystem-based approaches identified under the Convention on Biological Diversity and other management and conservation approaches carried out under existing national policy and legislative frameworks and established under relevant multilateral environmental agreements;

5. *Requests* the Executive Director of the United Nations Environment Programme, subject to the availability of resources and to further support the implementation of nature-based solutions, as defined in the present resolution, to convene intergovernmental consultations in a transparent, inclusive, regionally balanced manner, striving for gender balance, in order to undertake the following:

(a) Compile examples of best practice in nature-based solutions, based on the best available science;

(b) Assess existing and discuss potential new proposals, criteria, standards and guidelines to address divergences, with a view to achieving a common understanding among Member States for the implementation of nature-based solutions, including to support Member States in designing, implementing and evaluating nature-based solutions, building on existing work, initiatives and platforms, as appropriate, and without prejudice to existing efforts and initiatives of and new proposals from individual Member States;

(c) Identify options for supporting sustainable investment in nature-based solutions and share information on bilateral and multilateral sources of finance to enable developing countries to develop and deploy nature-based solutions;

6. *Also requests* the Executive Director, subject to the availability of resources, to support the intergovernmental consultations, including enabling the participation of developing countries and relevant partners and stakeholders, consistent with applicable United Nations rules;

7. *Calls upon* Member States and the Executive Director, in collaboration with other relevant United Nations entities, to support the implementation of the present resolution in partnership with local communities, women and youth as well as with indigenous peoples, with their free, prior and informed consent, as their knowledge and methods have proved effective in conserving, restoring and sustainably using biodiversity;

8. *Calls upon* Member States to follow a country-driven, gender-responsive, participatory and fully transparent approach when designing, implementing and monitoring nature-based solutions.

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5/11. Enhancing circular economy as a contribution to achieving sustainable consumption and production

The United Nations Environment Assembly,

Recalling its resolution 4/1 on innovative pathways to achieve sustainable consumption and production, which acknowledged that, along with other sustainable production and consumption approaches, a more circular economy, in which products and materials are designed in such a way that they can be reused, remanufactured, recycled or recovered and thus maintained in the economy for as long as possible, along with the resources of which they are made, and the generation of waste, especially hazardous waste, is avoided or minimized, and greenhouse gas emissions are prevented or reduced, can contribute significantly to sustainable consumption and production,

Acknowledging that pursuing circular economy approaches as a pathway to achieving sustainable consumption and production patterns can contribute to addressing climate change, biodiversity loss, land degradation and the impact of water stress, pollution and the impact thereof on human health, thus contributing to the achievement of related goals under the 2030 Agenda for Sustainable Development and other internationally agreed environmental goals,

Taking note of the findings by the Platform for Accelerating the Circular Economy, presented in the *Circularity Gap Report 2020*,[1] that the global circularity gap is widening, compounded by linear economy trends that are characterized by high rates of material resource extraction, ongoing stock build-up and low levels of end-of-use processing and recycling,

Welcoming the analysis by the International Resource Panel in its report *Global Resources Outlook 2019: Natural Resources for the Future We Want*[2] that policy considerations for a more circular economy include establishing effective infrastructure for waste management and recycling, incentivizing extended product life cycles and sustainable product design, reducing national regulatory barriers to the development or adoption of value-retention processes, and acknowledging the importance of sustainable material resource management,

[1] Circle Economy, *The Circularity Gap Report 2020* (2020), available at https://pacecircular.org/sites/default/files/2020-01/Circularity%20Gap%20Report%202020.pdf.

[2] International Resource Panel, *Global Resource Outlook 2019: Natural Resources for the Future We Want* (United Nations Environment Programme, 2019).

Recognizing that international exchanges, shared experiences, capacity development, finance and cooperation can help to implement circular economy approaches to achieve sustainable consumption and production, and welcoming efforts to advance circular economy approaches, noting in this context the establishment of regional and global initiatives,

Recognizing also that circular economy approaches require scaling up sustainable practices along value chains and acknowledging that there are business models and best practices that embrace circular economy approaches, technologies that improve resource management across sectors, and "leapfrogging technologies" that generate economic savings and improve resource efficiency while still driving development, notwithstanding the need for circular innovation,

Recognizing further the work undertaken under relevant international agreements, conventions, organizations and forums, including those related to the sound management of chemicals and waste,

Welcoming the work conducted by the United Nations Environment Programme in its Partnership for Clean Fuels and Vehicles and the contribution made by the Partnership to a more circular economy by addressing vehicle-associated emissions, pollution, chemicals and waste,

Recognizing the introduction or strengthening of regulations and standards by Member States and regional groups to ensure roadworthiness, reduce the negative environmental and health-related impact of used vehicles and promote clean fuels,

Recognizing also that circular economy approaches provide opportunities for more resource-efficient, less resource-intensive consumption and production practices and environmentally sound technologies and infrastructure, while at the same time supporting livelihoods,

Welcoming the extension by the General Assembly, in its resolution 76/202 of 17 December 2021, of the mandate of the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns to 2030, and taking note of the decision of the Board of the 10-Year Framework to continue developing a new global strategy on sustainable consumption and production that will reflect an ambitious and inclusive pathway for systemic and circular approaches and for multilateral and multi-stakeholder cooperation,

Welcoming also the holding of the UNEP@50 meeting commemorating the fiftieth anniversary of the establishment of the United Nations Environment Programme and the Stockholm+50 international meeting commemorating the fiftieth anniversary of the United Nations Conference on the Human Environment and its outcome documents,

Welcoming further the work of the International Resource Panel, including through its regular *Global Resources Outlook* reports, in developing science-based options for achieving Sustainable Development Goal 12 and related Sustainable Development Goals,

1. *Invites* Member States to integrate circular economy approaches into national and regional strategies and action plans, including those related to relevant multilateral environmental agreements, taking into account national circumstances and capacities;

2. *Also invites* Member States to take measures, in cooperation with the private sector, to enhance the design of products, taking into account life-cycle assessments, to favour product lifetime extension, repair, re-use and easier recycling in the context of a circular economy, to contribute to resource efficiency;

3. *Further invites* Member States, relevant organizations and networks to cooperate in sharing and discussing best practices regarding relevant product information along value chains in the context of the circular economy, in line with domestic and international law;

4. *Underlines* the need for partnerships and invites Member States, the private sector, non-governmental organizations, the scientific community, relevant international institutions and other relevant stakeholders to promote and enhance circular economy approaches as well as business models, innovations and investments to contribute to, among other things, the sustainable management, use and consumption of natural resources and materials;

5. *Invites* Member States to engage, as appropriate and in line with national circumstances and policies, with subnational, national and regional entities to strengthen policies, legal and regulatory frameworks, such as those concerning sustainable public procurement, technological innovation, extended producer responsibility, the materials life cycle and industrial symbiosis to support the uptake of circular economy approaches, with a view to contributing to the achievement of sustainable consumption and production;

6. *Encourages* Member States to enhance knowledge management and to develop strong advocacy, communication, outreach and awareness-raising mechanisms, platforms and campaigns; to support education, research, innovation and development; to enhance capacity-building; to foster public–private partnerships as appropriate; and to strengthen the sharing of information within and across countries and regions concerning sustainable consumption and production approaches, including the circular economy;

7. *Invites* Member States in a position to do so to improve the predictability of and enhance access to support, such as sustainable finance from both public and private sources, environmentally sound technologies for the uptake of circular economy and other approaches to sustainable consumption and production, especially by micro-, small and medium-sized enterprises, in particular in developing countries;

8. *Recognizes* the importance of inclusive multilateral and multi-stakeholder dialogues on sustainable consumption and production, resource efficiency and the circular economy to promote sustainable development;

9. *Requests* the Executive Director of the United Nations Environment Programme, in consultation with Member States, members of specialized agencies and relevant stakeholders, to continue to collect information and conduct further analysis on used vehicles and clean fuels, with a view to reducing the negative environmental and health-related impact of used vehicles, including end-of-life disposal, and promoting clean fuels, and to support Member States upon request;

10. *Requests* the Executive Director, in collaboration with other United Nations entities, including the International Resource Panel, development partners and relevant international multi-stakeholder networks, including the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns, to facilitate collaboration among Member States and members of specialized agencies in research, capacity-building, knowledge management and the sharing of best practices for the promotion of innovative pathways for sustainable consumption and production, including the circular economy, and to facilitate a conversation on natural resources and materials in the context of the circular economy;

11. *Requests* the Executive Director to report to the United Nations Environment Assembly at its sixth session on the implementation of the present resolution.

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United Nations Environment Assembly of the United Nations Environment Programme

United Nations Environment Assembly of the United Nations Environment Programme
Fifth session
High-level segment
Nairobi (hybrid), 22 and 23 February 2021
and 28 February–2 March 2022

Ministerial declaration of the United Nations Environment Assembly at its fifth session

Strengthening actions for nature to achieve the Sustainable Development Goals

1. We, the world's ministers for the environment, have gathered in Nairobi, Kenya, together with representatives of international organizations, major groups and other stakeholders at the resumed fifth session of the United Nations Environment Assembly, under exceptional circumstances created by the coronavirus disease (COVID-19) pandemic, with the urgent aim of strengthening actions for nature to achieve the Sustainable Development Goals.

2. We reaffirm all the principles set out in the Rio Declaration on Environment and Development and our commitment to the implementation of the 2030 Agenda for Sustainable Development and its Sustainable Development Goals, with the United Nations Environment Assembly contributing to the effective implementation of the environmental dimension of sustainable development in an integrated manner.

3. We are ready to do our utmost to end plastic pollution worldwide, and we welcome the decision by the Environment Assembly to establish an intergovernmental negotiating committee towards an international legally binding instrument on plastic pollution.

4. We are deeply concerned about the devastating impacts of the COVID-19 pandemic on human lives and health, economies and societies, which further threaten our ability to achieve sustainable development, and we are aware that we face heightened risks of future pandemics and other health threats if we maintain the current patterns of interaction with nature and do not take a One Health approach, and other relevant holistic approaches, in moving forward.

5. We recognize that a clean, healthy and sustainable environment is important for the enjoyment of human rights and for sustainable development in all its dimensions, and that the well-being of humanity depends on nature and hence on our ability to sustainably use, restore and protect the ecosystem services that it provides for poverty eradication, resilience, our health, our economies and ultimately our existence.

6. We note with profound concern the findings of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services that nature is facing severe pressure from human activities, and we stress the urgent need to halt the global decline of biodiversity and the fragmentation of habitats, which are unprecedented in human history, their main indirect and direct drivers being changes in land and sea use, direct exploitation of organisms, unsustainable consumption and

production patterns, climate change, invasive alien species and pollution of ocean and fresh water, air and soil.

7. We are deeply concerned about the impact of land degradation, desertification and droughts, especially in the most vulnerable countries, and recognize that practices that restore land and soil and aim to achieve land degradation neutrality have the potential to bring about positive socioeconomic change, protect ecosystems, facilitate climate adaptation and act as an accelerator for achieving several Sustainable Development Goals; and we acknowledge the work done by the United Nations Convention to Combat Desertification in this regard and look forward to the fifteenth session of the Conference of the Parties to the Convention, to be held in Abidjan, Côte d'Ivoire, in May 2022.

8. We also note with grave concern that the 2020 goal on sound management of chemicals, agreed under the Strategic Approach to International Chemicals Management, has not been achieved. The unsound management of chemicals and waste remains a threat to the environment and our health and is further aggravated by the COVID-19 pandemic through widespread use of single-use plastics and disinfectant chemicals, as well as by economic challenges.

9. We recognize the need for transformative and systemic changes and for policies that address several environmental, economic and social challenges simultaneously, rechannelling financial flows to serve the attainment of the Sustainable Development Goals through innovative, holistic approaches that truly value nature.

10. We will build on the strength of innovation, science and knowledge, capacity-building, and investment in green and sustainable technologies, which show that solutions exist or can be developed to benefit all countries, and we reaffirm the importance of dedicated North-South, South-South and triangular cooperation for development partnerships and our strong commitment to multilateralism and international solidarity.

11. We welcome the outcomes of the twenty-sixth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, including the adoption of the Glasgow Climate Pact, which emphasizes the urgent need for parties to increase their efforts to collectively reduce emissions through accelerated action and implementation of domestic mitigation measures and the critical role of protecting, conserving and restoring nature and ecosystems in delivering benefits for climate adaptation and mitigation while ensuring social and environmental safeguards. The Glasgow Climate Pact urges developed-country parties to provide enhanced support, including through financial resources, technology transfer and capacity-building, to assist developing-country parties with respect to both mitigation and adaptation in continuation of their existing obligations under the Convention and the Paris Agreement, and encourages other parties to provide or continue to provide such support voluntarily. The Pact also recognizes the importance of the adequacy and predictability of adaptation finance, including the value of the Adaptation Fund in delivering dedicated support for adaptation. We are committed to a successful twenty-seventh session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, to be held in Egypt in November 2022, that further enhances global action to tackle climate change.

12. We welcome the holding of the first part of the fifteenth meeting of the Conference of the Parties to the Convention on Biological Diversity, in Kunming, China, in 2021, under the theme proposed by the host, "Ecological civilization: building a shared future for all life on earth". We call for an ambitious and transformational post-2020 global biodiversity framework for adoption at the second part of the fifteenth Conference of the Parties that, among other things, includes a set of clear and robust goals and targets supported by increased finance and strengthened reporting and review mechanisms as a key instrument for achieving the Sustainable Development Goals and the 2050 vision of the Convention on Biological Diversity of living in harmony with nature.

13. We welcome and express our support for the upcoming special session of the United Nations Environment Assembly, to be held in Nairobi on 3 and 4 March 2022 under the theme "Strengthening the United Nations Environment Programme for the implementation of the environmental dimension of the 2030 Agenda for Sustainable Development" to commemorate the fiftieth anniversary of the creation of the United Nations Environment Programme by the United Nations Conference on the Human Environment, as a historic opportunity to reflect on the past, present and future contribution of the United Nations Environment Programme as the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system, and serves as an authoritative advocate for the global environment.

14. We commit ourselves to promoting an inclusive and sustainable recovery, a green and just transition, with the goal of revitalizing our economies and livelihoods and ending poverty by

mainstreaming biodiversity, climate change and pollution concerns into all policies and tools; by making use of green economy pathways that emphasize ecosystem- and knowledge-based management; by using gender-sensitive approaches and addressing inequalities; and by reducing carbon and non-carbon greenhouse gas emissions while adapting to climate change and its impact in line with the United Nations Framework Convention on Climate Change and the Paris Agreement.

15. We reaffirm our commitment to the United Nations Decade of Ecosystem Restoration and undertake to work across sectors and levels of government, and among governments, to halt the loss, degradation and fragmentation of ecosystems, focusing on areas of particular importance for biodiversity; sustainable land, sea and water use; effectively managing and actively designating protected areas and parks; safeguarding especially vulnerable habitats, types of nature and ecosystems; promoting ecological connectivity; and addressing deforestation, illegal timber trade and wildlife trafficking, environmentally harmful and illegal mining, illegal, unreported and unregulated fishing, and crimes, conflicts, and other unsustainable activities that have a serious impact on the environment.

16. We commit ourselves to promoting the conservation and sustainable use and management of natural resources and to advancing sustainable consumption and production patterns, including through resource efficiency and circular economy policy approaches, and by applying appropriate methods of valuation of nature and assessment of nature-related risks in policymaking.

17. We will promote and strengthen ecosystem-based approaches and nature-based solutions, including by reducing deforestation and forest degradation and by protecting, conserving, sustainably managing and restoring degraded land, soil and ecosystems that provide us with food, water and energy, are habitats for biodiversity, and provide carbon storage and sequestration, thus yielding multiple benefits across the economic, social and environmental domains and underpinning our efforts to achieve the Sustainable Development Goals.

18. We recognize the importance of the best available science for effective action and policymaking on climate change, biodiversity and pollution, and we stress the urgency of enhancing ambition and action in relation to mitigation, adaptation and finance in this critical decade.

19. We will promote comprehensive land and water use planning with robust national enforcement as an important tool for sustainable development and will encourage international cooperation to help create a conducive business environment that stimulates investment in sustainable production and value chains.

20. We commit ourselves to safeguarding life under water and restoring a clean, healthy, resilient and productive ocean capable of providing food and sustainable livelihoods and storing carbon, and we will do so by strengthening efforts to protect, conserve and sustainably manage our oceans, seas, lakes, rivers and coastal ecosystems while acting to prevent pollution, including eutrophication and plastic pollution, and to prevent sea level rise, ocean warming and acidification by keeping our efforts in line with the Paris Agreement and the 2030 Agenda for Sustainable Development. We look forward to the organization of the second United Nations Ocean Conference in Lisbon in 2022 and the United Nations Water Conference in New York in 2023.

21. We will continue our dedicated efforts to act to protect nature and human health from adverse impacts from chemicals and waste and support an ambitious framework for the sound management of chemicals and waste beyond 2020 at the fifth meeting of the International Conference on Chemicals Management, recognizing pollution as one of the major drivers of climate change and biodiversity loss, which in turn requires us to prevent pollution that toxifies land, air, ocean and fresh water.

22. We commit ourselves to pursuing and joining new and innovative partnerships across sectors, and to engaging all relevant stakeholders, working with youth, women, indigenous peoples and local communities and with the business, finance, education and science sectors to develop actions for nature and reverse the persistently negative long-term trend for the environment. We therefore welcome the Youth Environment Assembly held in Nairobi in February 2022.

23. We welcome and rely on the knowledge gained from the recent scientific assessments from the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, the Intergovernmental Panel on Climate Change, the International Resource Panel and the United Nations Environment Programme, and we encourage enhanced collaboration among scientific panels. We further recognize the contribution of indigenous peoples' expertise and knowledge.

24. We undertake to cooperate across sectors and levels of government, in partnership with other Governments and local actors and the private sector, to transition to sustainable food systems in line with the 2030 Agenda for Sustainable Development, the Convention on Biological Diversity and the United Nations Framework Convention on Climate Change and the Paris Agreement, and inspired by

the outcomes of the United Nations Food Systems Summit held in New York in 2021, with a view to delivering enhanced food security and resilience and fostering innovation while reducing emissions, biodiversity loss and freshwater use.

25. We welcome the extension by the General Assembly of the mandate of the 10-Year Framework of Programmes on Sustainable Consumption and Production Patterns (One Planet Network) to 2030.

26. We call for the decisive, adequate and coherent implementation of the actions and commitments contained in resolutions adopted by the United Nations Environment Assembly at its fifth session, as well as in the outcome documents of previous sessions of the Environment Assembly, addressing the triple crises for our common environment – climate change, biodiversity loss and pollution. We recognize our role, as ministers for the environment, in following up on these commitments within our own Governments, contributing to coordinated action across sectors and levels of government and promoting effective implementation.

27. We recognize that the effective implementation of these actions requires enabling and coherent legal and policy frameworks at all levels, good governance and enforcement of legislation. We reaffirm our strong political commitment to addressing the challenge of financing and acknowledge the need for effective and rapidly mobilized means of implementation from all sources of finance, including the domestic, international and private sectors as well as innovative sources, in line with the Addis Ababa Action Agenda of the Third International Conference on Financing for Development, and from relevant multilateral environmental agreements.

28. In closing, we welcome and express our support for the upcoming international meeting “Stockholm+50: a healthy planet for the prosperity of all – our responsibility, our opportunity”, to be held in Stockholm on 2 and 3 June 2022 to further accelerate the transformation to a sustainable future, and we request the Executive Director of the United Nations Environment Programme, in her capacity as Secretary-General of the Stockholm+50 international meeting, to forward the present declaration as the input of the United Nations Environment Assembly to that meeting.

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United Nations Environment
Programme

First special session: commemoration of the fiftieth anniversary of the establishment of the United Nations Environment Programme
Nairobi (hybrid), 3 and 4 March 2022

Political declaration of the special session of the United Nations Environment Assembly to commemorate the fiftieth anniversary of the establishment of the United Nations Environment Programme

We, Heads of State and Government, ministers and high-level representatives, having gathered, together with the representatives of international organizations and other stakeholders, at the special session of the United Nations Environment Assembly entitled "UNEP@50: Strengthening UNEP for the implementation of the environmental dimension of the 2030 Agenda for Sustainable Development" to commemorate the fiftieth anniversary of the establishment of the United Nations Environment Programme,

Expressing our gratitude to the Government of Kenya for hosting the special session – a historic milestone for the global community and the United Nations Environment Programme – to reflect on achievements and lessons learned and envisage future ambitions and actions to support the implementation of the environmental dimension of sustainable development,

Acknowledging with appreciation the 50-year contribution of the United Nations Environment Programme in supporting a worldwide effort to overcome the planet's biggest environmental challenges,

Recognizing that a clean, healthy and sustainable environment is important for the enjoyment of human rights, taking note of Human Rights Council resolution 48/13 entitled "The human right to a clean, healthy and sustainable environment", and noting that the General Assembly has been invited to consider the matter,

Recalling the Stockholm Declaration and the Stockholm Plan of Action for the Human Environment, the Rio Declaration on Environment and Development and Agenda 21, the Programme for the Further Implementation of Agenda 21, the Johannesburg Declaration on Sustainable Development and the Plan of Implementation of the World Summit on Sustainable Development, the Rio+20 Declaration entitled "The future we want" and in particular paragraph 88 thereof, General Assembly resolution 69/313 of 27 July 2015 entitled "Addis Ababa Action Agenda of the Third International Conference on Financing for Development", General Assembly resolution 70/1 of 25 September 2015 entitled "Transforming our world: the 2030 Agenda for Sustainable Development", General Assembly resolution 73/333 of 30 August 2019 entitled "Follow-up to the report of the ad hoc open-ended working group established pursuant to General Assembly resolution 72/277" and General Assembly resolution 76/208 of 17 December 2021 entitled "Report of the United Nations Environment Assembly of the United Nations Environment Programme", as well as the outcomes of all the major United Nations conferences and summits in the economic, social and environmental fields,

Recognizing the urgent need and our common objectives to reinforce and advance the conservation, restoration and sustainable use of the environment for present and future generations, as it is crucial to urgently reverse the current trends of environmental decline, which are impeding progress towards sustainable development, while recognizing differing national circumstances,

Reaffirming that eradicating poverty, changing unsustainable patterns of consumption and production and promoting sustainable ones, and protecting and managing the natural resource base of economic and social development are the overarching objectives of, and essential requirements for, sustainable development, while stressing that poverty eradication remains the greatest challenge facing the world today,

Recognizing the importance of fostering environmental rule of law and effective international environmental governance through multilateral processes, and conscious of ongoing initiatives to promote coordinated approaches and complementary actions for addressing biodiversity loss, climate change, desertification and land degradation, as well as pollution and unsound management of chemicals and waste,

Recognizing also the crucial importance of effective domestic legal frameworks and governance structures for promoting compliance with obligations under international environmental law, and of the delivery of the Sustainable Development Goals, while acknowledging the importance of international cooperation in this regard,

1. *Reaffirm* all the principles of the Rio Declaration on Environment and Development and, recognizing that we face different challenges, we will strengthen our international cooperation towards the environmental dimension of sustainable development;

2. *Support* the strengthening of international environmental governance in the context of the institutional framework for sustainable development, and promote enhanced coordination within the United Nations system for balanced integration of the environmental, economic and social dimensions of sustainable development;

3. *Commit ourselves* to mainstreaming, in a balanced manner, the environmental dimension of sustainable development into national policies, strategies and planning, including but not limited to supporting building of the capacity of relevant authorities, taking into account national circumstances, in order to achieve the 2030 Agenda for Sustainable Development;

4. *Call* for renewed efforts at all levels to enhance implementation of existing obligations and commitments under international environmental law, and to keep the ambition regarding environmental protection and means of implementation, including through global partnerships and enabling a sustainable future for our planet and addressing urgent social, economic and environmental challenges, also considering the backdrop of the coronavirus disease (COVID-19) pandemic and its disproportionate impact on the poorest and people in vulnerable situations by ensuring an environmentally, socially and economically sustainable recovery, including by building back better and greener;

5. *Affirm* the indispensable role of the United Nations Environment Assembly within the United Nations system as the intergovernmental decision-making body with universal membership, while respecting the independence and respective mandates of multilateral environmental agreements, for enhancing progress in the comprehensive implementation of the environmental dimension of the 2030 Agenda for Sustainable Development within the United Nations system, providing overarching policy guidance, and strengthening international environmental governance and implementation of the global environmental agenda in line with the document “The Future We Want”;

6. *Reaffirm* the role of the United Nations Environment Programme as the leading global environmental authority that sets the global environmental agenda, promotes the coherent implementation of the environmental dimension of sustainable development within the United Nations system, and serves as an authoritative advocate for the global environment, and support continuous strengthening of intergovernmental oversight and the accountability of the secretariat of the United Nations Environment Programme in the implementation of the Programme’s mandate in line with Governing Council decision 27/2;

7. *Renew* our support for strengthening the collaboration and cooperation between multilateral environmental agreements and the United Nations Environment Programme while respecting their independence and respective mandates, with a view to achieving progressive improvement in the state of the global environment, as well as in the provision of the means of implementation, and, to that end, invite the governing bodies of multilateral environmental agreements

to collaborate with the United Nations Environment Assembly, as appropriate, to promote policy coherence and its effective implementation;

8. *Support* the strengthening of the United Nations Environment Programme and its regional presence, underline the importance of universal membership to the United Nations Environment Programme, and invite all Member States and members of specialized agencies that have not yet done so to become accredited to the United Nations Environment Programme, and, in that regard, take note with interest of the adoption of General Assembly resolution 76/246 and underline the need to continue improving the United Nations Office at Nairobi, as the only United Nations headquarters duty station in the global South and the host of the headquarters of the United Nations Environment Programme, and, furthermore, invite the United Nations Office at Nairobi to provide more competitive services while inviting the governing bodies of all the multilateral environmental agreements, in particular those hosted by the United Nations Environment Programme, to consider convening, within their mandates, their meetings more frequently in Nairobi;

9. *Stress* the importance of advancing equitable geographic distribution and gender parity among the staff of the secretariat of the United Nations Environment Programme, particularly with regard to Professional and senior-level positions, and request the Executive Director of the Programme to continue ongoing efforts and take effective action in this regard and continue to report regularly to the Committee of Permanent Representatives on progress achieved;

10. *Invite* the General Assembly to consider, as appropriate, the level of regular-budget funding required to help the United Nations Environment Programme to fulfil its mandate, taking into account the Programme's approved work programme and General Assembly resolution 2997 (XXVII);

11. *Reaffirm* that all Member States and members of specialized agencies, taking into account their economic and social circumstances, should contribute financially to the United Nations Environment Programme; in this regard, urge Member States and others in a position to do so to support the United Nations Environment Programme through more stable, adequate and predictable core contributions to the Environment Fund, with due consideration for the voluntary indicative scale of contributions, and stress the need for the United Nations Environment Programme to manage its financial resources prudently and diversify its donor base by encouraging Member States that do not regularly contribute to the Environment Fund to do so;

12. *Encourage* the United Nations Environment Programme, as chair of the Environment Management Group, in collaboration with the other members of the Group, to continue to strengthen system-wide inter-agency coordination on the environment and to call for active involvement and support from all members of the Group in the implementation of system-wide strategies on the environment;

13. *Support* the key role of the United Nations Environment Programme in promoting and strengthening the science-policy interface in order to support intergovernmental debate, negotiations and deliberations, and policy decisions relating to international environmental law and governance, promote the identification and sharing of the best available science to support effective environmental action and policymaking, and in cooperation and collaboration between the relevant scientific panels and to encourage geographical and gender balance in the membership of such panels, and commit ourselves to investing further in environmental research, including in assessments by the United Nations Environment Programme, and making more effective use of knowledge generated by the scientific community;

14. *Recognize* the importance of access to information, access to public participation in decision-making processes and access to justice in environmental matters, and invite Member States and members of specialized agencies to disseminate and share evidence-based environmental information and raise public awareness regarding critical, persistent and emerging environmental issues and continue to support the United Nations Environment Programme in developing a global environmental data strategy;

15. *Resolve* to continuously strengthen, where needed, environmental laws, policies and regulatory frameworks at the national, regional and global levels, without reducing the existing levels of environmental protection, and to strengthen capacity across all sectors for the effective implementation of international environmental law by closing knowledge gaps, enhancing cross-sectoral coordination, improving monitoring and law enforcement, increasing political will and engaging stakeholders, in accordance with national legal systems, while acknowledging the importance of international cooperation in supporting and complementing national action;

16. *Invite* Member States and members of specialized agencies to increase their support to the Fifth Montevideo Programme for the Development and Periodic Review of Environmental Law

(Montevideo Programme V), and to promote the development and implementation of environmental rule of law and welcome the ongoing discussions on this matter while strengthening the capacity of Member States and members of specialized agencies, upon their request;

17. *Encourage* Member States and members of specialized agencies that have not yet done so to consider ratifying relevant multilateral environmental agreements and to effectively implement them, including through the incorporation of their provisions into national legal systems as appropriate;

18. *Invite* Member States and members of specialized agencies to address relevant principles of international environmental law in their domestic legal systems, as appropriate, noting, in this context, the ongoing work by the International Law Commission on general principles of law;

19. *Commit ourselves* to cooperating to strengthen capacity across all sectors for the effective implementation of international environmental law, including in the administrative and justice sectors, in accordance with domestic legal systems, while acknowledging the importance of international cooperation and support in this regard;

20. *Call upon* Member States and members of specialized agencies to enhance the provision and mobilization of all types and sources of means of implementation, including capacity-building, technology and financial support, and to promote global partnerships and North-South, South-South and triangular cooperation, in order to support developing countries in the implementation of national environmental policies in the areas in which they require it, and complementing their national efforts, consistent with the 2030 Agenda for Sustainable Development and the Addis Ababa Action Agenda of the Third International Conference on Financing for Development;

21. *Call* for the urgent fulfilment of existing financial commitments under various multilateral environmental agreements to assist developing countries, and stress the importance of fulfilling relevant pledges;

22. *Commit ourselves* to further amplifying the mobilization of domestic financial resources, including through enhanced collaboration with the private sector, to advance the holistic and balanced implementation of the environmental dimension of sustainable development, taking into consideration the need of developing countries for enhanced international cooperation and support to complement their efforts to mobilize domestic resources;

23. *Invite* the Executive Director of the United Nations Environment Programme to identify further options, in line with the Programme's medium-term strategy and programme of work, for providing assistance to Member States and members of specialized agencies upon their request, including through United Nations country teams, to improve implementation of their environmental objectives, international environmental law and the environmental dimension of the 2030 Agenda for Sustainable Development at the national level, including access to scientific information, technologies, technical assistance and financial resources, while ensuring complementarity with the work of treaty bodies;

24. *Call on* the United Nations, within its mandate, to facilitate effective and efficient use of and adequate and timely access to existing financial instruments, including to support access by Member States and members of specialized agencies to capacity-building and technology, with a special focus on the needs of developing countries, and call on Member States and members of specialized agencies to make effective and efficient use of existing financial mechanisms and funds for the purpose of implementing international environmental law and improving the status of the global environment in promoting environmentally, economically and socially sustainable and resilient recovery from the COVID-19 pandemic;

25. *Encourage* the active and meaningful engagement of all relevant stakeholders, including indigenous peoples and local communities and strengthen the ability of major groups and stakeholders to participate in meetings and activities of the United Nations Environment Programme in line with applicable rules and procedures in a geographically and gender-balanced manner, and commit ourselves to continuing to explore new ways of promoting transparency and the effective engagement of civil society, including via digital means;

26. *Take note* of the report "The UNEP We Want" prepared by major groups and stakeholders, which provides proposals towards a more inclusive and impactful United Nations Environment Programme.

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Food and Agriculture Organization of the United Nations

BES

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Report of the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on the work of its sixth session

Addendum

At its sixth session, in its decision IPBES-6/1, section V, paragraph 1, the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) approved the summary for policymakers of the thematic assessment of land degradation and restoration as set out in the annex to the present addendum.

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Annex

Summary for policymakers of the thematic assessment report on land degradation and restoration of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

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[1] Authors are listed with, in parenthesis, their country of citizenship, or countries of citizenship separated by a comma when they have several; and, following a slash, their country of affiliation, if different from citizenship, or their organization if they belong to an international organization: Name of expert (nationality 1, nationality 2/affiliation). The countries or organizations having nominated these experts are listed on the IPBES website.

I. Key messages

A. Land degradation is a pervasive, systemic phenomenon: it occurs in all parts of the terrestrial world and can take many forms

Combating land degradation and restoring degraded land is an urgent priority to protect the biodiversity and ecosystem services vital to all life on Earth and to ensure human well-being

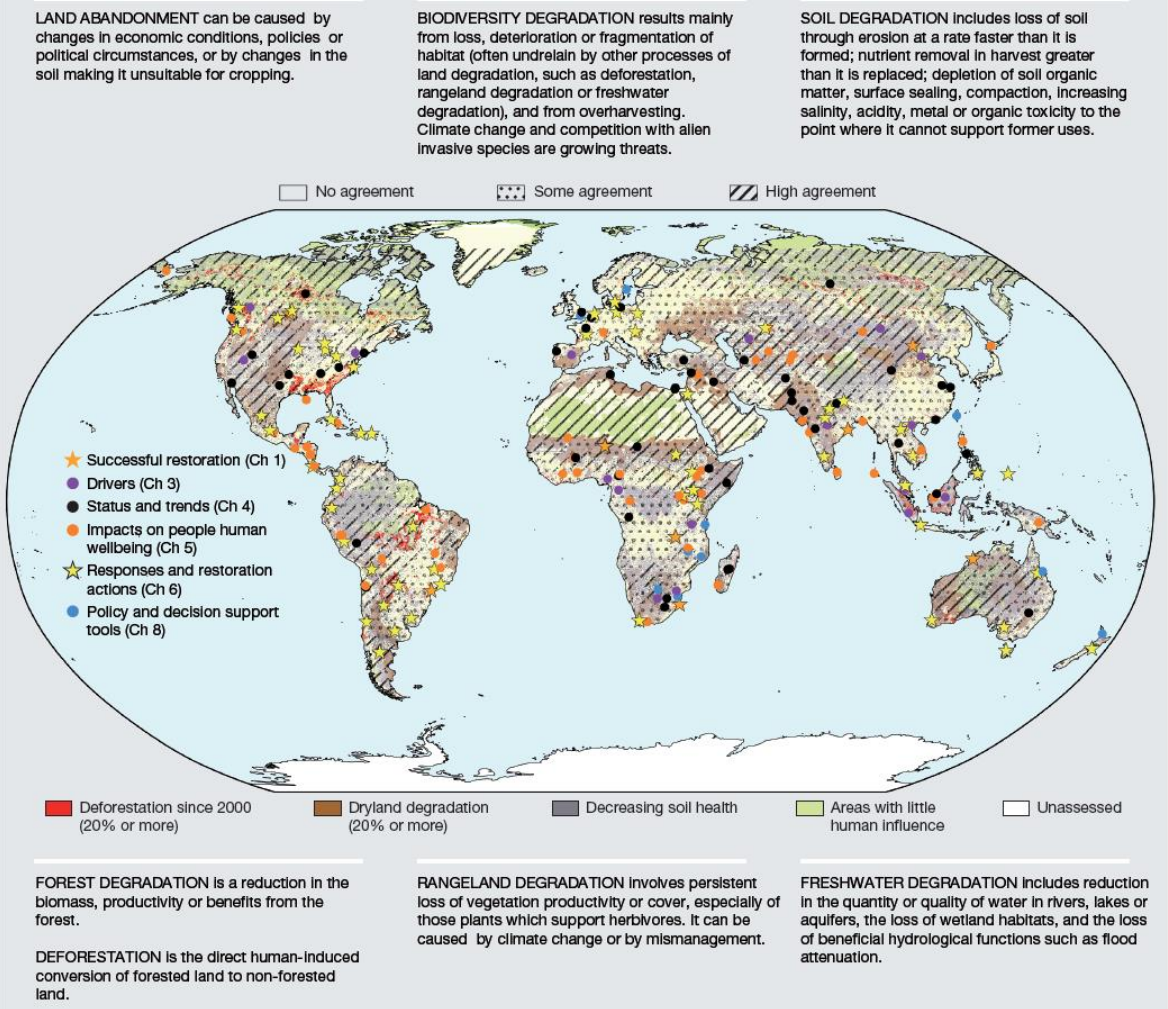
A1. Currently, degradation of the Earth's land surface through human activities is negatively impacting the well-being of at least 3.2 billion people, pushing the planet towards a sixth mass species extinction, and costing more than 10 per cent of the annual global gross product in loss of biodiversity and ecosystem services. Loss of ecosystem services through land degradation has reached high levels in many parts of the world, resulting in negative impacts that challenge the coping capacity of human ingenuity. Groups in situations of vulnerability feel the greatest negative effects of land degradation, and often experience them first. These groups also see the greatest benefits from avoiding, reducing and reversing land degradation (Figure SPM.1). The main direct drivers of land degradation and associated biodiversity loss are expansion of crop and grazing lands into native vegetation, unsustainable agricultural and forestry practices, climate change, and, in specific areas, urban expansion, infrastructure development and extractive industry.

A2. Investing in avoiding land degradation and the restoration of degraded land makes sound economic sense; the benefits generally by far exceed the cost. Land degradation contributes to the decline and eventual extinction of species and the loss of ecosystem services to humanity, making avoidance, reduction and reversal of land degradation essential for human well-being. Short-term gains from unsustainable land management often turn into long-term losses, making the initial avoidance of land degradation an optimal and cost-effective strategy. Studies from Asia and Africa indicate that the cost of inaction in the face of land degradation is at least three times higher than the cost of action. On average, the benefits of restoration are 10 times higher than the costs, estimated across nine different biomes. While challenging, the benefits of restoration include, but are not limited to, increased employment, increased business spending, improved gender equity, increased local investment in education and improved livelihoods.

A3. Timely action to avoid, reduce and reverse land degradation can increase food and water security, can contribute substantially to the adaptation and mitigation of climate change and could contribute to the avoidance of conflict and migration. This is especially important considering the projected 4 billion people that will be living in drylands in 2050. Inherent feedbacks between the Earth's land systems, climate and human societies mean that efforts to address land degradation and restore land have multiplicative benefits. Land restoration and reduced and avoided degradation that increases carbon storage or avoids greenhouse gas emissions in global forests, wetlands, grasslands and croplands could provide more than one third of the most cost-effective greenhouse gas mitigation activities required by 2030 to keep global warming to below 2°C. By 2050, land degradation and climate change together are predicted to reduce crop yields by an average of 10 per cent globally and up to 50 per cent in certain regions. Decreasing land productivity, among other factors, makes societies, particularly on drylands, vulnerable to socioeconomic instability. In dryland areas, years with extreme low rainfall have been associated with an increase of up to 45 per cent in violent conflict. Every 5 per cent loss of gross domestic product (GDP), itself partly caused by degradation, is associated with a 12 per cent increase in the likelihood of violent conflict. Land degradation and climate change are likely to force 50 to 700 million people to migrate by 2050.

Figure SPM.1

Land degradation is a pervasive, systemic phenomenon: it occurs in all parts of the terrestrial world and can take many forms. Successful examples of restoration can also be found in all ecosystems



Source: The degradation background map combines a deforestation map by Hansen et al (2013),[2] a drylands degradation map by Zika and Erb (2009),[3] a cropland degradation map by Cherlet et al (2013)[4] and a wilderness map by Watson et al (2016).[5] It is overlaid by a map of agreement and disagreement between different data sources within a degradation type, adapted from Gibbs and Salmon (2015).[6] For further explanation on the metrics and methodology for Figure SPM. 1, see supporting material Appendix 1.1 available from https://www.ipbes.net/supporting-material-e-appendices-assessments.

A4. Avoiding, reducing and reversing land degradation is essential for meeting the Sustainable Development Goals contained in Agenda 2030 (Figure SPM.2). Due to the delay between starting restoration and seeing the full benefits, the window, while still open for limiting land degradation to a level that does not endanger the achievement of the Sustainable Development Goals, is estimated to close over the next decade. The area of non-degraded land is progressively shrinking at the global scale, while land requirements for a range of competing uses continue to grow. Food, energy, water and livelihood security, as well as the good physical and mental health of individuals

[2] Hansen, M. C., Potapov, P. V., Moore, R., Hancher, M., Turubanova, S. A., Tyukavina, A., Thau, D., Stehman, S. V., Goetz, S. J., Loveland, T. R., Kommareddy, A., Egorov, A., Chini, L., Justice, C. O., and Townshend, J. R. G. (2013). High-resolution global maps of 21st-century forest cover change. *Science*, *342*, (6160), 850–853. DOI: 10.1126/science.1244693.

[3] Zika, M and Erb, K.H. (2009) The global loss of net primary production resulting from human-induced soil degradation in drylands. *Ecological Economics*, *69* (2), 310-319. DOI: 10.1016/j.ecolecon.2009.06.014.

[4] Cherlet, M., Ivits-Wasser, E., Sommer, S., Toth, G., Jones, A., Montanarella, L., and Belward, A. (2013). Land productivity dynamics in Europe: Towards a valuation of land degradation in the EU. EUR 26500. DOI: 10.2788/70673.

[5] Watson, J. E. M., Shanahan, D. F., Di Marco, M., Allan, J., Laurance, W. F., Sanderson, E. W., Mackey, B., and Venter, O. (2016). Catastrophic Declines in Wilderness Areas Undermine Global Environment Targets. *Current Biology*, *26* (21), 2929–2934. DOI: 10.1016/j.cub.2016.08.049.

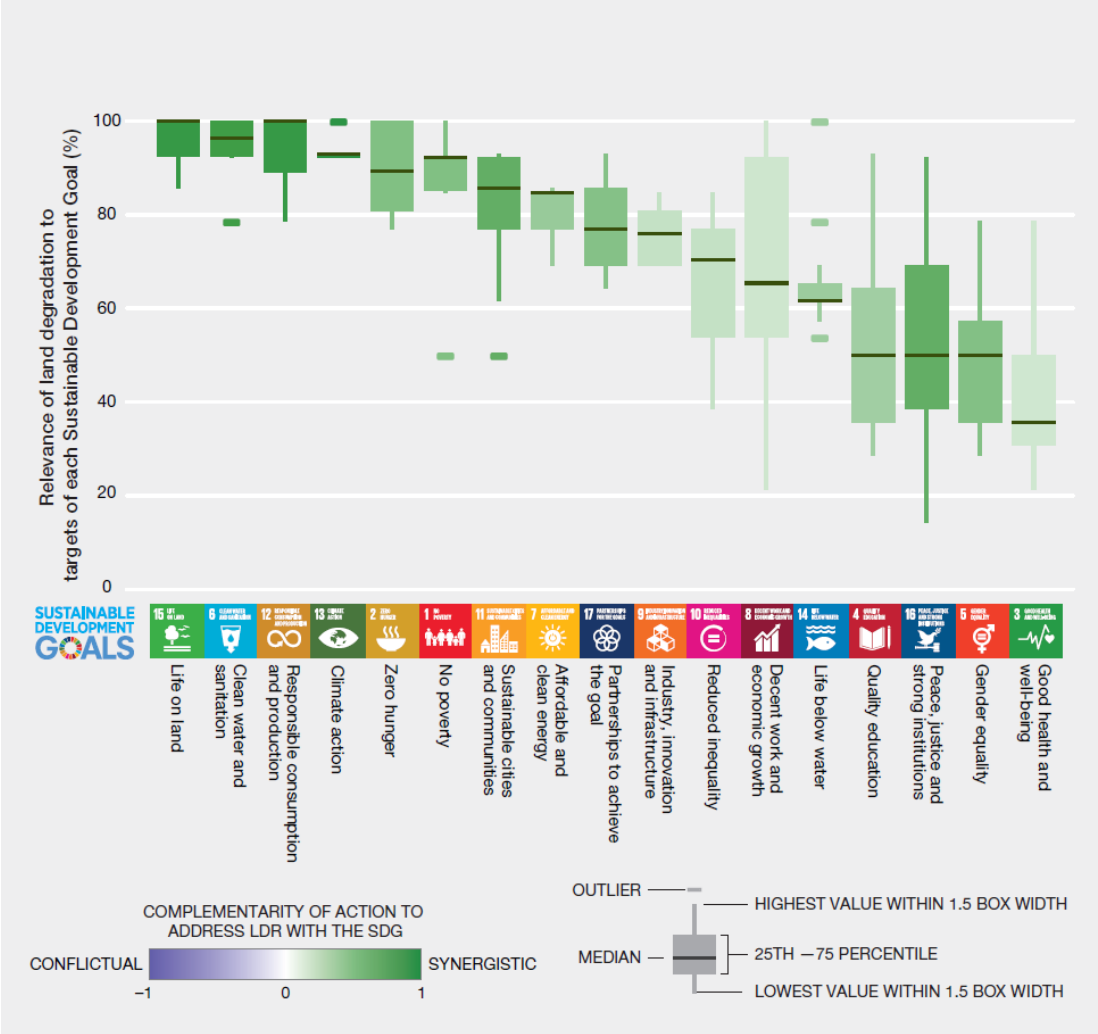
[6] Gibbs, H. K., and Salmon, J. M. (2015). Mapping the world's degraded lands. *Applied Geography*, *57*, 12–21. DOI: 10.1016/j.apgeog.2014.11.024.

and societies, are in whole or in part a product of nature and are negatively impacted by land degradation processes. In addition, land degradation causes biodiversity loss and reduction of nature´s contributions to people, erodes cultural identity and, in some cases, leads to loss of the knowledge and practices that could help halt and reverse land degradation. Full achievement of the Sustainable Development Goals contained in the 2030 Agenda for Sustainable Development is likely to only be possible through urgent, concerted and effective action to avoid and reduce land degradation and promote restoration.

Figure SPM.2

Avoiding, reducing and reversing land degradation is essential for reaching the majority of the Sustainable Development Goals and would deliver co-benefits for nearly all of them

The graphic presents the results of a survey of 13 coordinating lead authors of this assessment, who were asked to synthesize findings of the chapters in order to evaluate the relevance of efforts to address land degradation and restoration for targets of each Sustainable Development Goal, as well as the extent to which addressing land degradation would have a positive or negative impact on progress towards each Sustainable Development Goal. The vertical axis indicates the percentage of experts who believed halting land degradation and restoring degraded land to be relevant to the achievement of that Goal. The green colours indicate the degree to which the targets are synergistic with progress to address land degradation: dark green means all targets are aligned, while lighter green boxes indicate areas where there may be trade-offs between targets and efforts to address land degradation and restoration. In none of the cases was the relationship between efforts to address land degradation and meeting the Sustainable Development Goals judged to be more conflictual than synergistic.



B. Unless urgent and concerted action is taken, land degradation will worsen in the face of population growth, unprecedented consumption, an increasingly globalized economy and climate change

B1. Widespread lack of awareness of land degradation as a problem is a major barrier to action. Perceptions of human-environment relationships have a strong influence on the design and

implementation of land management policies. Land degradation is often not recognized as an unintended consequence of economic development. Even when the link between land degradation and economic development is recognized, the consequences of land degradation may not be given due consideration, which may result in lack of action. Appreciation of the challenges posed by land degradation is further undermined by the fact that negative impacts can be highly variable and localized in nature, and are often strongly shaped by distant, indirect drivers. Land degradation and thus loss of biodiversity and ecosystem services is the most pervasive, systemic phenomenon with far-reaching negative consequences for human well-being worldwide, including by exacerbating food and water insecurity and climate change. Thus, raising awareness of the drivers and consequences of land degradation is essential for moving from high-level policy goals to implementation at the national and local levels.

B2. High consumption lifestyles in more developed economies, combined with rising consumption in developing and emerging economies, are the dominant factors driving land degradation globally. The ultimate driver of land degradation is high and rising per capita consumption, amplified by continued population growth in many parts of the world. Increases in consumption often follow the opening up of new economic opportunities that lower the costs of land-based resources for consumers, leading to a rise in demand. New economic opportunities often arise from increased access to growing regional and global markets, and from technological developments, which increase production capacity. Without adequate regulation, these factors could drive unsustainable levels of agricultural expansion, natural resource and mineral extraction, and urbanization. The widespread failure of policies and institutions to enforce and incentivize sustainable practices and internalize the long-term economic costs of unsustainable production has meant that the exploitation of natural resources typically leads to greater levels of land degradation. Tackling land degradation thus requires systemic change on a macroeconomic level, including a concerted effort to improve the sustainability of both production systems and consumer lifestyles, while simultaneously working to foster a socioeconomic environment conducive to low population growth rates and per capita consumption.

B3. The full impact of consumption choices on land degradation worldwide is not often visible due to the distances that can separate many consumers and producers. Land degradation is often the result of social, political, industrial and economic changes in other parts of the world, with effects that may involve a lag of months or years. These disconnections mean that many of the actors who benefit from the overexploitation of natural resources are among the least affected by the direct negative impacts of land degradation, and therefore have the least incentive to take action. The fact that regional and local land-use decisions are so strongly influenced by distant drivers can also undermine the effectiveness of local- and regional-scale governance interventions. Market integration may also mean that local governance interventions can result in both positive and negative rebound effects elsewhere, for example, through sustainable investment strategies or the displacement of land uses where environmental enforcement is weaker.

B4. Institutional, policy and governance responses to address land degradation are often reactive and fragmented, and fail to address the ultimate causes of degradation. National and international policy and governance responses to land degradation are often focused on mitigating damage already caused. Most policies directed at addressing land degradation are fragmented and target specific, visible drivers of degradation within specific sectors of the economy, in isolation from other drivers. Land degradation is rarely, if ever, the result of a single cause and can thus only be addressed through the simultaneous and coordinated use of diverse policy instruments and responses at the institutional, governance, community and individual levels.

B5. Land degradation is a major contributor to climate change, while climate change can exacerbate the impacts of land degradation and reduce the viability of some options for avoiding, reducing and reversing land degradation. The impact of almost all direct drivers of land degradation will be worsened by climate change. These include, among others, accelerated soil erosion on degraded lands as a result of more extreme weather events, increased risk of forest fires and changes in the distribution of invasive species, pests and pathogens. Sustainable land management and land restoration can assist climate change mitigation and adaptation. Long-established land management and restoration practices may no longer be viable in the face of climate change. Notwithstanding this risk, nature-based climate mitigation and adaptation actions remain promising.

B6. Rapid expansion and unsustainable management of croplands and grazing lands is the most extensive global direct driver of land degradation. Croplands and grazing lands now cover more than one third of the Earth´s land surface, with recent clearance of native habitats, including forests, being concentrated in some of the most species-rich ecosystems on the planet. Intensified land-management systems have greatly increased crop and livestock yields in many areas of the world,

but, when inappropriately managed, can result in high levels of land degradation, including soil erosion, fertility loss, excessive ground and surface water extraction, salinization, and eutrophication of aquatic systems. Increasing demand for food and biofuels will likely lead to a continued increase in nutrient and chemical inputs and a shift towards industrialized livestock production systems, with pesticide and fertilizer use expected to double by 2050. Proven management practices currently exist to avoid and reduce degradation of existing croplands and grazing lands, including sustainable intensification, conservation agriculture, agroecological practices, agroforestry, grazing pressure management and silvopastoral management. Avoidance of further agricultural expansion into native habitats can be achieved through yield increases, shifts towards less land-degrading diets, such as those with more vegetables, and reductions in food loss and waste.

C. The implementation of known, proven actions to combat land degradation and thereby transform the lives of millions of people across the planet will become more difficult and costly over time. An urgent step change in effort is needed to prevent irreversible land degradation and accelerate the implementation of restoration measures

C1. Existing multilateral environmental agreements provide a platform of unprecedented scope and ambition for action to avoid and reduce land degradation and promote restoration. The United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, the United Nations Framework Convention on Climate Change, the Convention on Biological Diversity, the Convention on Wetlands of International Importance especially as Waterfowl Habitat (Ramsar Convention), the 2030 Agenda for Sustainable Development and its Sustainable Development Goals and other agreements all have provisions to avoid, reduce and reverse land degradation. These have found a focus in target 15.3 of the Sustainable Development Goals, taking into account, among others, the scientific conceptual framework for land degradation neutrality. However, greater commitment and effective cooperation in using and implementing these established mechanisms at the national and local levels are vital to enable these major international agreements to create a world with no net land degradation, no loss of biodiversity and improved human well-being.

C2. More relevant, credible and accessible information is needed to allow decision makers, land managers, and purchasers of goods to improve the long-term stewardship of land and sustainability of natural resource use. Effective monitoring strategies, verification systems and adequate baseline data—on both socioeconomic and biophysical variables—provide critical information on how to accelerate efforts to avoid, reduce and reverse land degradation and conserve biodiversity. Land managers, including indigenous peoples and local communities, as well as experts and other knowledge holders, all have key roles to play in the design, implementation and evaluation of more sustainable land management practices. Given the complexity of global supply chains, better and more open-access information on the impacts of traded commodities is needed to support decisions, manage risk and guide investments that promote more sustainable commodity production systems and more sustainable lifestyle choices, within the framework of international commitments and in accordance with national legislation at the appropriate level. These would also allow consumers throughout supply chains to make better-informed commodity choices that reward responsible management practices, and raise awareness about the implications of their choices.

C3. Coordinated policy agendas that simultaneously encourage more sustainable production and consumption practices of land-based commodities are required to avoid, reduce and reverse land degradation. Achieving policy reform for sustainable land management requires a step change in how the design and implementation of more sustainable consumption and production policies are aligned across different sectors, including between departments and ministries. Key policy agendas requiring greater alignment include food, energy, water, climate, health, rural, urban and industrial development. The chances of success are improved by close coordination, sharing of information and knowledge, adoption of specific policy instruments for both regulatory and incentive-based measures, and capacity-building that supports a whole supply chain approach to avoiding, reducing and reversing land degradation. Success in these goals is highly dependent on creating enabling conditions for more sustainable land management, which include policies that confer and protect individual and collective land tenure and property rights, in accordance with national legislation at the appropriate level, empower indigenous peoples and local communities, and recognize the role of indigenous and local knowledge and practices for sustainable land management. Efforts are also needed to improve institutional competencies at the national and international levels.

C4. Eliminating perverse incentives that promote degradation and devising positive incentives that reward the adoption of sustainable land management practices are required to avoid, reduce and reverse land degradation. Positive incentives for sustainable land management could include strengthened regulations that ensure that the environmental, social and economic costs of unsustainable land use and production practices are reflected in prices. Perverse incentives include subsidies that reward unsustainable land use and production. Voluntary or regulation-based incentive mechanisms for safeguarding biodiversity and ecosystem services can help avoid, reduce and reverse land degradation. Such mechanisms include both market and non-market based approaches. Examples of market-based approaches include credit lines, insurance policies and future contracts that reward adoption of more sustainable land management practices, payments for ecosystem services and conservation tenders, as applied in some countries. Examples of non-market based approaches include joint mitigation and adaptation mechanisms, justice-based initiatives and ecosystem-based adaptation and integrated water co-management schemes.

C5. Landscape-wide approaches that integrate the development of agricultural, forest, energy, water and infrastructure agendas, all informed by the best available knowledge and experience, are required to avoid, reduce and reverse land degradation. There is no one-size-fits-all approach to sustainable land management. Achieving success requires selecting from the full toolkit of approaches that have been effectively implemented in different biophysical, social, economic and political settings. Such a toolkit includes a wide range of low-impact farming, pastoral, forest management and urban design practices based on scientific, indigenous and local knowledge systems. Integrating different practices into landscape-scale planning, including local-level sustainable finance and business practices, can reduce the impacts of degradation and enhance the resilience of both ecosystems and rural livelihoods. Participatory planning and monitoring, based on, among others, land capabilities that include local institutions and land users and are supported by multiple knowledge and value systems, are more likely to result in agreement among stakeholders and the effective implementation and monitoring of integrated land management plans

C6. Responses to reduce environmental impacts of urbanization not only address the problems associated with urban land degradation, but can also significantly improve quality of life while simultaneously contributing to climate change mitigation and adaptation. Proven approaches include urban planning, replanting with native species, green infrastructure development, remediation of contaminated and sealed soils, and wastewater treatment and river channel restoration. - Landscape-level and ecosystem-based approaches that use, among others, restoration and sustainable land management techniques to enhance the provision of ecosystem services have proven effective in reducing flood risk and improving water quality for urban populations.

II. Background to the key messages

A. Land degradation is a pervasive, systemic phenomenon: it occurs in all parts of the terrestrial world and can take many forms

Combating land degradation and restoring degraded land is an urgent priority to protect the biodiversity and ecosystem services vital to all life on Earth and to ensure human well-being

Box SPM.1

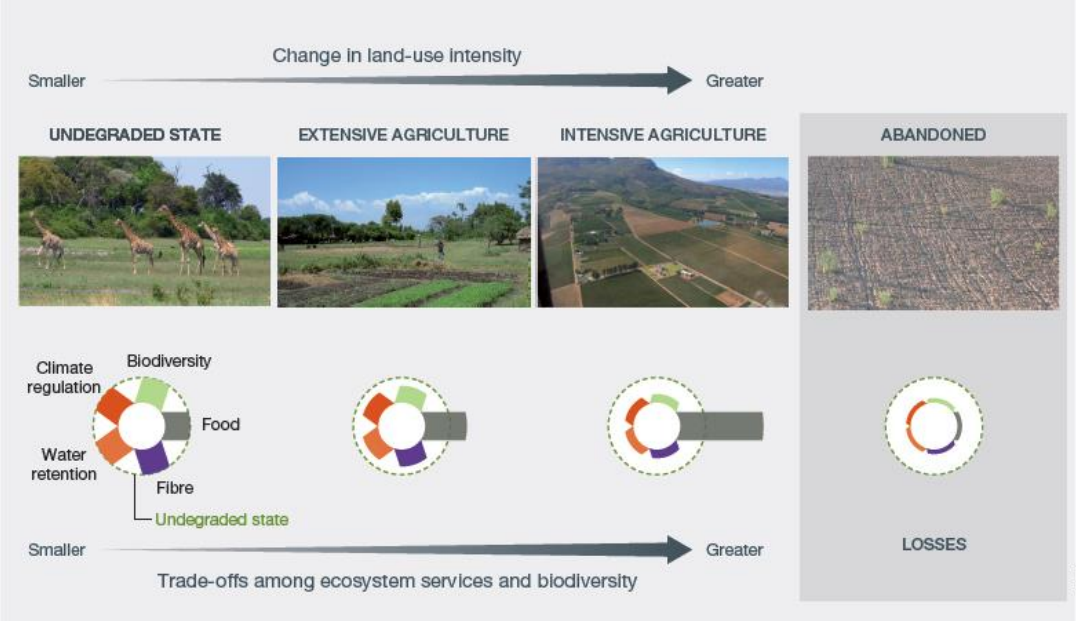
For the purposes of this assessment, “land degradation” is defined as the many human-caused processes that drive the decline or loss in biodiversity, ecosystem functions or ecosystem services in any terrestrial and associated aquatic ecosystems. “Degraded land” is defined as the state of land which results from the persistent decline or loss in biodiversity and ecosystem functions and services that cannot fully recover unaided within decadal time scales. “Degraded land” takes many forms: in some cases, all biodiversity, ecosystem functions and services are adversely affected; in others, only some aspects are negatively affected while others have been increased. Transforming natural ecosystems into human-oriented production ecosystems—for instance agriculture or managed forests—often creates benefits to society but simultaneously can result in losses of biodiversity and some ecosystem services. Valuing and balancing these trade-offs is a challenge for society as a whole (Figure SPM.3; Figure SPM.10).

“Restoration” is defined as any intentional activity that initiates or accelerates the recovery of an ecosystem from a degraded state. “Rehabilitation” is used to refer to restoration activities that may fall short of fully restoring the biotic community to its pre-degradation state {1.1, 2.2.1.1}.

Figure SPM.3

Human transformation of natural ecosystems and trade-offs among ecosystem services and biodiversity

This figure shows the trade-offs among ecosystem services and biodiversity with land use intensification, using food production as an example. In this specific example, as food production increases, there is a decrease in other ecosystem services and biodiversity (illustrated by reduced bars) as compared to the undegraded state. In extreme cases, land has been degraded to the point of abandonment (right panel), thus providing less of all ecosystems services. This pattern generally applies to all ecosystems and land-use types. Deciding whether trade-offs among land-use types are negative or beneficial depends on values and priorities, and is therefore part of the socio-political decision-making process. Evidence suggests there are few, if any, beneficiaries from extreme degradation and the permanent loss of function and services.



Source: Adapted from Van der Esch et al. (2017).[7]

Box SPM.2

Indigenous and local knowledge consists of bodies of social-ecological knowledge developed and held by local communities, some of which have interacted with a given ecosystem for a very long time. Indigenous and local knowledge includes practices and beliefs about relationships of living beings, including humans, with one another and their environment. This knowledge evolves continuously through interaction of experiences and different types of knowledge, and can provide information, methods, theory and practice for sustainable management that has been tested through application and experimentation in real-world situations, by many people, over a wide range of conditions. Indigenous and local knowledge aids in avoiding, reducing and reversing land degradation and in sustainable land management to reduce degradation and improve restoration by offering different ways of thinking about people's relationship to nature {1.3.1, 2.2.2.1} (Figure SPM.4) and alternative land management systems {1.3.1.2, 1.3.1.4, 1.4.3.1, 1.4.8.2, 2.2.2.2, 2.3.2.1, 6.3.1, 6.3.2.3, 6.4.2.4} and by promoting good governance {1.3.1.5, 2.2.2.3}.

[7] Van der Esch, S., ten Brink, B., Stehfest, E., Bakkenes, M., Sewell, A., Bouwman, A., Meijer, J., Westhoek, H., and van den Berg, M. (2017). *Exploring future changes in land use and land condition and the impacts on food, water, climate change and biodiversity: Scenarios for the UNCCD Global Land Outlook.* The Hague: PBL Netherlands Environmental Assessment Agency. Retrieved from http://www.pbl.nl/sites/default/files/cms/publicaties/pbl-2017-exploring-future-changes-in-land-use-and-land-condition-2076.pdf.

Figure SPM.4

This figure was developed by senior knowledge holders of the Ngan'gi set of Aboriginal languages, in collaboration with the Commonwealth Scientific and Industrial Research Organisation,[8] and shows the depth and detail of their understanding of the land. This detailed knowledge can assist to prevent degradation and restore landscapes, and is representative of indigenous peoples and local communities worldwide. For ease of readability this figure has been cropped to show a portion of the full year's seasonal knowledge of the Nauiyu Nambiyu community in Daly River, Northern Territory, Australia.

1. **Less than one quarter of the Earth's land surface remains free from substantial human impacts (*established but incomplete*).[9] Transformation and degradation of various types and intensity are causing predominantly negative impacts on biodiversity and ecosystem functions on the other three quarters *(well established*)** (Figure SPM.5). Ecosystems affected by land degradation (including, for example, some areas that have been transformed to agricultural systems and urban areas) mainly include forests, rangelands and wetlands. Wetlands are particularly degraded, with 87 per cent lost globally in the last 300 years, and 54 per cent since 1900 {4.2.5, 4.2.6.2, 4.3.2.1, 4.3.4}. Land degradation, including transformation to urban areas and to intensive agricultural systems involving high use of chemicals, frequently leads to eutrophication of water bodies by fertilizers, to toxic effects of pesticides on non-target species, and to erosion). The extent of transformation in developed countries is large, even though the rate of transformation has slowed or even reversed in recent decades. In developing countries, the extent of transformation is lower, but the rate of transformation remains high. In the future, most degradation and especially transformation is forecasted to occur in Central and South America, sub-Saharan Africa and Asia, which have the largest remaining amount of land suitable for agriculture (*well established*). By 2050, it is estimated that less than 10 per cent of the Earth's land surface will remain substantially free of direct human impact. Most of this remnant will be found in deserts, mountainous areas, tundra and polar systems that are unsuitable for human use or settlement (*well established*) {7.2.2, 7.3}.

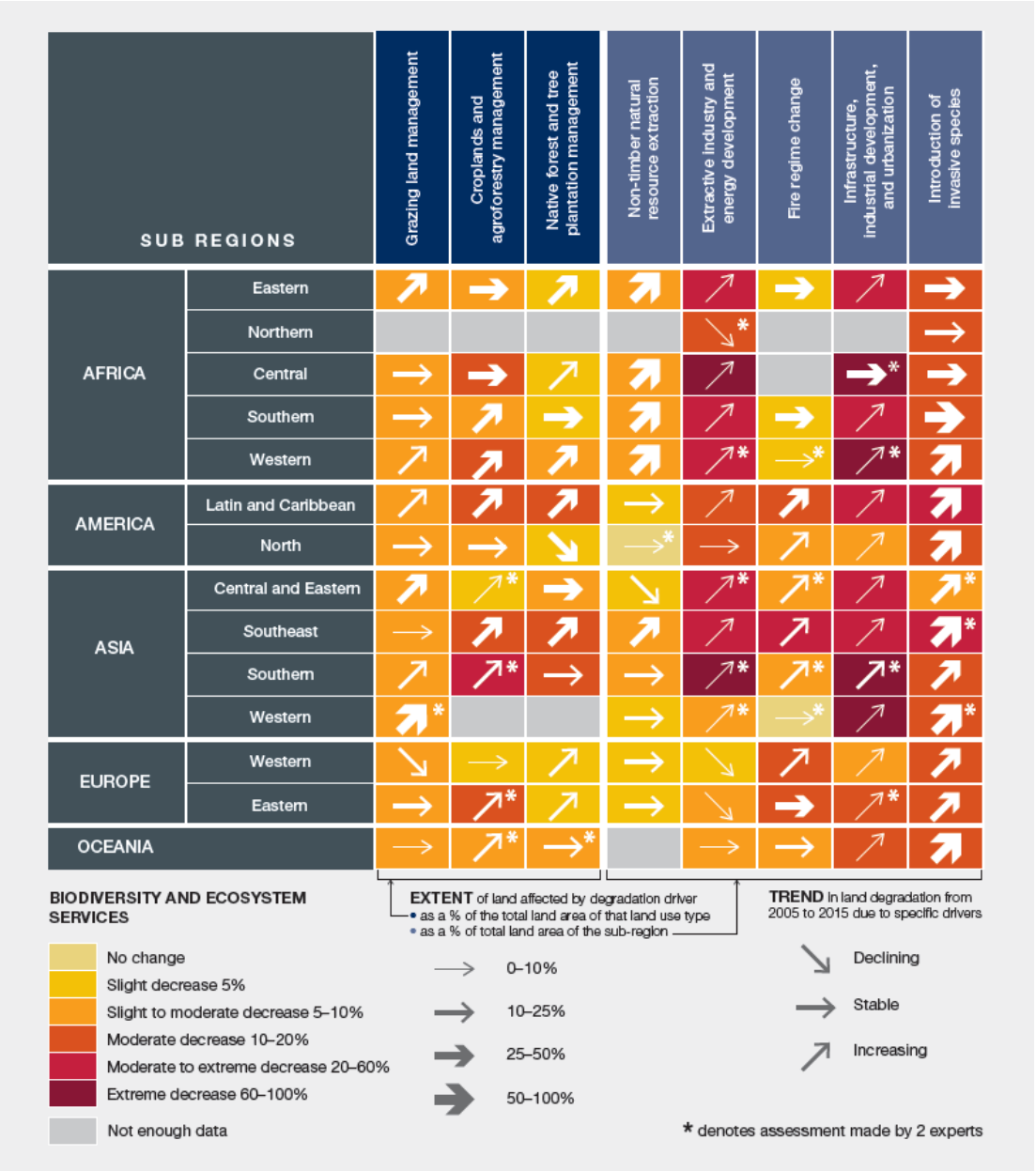
[8] Woodward, E., Marrfurra McTaggart, P., Yawulminy, M., Ariuu, C., Daning, D., Kamarrama, K., Ngulfundi, B., Warrumburr, M., and Wawul, M. (2009). Ngan'gi Seasons, Nauiyu - Daly River, Northern Territory, Australia. Darwin, CSIRO Sustainable Ecosystems.

[9] For an explanation of confidence terms, see appendix.

Figure SPM.5

Status, trend and extent of direct drivers of land degradation across subregions globally

This report is based on expert opinions from the 28 authors working on the assessment with a wide range of land degradation and regional experience. Three or more experts contributed to each cell unless denoted by an asterisk (*), which indicates two expert opinions. Data was not reported when fewer than two experts contributed to the scoring, which is denoted by the grey cells. Within each region, the impacts on biodiversity and ecosystem services in managed systems (i.e., grazing land, croplands and agroforestry, and native forest and tree plantation) were evaluated relative to well-managed production systems of that type, rather than relative to their initial untransformed state, which often existed in the distant past (Figure SPM.10). The five land degradation drivers of non-timber natural resource extraction, extractive industry and energy development, infrastructure, industry, and urbanization, fire regime change and introduction of invasive species were evaluated relative to the inferred state of biodiversity and ecosystem services in the absence of human disturbance (Box 1.1, 2.1). Experts scored changes in biodiversity and ecosystem services separately. In the analysis, however, the scores of biodiversity and ecosystem services were highly correlated (range = 0.70-0.98). Consequently, changes in biodiversity and ecosystem services are reported as one integrated score. Trends in land degradation from 2005 to 2015 due to specific drivers are shown by the angle of the arrows. The time period 2005–2015 was chosen to identify more recent trends in land degradation. Within the agricultural production drivers, the extent of land affected by the degradation driver is expressed as a percentage of the total land area of that land use type. The extent of land affected by the degradation driver of the remaining five drivers is expressed as the total land area of the subregion. For further explanation on the metrics and methodology for Figure SPM. 5, see supporting material Appendix 1.2 available from https://www.ipbes.net/supporting-material-e-appendices-assessments.



2. **Habitat loss through transformation and the decline in suitability of the remaining habitat through degradation are the leading causes of biodiversity loss (*well established)*** {4.2.9} (Figure SPM.6). Between 1970 and 2012, the index of the average population size of wild terrestrial vertebrate species declined by 38 per cent and that of freshwater vertebrate species by 81 per cent (*established but incomplete*) {4.2.9, 7.2.2}. Species extinction rates are currently hundreds to thousands of times above the long-term rate of species turnover (*established but incomplete*) {4.2.9.1, 7.2.2}. There is a body of evidence suggesting a positive association between diversity, especially functional biodiversity, ecosystem functions and resilience to disturbance (*established but incomplete*) {4.2.9.3}.

Figure SPM.6

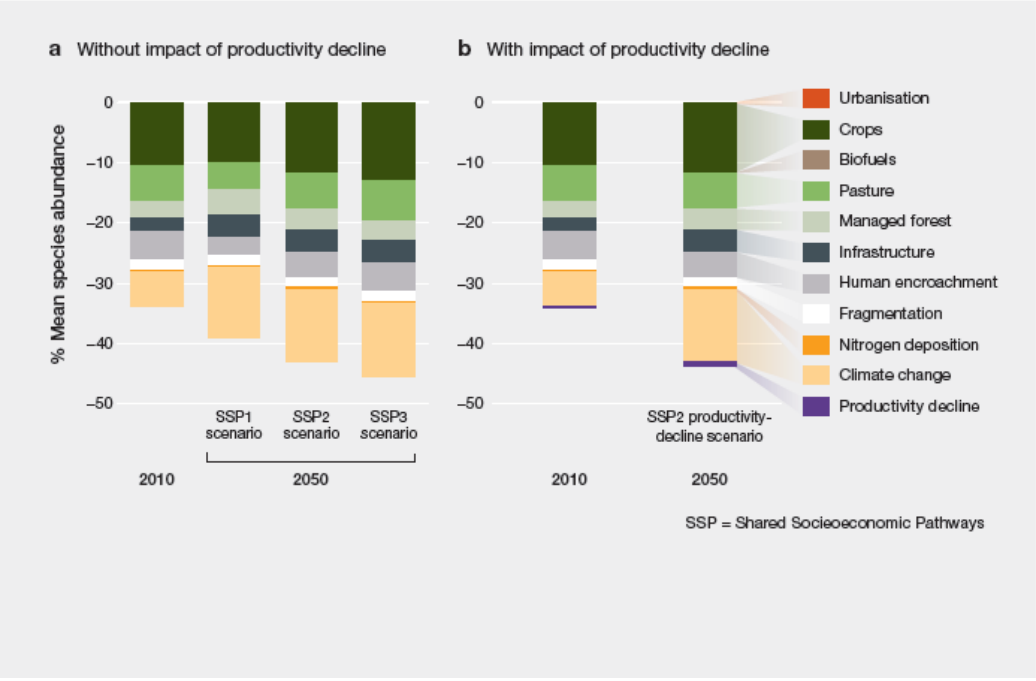
Projected loss in global biodiversity by 2050 under a range of scenarios (shared socioeconomic pathways, SSP1, 2 and 3, plus a variant of SSP2 which includes a decline in plant productivity. Biodiversity is expressed as mean species abundance (MSA), a measure of the size of populations of wild organisms as a percentage of their inferred abundance in their natural state (% MSA)

The SSP1 scenario describes a world with high economic growth, low population growth, medium to fast technology change, emphasis on environmental protection and international cooperation, high globalization of trade, low meat consumption and waste of food, strict land-use regulation (e.g., protected areas) and high improvement of crop yield and livestock production efficiency.

The SSP2 scenario is a "middle-of-road" scenario, with medium economic and population growth, technological change, globalization of trade, meat consumption and waste of food, moderate land-use regulation and medium improvement of crop yield and livestock production efficiency. It represents a continuation of the trends observed in recent decades.

The SSP3 scenario describes a world with low economic growth, high population growth, less technological change, little environmental protection, reduced international cooperation, low globalization of trade, high meat consumption and waste of food, low land-use regulation (e.g., protected areas) and low improvement of crop yield and livestock production efficiency. The SSP2 "productivity decline scenario" makes the same socioeconomic assumptions as SSP2 but takes into account the impact of a persistent decline in biomass and crop yields as observed at particular locations in the last decades, as a result of unsustainable land management.

The left panels show the effects of land use transformation, while the right panels include land degradation-induced productivity loss. By 2010, 34 per cent of global biodiversity indexed in this way had already been lost. Biodiversity loss is projected to reach 38–46 per cent by 2050. The global loss in the middle-of-the-road scenario - SSP2 with productivity decline - projects a future loss of around 10 per cent by 2050. This is equivalent to a complete loss of the original biodiversity of an area about 1.5 times the size of the United States of America. The strongest drivers of biodiversity loss to date have been agriculture, followed by forestry, infrastructure, urban encroachment and climate change. In the period 2010–2050, climate change, crop agriculture and infrastructure development are expected to be the drivers of biodiversity loss with the greatest projected increase {7.2.2.1}.



Source: Adapted from Van der Esch et al. (2017).[10]

[10] Van der Esch, S., ten Brink, B., Stehfest, E., Bakkenes, M., Sewell, A., Bouwman, A., Meijer, J., Westhoek, H., and van den Berg, M. (2017). *Exploring future changes in land use and land condition and the impacts on food,*

3. **Land degradation has already had a pronounced impact on ecosystem functions worldwide (*well established*).** Net primary productivity of ecosystem biomass and of agriculture is presently lower than it would have been under natural state on 23 per cent of the global terrestrial area, amounting to a 5 per cent reduction in total global net primary productivity (*established but incomplete*) {4.2.3.2, 4.2.9.3}. Over the past two centuries, soil organic carbon, an indicator of soil health, has seen an estimated 8 per cent loss globally (176 gigatons of carbon (Gt C)) from land conversion and unsustainable land management practices (*established but incomplete*) {4.2.3.1, 7.2.1} (Figure SPM.7). Projections to 2050 predict further losses of 36 Gt C from soils, particularly in sub-Saharan Africa {7.2.1.1}. These future losses are projected to come from the expansion of agricultural land into natural areas (16 Gt C), degradation due to inappropriate land management (11 Gt C) and the draining and burning of peatlands (9 Gt C) and melting of permafrost (*established but incomplete*) {4.2.3, 7.2.1.1}.

Figure SPM.7

Human activity has changed the surface of the planet in profound and far-reaching ways

Panel (a) shows the degree to which humans have appropriated production of biomass.[11] In some cases, particularly areas of intensive agriculture, human use is equivalent to 100 per cent of the total biomass that would have been produced by plant natural conditions (darker blue). Panel (b) shows the decline in soil organic carbon, an indicator of soil degradation (decline in red, increase in blue), relative to an estimated historical condition that predates anthropogenic land use.[12] [13] Panel (c) shows the parts of the land surface that can be considered as "wilderness". The areas shown in green are wilderness in the sense that ecological and evolutionary processes operate there with minimal human disturbance.[14] In the remaining three quarters of the Earth's surface, natural processes are impaired by human activities to a significant degree. Panel (d) shows (in purple) the levels of species loss, estimated for all species groups, relative to the originally-present species composition.[15]

water, climate change and biodiversity: Scenarios for the UNCCD Global Land Outlook. The Hague: PBL Netherlands Environmental Assessment Agency. Retrieved from http://www.pbl.nl/sites/default/files/cms/publicaties/pbl-2017-exploring-future-changes-in-land-use-and-land-condition-2076.pdf.

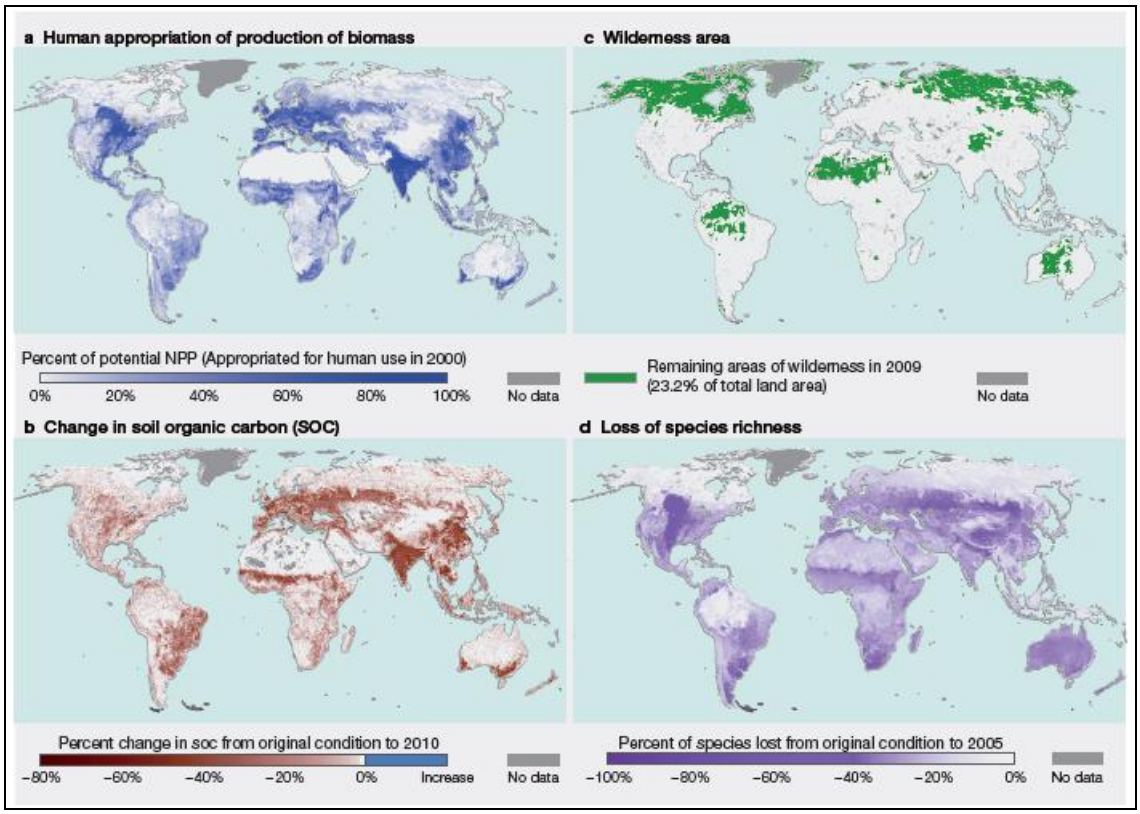
[11] Haberl, H., Erb, K-H., Krausmann, F., Gaube, V., Bondeau, A., Plutzar, C., Gingrich, S., Lucht, W., and Fischer-Kowalski, M. (2007). Quantifying and mapping the human appropriation of net primary production in Earth's terrestrial ecosystems. *PNAS*, *104* (31), 12942–12947. DOI: 10.1073/pnas.0704243104.

[12] Van der Esch, S., ten Brink, B., Stehfest, E., Bakkenes, M., Sewell, A., Bouwman, A., Meijer, J., Westhoek, H., and van den Berg, M. (2017). *Exploring future changes in land use and land condition and the impacts on food, water, climate change and biodiversity: Scenarios for the UNCCD Global Land Outlook.* The Hague: PBL Netherlands Environmental Assessment Agency. Retrieved from http://www.pbl.nl/sites/default/files/cms/publicaties/pbl-2017-exploring-future-changes-in-land-use-and-land-condition-2076.pdf.

[13] Stoorvogel, J. J., Bakkenes, M., Temme, A. J., Batjes, N. H., and Ten Brink, B. J. (2017). S-World: A Global Soil Map for Environmental Modelling. *Land Degradation and Development*, *28* (1), 22–33. DOI: 10.1002/ldr.2656.

[14] Watson, J. E. M., Shanahan, D. F., Di Marco, M., Allan, J., Laurance, W. F., Sanderson, E. W., Mackey, B., and Venter, O. (2016). Catastrophic Declines in Wilderness Areas Undermine Global Environment Targets. *Current Biology*, *26* (21), 2929–2934. DOI: 10.1016/j.cub.2016.08.049.

[15] Newbold, T., Hudson, L. N., Arnell, A. P., Contu, S., De Palma, A., Ferrier, S., Hill, S. L. L., Hoskins, A. J., Lysenko, I., Phillips, H. R. P., Burton, V. J., Chng, C. W. T., Emerson, S., Gao, D., P (2016). Has land use pushed terrestrial biodiversity beyond the planetary boundary? A global assessment. *Science*, *353*(6296), 288–291. DOI: 10.1126/science.aaf2201.



4. **Land degradation adversely affects human well-being through the loss of biodiversity and ecosystem services, which has reached critical levels in many parts of the world (*well established*).** In many contexts, land degradation negatively impacts food and water security,[16] as well as human health and safety {1.3.1, 1.3.2, 1.4.4, 5.3.2, 5.4, 5.6, 5.8.2}. Degradation-driven losses in agricultural production—through erosion, soil fertility loss, salinization and other processes—constitute a risk to food security {4.2.1–4.2.3, 4.3.3, 5.3.2.3, 5.3.2.4}. Soil fertility loss is caused by three main processes: soil acidification, salinization and waterlogging {4.2.1, 4.2.2}. By 2050, land degradation and climate change together are predicted to reduce crop yields by an average of 10 per cent globally and up to 50 per cent in certain regions {5.3.2.6}. Although important advances have been made in reducing global food insecurity in the past decade, there are still nearly 800 million people worldwide without access to adequate nutrition {4.2.5.1, 5.3.3.1}. Land degradation impairs water security through a reduction in the reliability, quantity and quality of water flows {5.8.2}. Degradation of catchment and aquatic ecosystems, combined with increasing water abstraction and pollution by human activities, have contributed to deterioration in water quality and supply, such that four fifths of the world's population now live in areas where there is a threat to water security {4.2.4.3, 4.2.5.1, 5.8.1}.

5. **Transformation of natural ecosystems to human use-dominated ecosystems can increase the risk of novel diseases such as Ebola, monkeypox and Marburg virus, some of which have become global health threats, by bringing people into more frequent contact with pathogens capable of transferring from wild to human hosts (*established but incomplete*) {5.4.1, 5.4.2, 5.4.3}.** Modifications in hydrological regimes affect the prevalence of pathogens and vectors that spread disease {2.2.2.4, 4.2.7, 5.4.1}. Land degradation generally increases the number of people directly exposed to hazardous air, water and land pollution, particularly in developing countries, with the worst-off countries recording rates of pollution-related loss of life higher than those in wealthy countries (*established but incomplete*) {5.4.4; Figure 5.8}. Land degradation generally harms psychological well-being by reducing benefits to mental balance, attention, inspiration and healing (*established but incomplete*) {5.4.6, 5.9.1}. Land degradation has particularly negative impacts on the mental health and spiritual well-being of indigenous peoples and local communities {1.3.1.2}. Finally, land degradation, especially in coastal and riparian areas, increases the risk of storm damage, flooding and landslides, with high socioeconomic costs and human losses {1.3.3, 5.5.1}. With around 10 per cent of the world's population living in coastal zones less than 10 metres above the mean sea

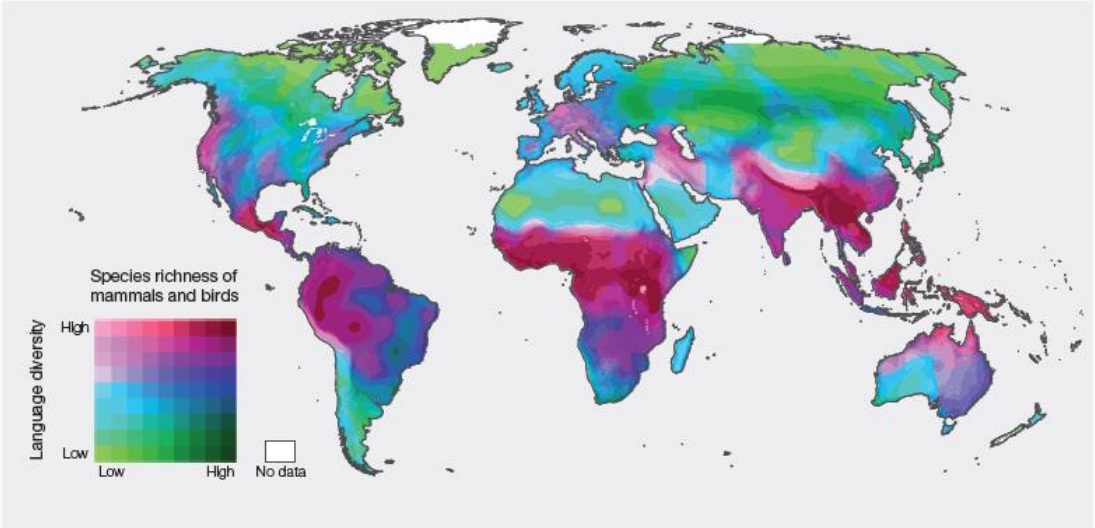
[16] The definition that follows is for the purpose of this assessment only: water security is used to mean the ability to access sufficient quantities of clean water to maintain adequate standards of food and goods production, sanitation and health care and for preserving ecosystems.

level—currently more than 700 million people, expected to increase to more than 1 billion by 2050—the economic and human risks associated with loss of coastal wetlands are substantial {5.5.1, 5.5.3}.

6. **Land degradation negatively affects the cultural identity of some communities, particularly indigenous peoples and local communities, and erodes their traditional knowledge and management systems (*well established*)**. An individual's or society's relationship to land shapes identity, traditions and values, as well as spiritual beliefs and moral frameworks {1.2, 1.3.1, 1.3.2, 1.4.3, 2.2.2.1, 5.4.6, 5.9.1, 5.9.2}. There is a strong co-occurrence between linguistic diversity (a proxy for cultural diversity) and biological diversity (Figure SPM.8). Though difficult to quantify, many indigenous peoples and local communities consider land degradation to cause pronounced loss of their cultural identity and indigenous and local knowledge (*well established*) {1.3.2, 1.4.3, 1.4.6, 1.4.8, 2.2.2.3, 5.9.2.3}, manifested, for instance, in the abandonment of sacred places and rituals (*established but incomplete*) {5.9.2.1}. Land degradation causes a loss of sense of place and of spiritual connection to the land, in indigenous peoples and local communities (*established but incomplete*) {2.2.3.1}, as well as in urban residents living far from the affected areas (*well established*) {5.9.1}.

Figure SPM.8
Cultural diversity and biodiversity are spatially associated

This map shows patterns in cultural diversity, using language diversity as a proxy indicator, and patterns in biodiversity, using mammal and bird species richness as a proxy indicator. Language diversity is measured as the geographic concentration of the points of origin of each unique language.[17] Biodiversity is represented by the total species richness of mammals and birds.[18] Areas with darker colour are more biodiverse, while the colour spectrum from green to magenta represents increasing language diversity. Many indigenous peoples and local communities consider land degradation to cause pronounced loss of their cultural identity.



7. Alienation of indigenous peoples and local communities from the land often leads to the irreversible loss of accumulated knowledge on how to manage land. In most cases, land management practices based on indigenous and local knowledge have proven to be sustainable over long time periods and offer alternative models to the currently dominant human-nature relationship {1.2.1, 1.3.1, 1.3.2.2, 14.1.1, 1.4.3.1, 1.4.8.2, 2.3.2; 5.3.3.1}. The model for human-nature relationships offered by indigenous and local knowledge holders is based on relational ethics rather than on technological progress or economic growth {2.3.1.2}. In parallel, novel concepts, such as “Ecological Solidarity”, “Mother Earth Rights”, “Living Well” and “Systems of Life”, are being adopted by different countries,[19] concepts that acknowledge that humans and ecosystems not only interact, but are also interdependent {2.2.1.3; 2.2.2.1; 2.2.2.2.}. This cognitive framing of human integration with nature is likely to create a collective sense of duty at various spatial and political scales to protect and restore

[17] Hammarström, H., Forkel, R., and Haspelmath, M. (2017). Glottolog 3.0. Max Planck Institute for the Science of Human History. Retrieved from http://glottolog.org.

[18] Jenkins, C. N., Pimm, S. L., and Joppa, L. N. (2013). Global patterns of terrestrial vertebrate diversity and conservation. *PNAS*, *110*(28), E2602–E2610. DOI: 10.1073/pnas.1302251110.

[19] Ecological solidarity first appeared in France’s Law on National Parks and was adopted in France’s Law for the Restoration of Biodiversity, Nature and Landscapes (Law No. 2016-1087 of 8 August 2016); the legislation of the Plurinational State of Bolivia (Law No. 071, of Mother Earth Rights, and Law No. 300, the Framework Law of Mother Earth and Integral Development for Living Well); and the Constitution of Ecuador {2.2.1.3}. For more examples, see 2.2.2.

land and to recognize the obligation to balance current needs with those of future generations {1.3, 1.4.1.2, 1.4.6.3, 1.4.7.3, 2.2.4.3, 2.3.2.2}.

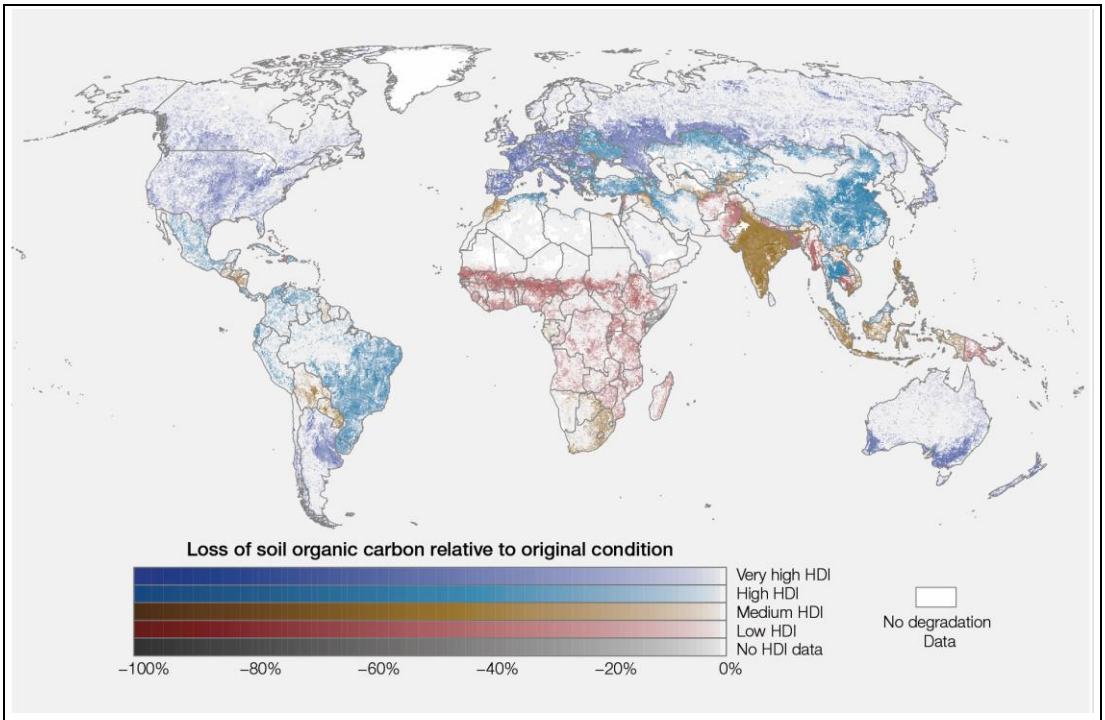
8. **Land degradation-associated changes in ecosystem services can exacerbate income inequality since the negative impacts fall disproportionately on people in vulnerable situations, including women, indigenous peoples and local communities, and lower-income groups (*well established*).** Although land degradation exists in both developed and developing parts of the world, it tends to have the strongest negative impacts on the well-being of people in vulnerable situations and of those living in economically poor areas {5.2.1, 5.2.2} (Figure SPM.9). People living in more marginal environments are usually poorer than the national average {5.2.1}. They are particularly dependent on the ecosystem services for disaster risk reduction that are lost through land degradation, and recover more slowly following natural disasters {5.2.2.1, 5.5.2, 5.5.3}. The effect of agricultural soil loss on poverty at the national level can be enormous; negative impacts of land degradation as large as 5 per cent of total GDP have been observed {5.2}. In many countries, lower-income groups are on average more dependent on the agricultural sector than the population as a whole; in addition, the land they have access to is often of lower productivity than average {2.2.2.3, 5.2.1}. In lower-income countries, losses in the agricultural sector are 2.5 times more important to the income of individuals at the lower end of the income distribution than are losses in other parts of the economy {5.2}. In addition, people in vulnerable situations have fewer financial resources to invest in technologies, for instance, in agriculture or sanitation, to mitigate the negative impacts of degradation {1.3.2.2, 1.4.8.2, 5.2.2.2}. Land degradation also reduces the availability of wild-harvested goods that serve as buffers for vulnerable households in times of hardship {3.3.4, 5.2.2.1}. The poor also rely more than average on ecosystem-derived fuels, such as wood, charcoal and dung, to meet their energy needs {5.7.2.1}. Land degradation creates higher labour demands on fuelwood-dependent households, generating an additional labour burden that often falls disproportionately on women {5.2.3.2, 5.7.2.1}. The negative impact of land degradation on ecosystem services frequently acts in concert with other stressors, such as socioeconomic change, climate variability, political instability and inefficient or ineffective institutions {3.4, 3.6.2.1, 5.6.1.1}. The combined result is decreased livelihood security among the most vulnerable members of society {2.2.2.3}.

Figure SPM.9

Land degradation affects countries of all income levels and at all levels of human development

Some of the most degraded areas in the world, such as Western Europe and parts of Australia, are also the high GDP countries. However, the negative impacts of land degradation on human well-being are likely to be more pronounced in locations where degradation overlaps with poverty, low institutional capacity and weak social safety nets. In this map, countries are coloured according to their Human Development Index (HDI) score,[20] while loss of soil organic carbon relative to estimated original condition (one indicator of land degradation) is illustrated by the lightness or darkness of each pixel. HDI is a composite statistic that is commonly used to indicate human development based on data on education, life expectancy and per capita income. Change in soil organic carbon is modelled relative to estimated quantities prior to anthropogenic land use and land cover change.

[20] United Nations Development Programme (2015). Human Development Data (1990–2015) Retrieved from http://hdr.undp.org/en/data.



Source: Data on soil organic carbon from Van der Esch et al. (2017)[21] and Stoorvogel et al. (2017).[22]

9. **The economic benefits of sustainable land management practices and/or restoration actions to avoid, reduce and reverse land degradation have been shown to exceed their costs in many places (*established but incomplete*), but their overall effectiveness is context-dependent (*well established*).** A variety of sustainable land management practices, such as agroforestry, soil and water conservation techniques and river-channel restoration, have been shown to be effective in avoiding, reducing and reversing land degradation in both rural and urban settings (*well established*) {1.2.2, 1.3, 1.4, 2.2.3.1, 4.2.6.2, 6.3.1, 6.3.2}. Such practices and restoration actions generally produce positive results, but their effectiveness depends on the degree to which they address the nature, extent and severity of underlying drivers and processes of degradation, and the biophysical, social, economic and political settings in which they are implemented {1.2.1, 1.3.2.2, 1.3.3.1, 3.5, 5.2.3.3, 6.3, 6.4}. For example, land management practices based on indigenous and local knowledge, and community-based natural resource management systems, have been effective in avoiding and reversing land degradation in many regions {1.3.1.1, 1.3.2.3, 1.4.3.2, 1.4.7.2, 1.4.8.2, 2.2.2.1, 2.2.2.2, 5.3.3.1, 6.3.1, 6.3.2, 6.4.1.2, 6.4.2.2, 6.4.2.4, 6.4.3, 8.3.1}. For instance, recent advances in valuing ecosystem services, as well as the non-market benefits of ecological restoration and subsequent incorporation of such values in benefit-cost analyses of restoration projects, with socially-appropriate discount rates, show that restoration investments are economically beneficial. Across biomes, at the global level the benefits of restoration are estimated to exceed the costs by an average margin of 10 to 1 {6.4.2.3} (*established but incomplete*). In several Asian and African countries, the cost of inaction has been estimated to be 3.8 to 5 times higher than the estimated costs to avoid land degradation {5.2.3.4}.

10. **Desertification currently affects more than 2.7 billion people and can contribute to migration (*well established*).** Desertification is defined as land degradation in arid, semi-arid and dry sub-humid areas (collectively called drylands) because of human activities and climatic variations. Inhabited drylands cover 24 per cent of the Earth's surface and are home to 38 per cent of the world's population, with especially pastoralists and smallholder farmers tending to be disproportionately poor and vulnerable to changes in the natural resource base {5.6.1.3, 5.6.2.2, 4.2.6.2}. For example, in sub-Saharan Africa, half of the total population, but three quarters of the poor, live in drylands {5.2.1}. Populations in drylands are projected to increase by 43 per cent—from 2.7 billion in 2010 to 4.0

[21] Van der Esch, S., ten Brink, B., Stehfest, E., Bakkenes, M., Sewell, A., Bouwman, A., Meijer, J., Westhoek, H., and van den Berg, M. (2017). *Exploring future changes in land use and land condition and the impacts on food, water, climate change and biodiversity: Scenarios for the UNCCD Global Land Outlook.* The Hague: PBL Netherlands Environmental Assessment Agency. Retrieved from http://www.pbl.nl/sites/default/files/cms/publicaties/pbl-2017-exploring-future-changes-in-land-use-and-land-condition-2076.pdf.

[22] Stoorvogel, J. J., Bakkenes, M., Temme, A. J., Batjes, N. H., and ten Brink, B. J. (2017). S-World: A Global Soil Map for Environmental Modelling. *Land Degradation and Development*, *28* (1), 22–33. DOI: 10.1002/ldr.2656.

billion in 2050—amplifying the impact of people on dryland landscapes {7.2.4.1}. Drylands are particularly susceptible to land degradation when one or more of the following features are present: low-productivity ecosystems; easily degradable soils; highly variable temperature and rainfall; and dense and rapidly growing populations of economically marginalized populations (*well established*) {3.3.1.2, 7.2.1, 7.2.3, 7.2.4, 7.2.5, 7.3.1}. These interrelated characteristics contribute to high rates of poverty and limit the capacity of populations to develop local mechanisms for coping with increasingly severe episodic or chronic deficits of food, water, energy and physical security (*well established*) {3.6, 7.1, 7.2.3, 7.3.1}. For example, degradation in drylands is one reason why grain yields in sub-Saharan Africa failed to increase between 1960 and 2005, despite increases in all other world regions. Land degradation acts in concert with other socioeconomic stressors to result in increased local or regional violent conflict and out-migration from severely degraded areas (*established but incomplete*) {5.6.1.2, 5.6.1.3}. When the rainfall is less than a tenth of its expected value, an increase of up to 45 per cent in communal conflict has been observed {5.6.1.3}, while a 5 per cent decline in gross domestic product has been associated with a 12 per cent increase in violent conflict {5.6.1.2}. By 2050, 50 to 700 million people are projected to have migrated as a result of the combination of climate change and land degradation. Migrants can come into conflict with prior residents of the areas into which they move, especially if the destinations also have a fully used or degraded resource base {5.6.2}.

11. **The capacity of rangelands to support livestock will continue to diminish in the future, due to both land degradation and loss of rangeland area. The increased use of intensive livestock production systems with high off-site impacts increases the risk of degradation in other ecosystems (*established but incomplete*).** Global demand for livestock products is projected to double between 2000 and 2050, while competition for land between livestock grazing and other land uses, such as cropping, mining and human settlements, continues to increase (*well established*) {3.3.1.1, 4.3.2}. In many of the world's rangelands, livestock stocking levels are at or above the land's capacity to sustain animal production in the long term, leading to overgrazing and long-term declines in plant and animal production {1.4.7, 3.3.1.1, 4.3.2.2}. In extreme cases, changing land condition has led to a reduction of up to 90 per cent in the ability of rangelands to support large herbivores {4.2.6.2}. The impacts have been particularly pronounced in drylands, where 69 per cent of global livestock production occurs and livestock production is often the only viable agricultural activity {3.3.1, 4.2.6.2, 4.3.2.2}. Reduction in the productivity of the livestock sector negatively impacts the livelihoods of 1.3 billion people, including 600 million poor smallholder farmers {5.2}.

12. A response to the growing demand for animal protein but declining livestock production on rangelands has been the increased use of intensive "landless" livestock production systems. These systems have driven the expansion of croplands dedicated to animal feed production, which currently amount to 30 per cent of all croplands. Increased demand for animal feed is met by increased crop production per unit of land, displacement of food crops and/or conversion of natural lands to croplands {3.3.2.2}. Only 26 per cent of ruminants are currently raised fully on rangeland systems, with the rest partly or fully raised on agricultural crops or crop residue for at least part of their lifespan. An estimated 76–79 per cent of poultry and pork are fully raised in intensive systems {3.3.2}. While intensive livestock systems often reduce greenhouse gas emissions per unit of protein produced, they can have multiple negative indirect and off-site impacts on ecosystem services if not properly managed {2.2.1.3}, including the transformation of natural ecosystems into feed-producing croplands. The waste streams from intensive production systems can result in air pollution, water contamination, human health impacts and eutrophication of freshwater ecosystems {4.3.2.2, 5.4.4, 5.8.2.2}.

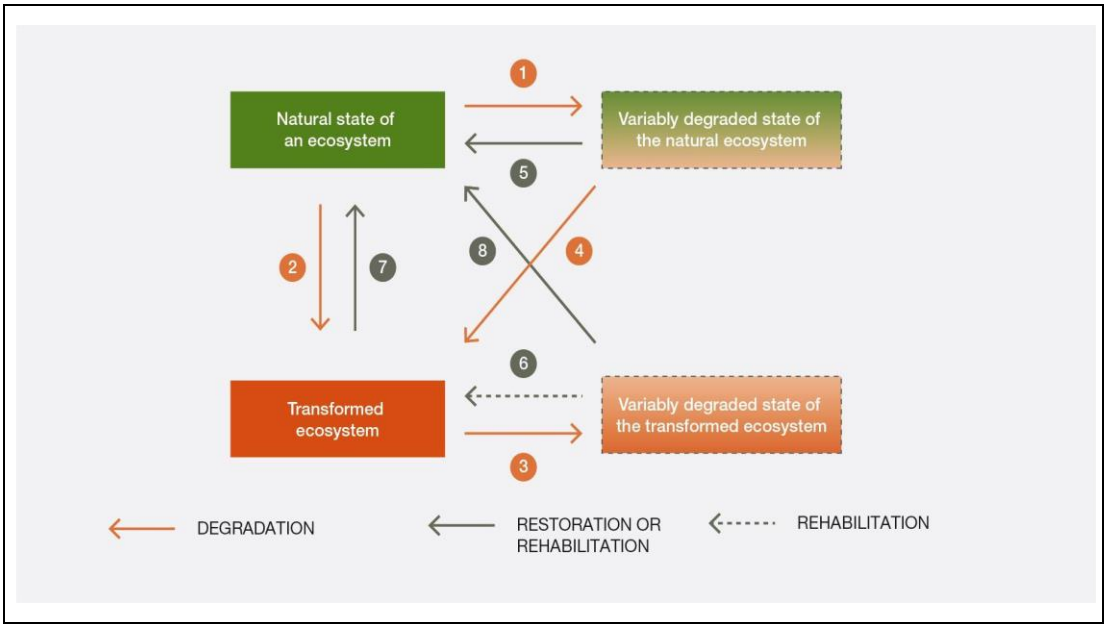
13. **Avoiding, reducing and reversing land degradation can contribute substantially to adaptation to and mitigation of climate change, but land-based climate adaptation and mitigation strategies must be implemented with care if unintended negative impacts on biodiversity and ecosystem services are to be avoided (*well established*).** Between 2000 and 2009, land degradation was responsible for annual global emissions of 3.6–4.4 billion tonnes of CO_2 (*established but incomplete*) {4.2.3.2}. The main processes include deforestation and forest degradation, the drying and burning of peatlands, and the decline of carbon content in many cultivated soils and rangelands as a result of excessive disturbance and insufficient return of organic matter to the soil {4.2.3, 4.3.4}. Climate change will be an increasingly important driver of land degradation throughout the twenty-first century {3.4, 4.2.8, 7.2.5}. Changes in temperature and rainfall patterns will result in range shifts and in some cases extinction of species, causing a modification in both the composition and functioning of ecosystems, not necessarily constituting degradation {3.4, 7.2.2}. In mountainous and high latitude regions, permafrost melt and glacier retreat will result in mass land movements such as landslides and surface subsidence, and increased greenhouse gas emissions {3.4.1, 4.2.3.3, 4.2.6.4}. In forests, the likelihood of wildfires, pest and disease outbreaks increases in scenarios where droughts and hot spells are projected to be more frequent {3.4.5}.

14. **Many sustainable land management practices yield net climate benefits (*well established*).** Actions to avoid, reduce and reverse land degradation can provide more than one third of the most cost-effective climate mitigation needed to keep global warming under 2°C by 2030 (*established but incomplete)* {4.2.3, 4.2.8}. These approaches and practices include, among others, agroecology, conservation measures, agroforestry and some integrated animal and crop production systems that promote soil organic matter accumulation and nutrient cycling, restoration of degraded forests, rangelands and wetlands, and measures that enhance soil carbon storage in managed landscapes such as reduced or no-till farming practices, cover crops, green manures or intercropping {1.3, 4.2.3, 4.2.8.8, 4.3.4, 6.3.1.1, 6.3.1.2, 6.3.1.3, 6.3.2.3}. However, some activities aimed at climate mitigation, when not appropriately implemented, can have the unintended consequence of increasing the risk of land degradation and biodiversity loss, either directly or indirectly, through, for instance: increased herbicides and pesticides use; afforestation by monoculture plantation on previously non-forest habitats; expansion of bioenergy crops into lands formerly under natural vegetation; net displacement of croplands into natural vegetation as a result of increasing competition for land between food and bioenergy crops; and excessive fire protection in landscapes with an evolutionary history of fire (*well established*) {1.4.3, 3.3.7.2, 3.5, 4.2.6.5, 5.3.2.5, 7.2.2, 7.2.5.2, 7.2.6}.

B. Unless urgent and concerted action is taken, land degradation will continue to accelerate in the face of continued population growth, unprecedented consumption, an increasingly globalized economy and climate change

15. **Quantifying land degradation and its reversal through restoration requires assessments of both the geographic extent and severity of damage against a reference state (*well established*).** A range of national and international policies, notably Aichi Biodiversity Target 15 of the Strategic Plan for Biodiversity 2011–2020, call for the quantification of land degradation and its reversal. Lack of consensus over baselines and what types of change constitute degradation has resulted in inconsistent estimates of the extent and severity of land degradation {1.1, 2.2.1.1–2.2.1.3, 4.1.4, 4.1.6, 7.13}, and thus to differing interpretations of the consequences of degradation for human well-being and to differences in interpreting and measuring progress towards Aichi Target 15. There are several options for agreeing on a reference state {1.1, 2.2.1.1, 4.1.4, Box 1.1, Box 2.1, Table 4.2}. Reference states related to the natural state of the ecosystem may be harder to define than those based on the current state, but are comparable and fair across countries at different stages of development. If, on the other hand, the baseline is set to a recent ecosystem state, countries that transformed their ecosystems centuries ago are able, in practice, to assume much less ambitious restoration measures than countries that began transformation in the past few decades. Other approaches, such as land degradation neutrality, which relates to target 15.3 of the Sustainable Development Goals, are addressed from an agreed point in time, and detailed guidelines have been developed regarding how neutrality can be monitored and assessed (Figure SPM.10) {2.2.1.1}.

Figure SPM.10
Land degradation can occur either through a loss of biodiversity, ecosystem functions or services, without a change in land cover class or use (1), or by the transformation to a derived ecosystem type such as the conversion of natural cover to a crop field (2), delivering a different spectrum of benefits, but also typically involving loss of biodiversity and reduction of some ecosystem functions and services
The transformed ecosystem can also be degraded with respect to the new social expectations associated with that land use (3). Degraded natural ecosystems can also be transformed to another ecosystem (4), or restored towards their original natural state, either completely or partially ("rehabilitated") (5). Degraded transformed ecosystems can be rehabilitated towards a less degraded state, with respect to the expectation for a deliberately modified landscape (6). Both degraded and undegraded transformed lands can, under many circumstances, be restored or rehabilitated towards their original natural state (7 and 8). Success in achieving the aspirational goal of land degradation neutrality by 2030 in Sustainable Development Goal 15 may be measured based on whether biodiversity, ecosystem functions and services are stable or increasing in each of the focal ecosystems compared to their state in 2015.



16. **High and rising per capita consumption is a major factor underpinning increasing degradation in many parts of the world (*well established*).** The current unsustainably high rate of transformation of land and consumption of land-based resources has two underlying drivers: the first is the massive increase in human population over the past two centuries; and the second is the even larger increase in per capita consumption rates of many resources {4.3.2.2, 7.1.5}. The future global population, if multiplied by a per capita consumption rate similar to that currently enjoyed in the developed world, will greatly exceed the global capacity to deliver food, energy and other land-based resources {7.2.3, 7.3.1}. While the global population growth rate is declining, especially in developed countries, it remains high in large parts of the developing world and in some developed countries due to migration {7.1.5.1}. Measures to address population growth across the world and associated changes in consumption patterns can deliver significant and lasting environmental and social benefits, including improved access to education, voluntary family planning and gender equality (*well established*); improved access to social welfare to support ageing populations (*established but incomplete*); and rethinking the role of subsidies that may be further stimulating population growth in many more developed nations {2.2.4.2, 2.3.1.4}. Measures to reduce per capita consumption of land-derived goods, especially in places where it is above the global average, include, among others, the encouragement of recycling and reuse, the reduction of loss and waste and the increase in public awareness of the land degradation impacts of consumption patterns {2.3.2, 2.3.1.4, 3.3.2.2, 5.3.1.1}.

17. Per capita consumption remains high in developed economies, while in emerging and developing economies it is growing rapidly {3.6.2, 3.6.3}. Many far-reaching changes in how land is used and managed result from responses to economic drivers, such as a shift in demand for a particular commodity or improved market access, mediated by institutional and political settings (*established but incomplete*) {1.2.1, 1.3.1.1, 1.3.1.5, 1.3.2.2, 1.3.3.1, 1.3.3.3, 2.2.1.3, 2.2.3.3, 2.2.4.3, 3.6.3, 3.6.4, 6.4.2.3}. Weak institutions and poorly-enforced regulations, including those related to land rights and access to natural resources, can lead to overexploitation, exacerbating the effect of rising consumption and population growth on land degradation {1.3.1.2, 1.3.1.4, 3.6.2, 8.3.2.1}.

18. **Local-scale land degradation is often the result of social, political and economic processes in other parts of the world, with effects that may involve a lag of months or years (*established but incomplete*).** Demand for food imports is increasing across much of the world {3.6.4}. This high dependency on imports means that between one quarter and one half of the environmental impacts of consumption—be they CO_2 emissions, chemical pollutants, biodiversity loss or the depletion of freshwater resources—are felt in parts of the world other than where the consumption occurs {3.6.4, 5.8.1.1} (Figure SPM.11). On average, a country's use of non-domestic natural resources is about three times larger than the physical volume of goods traded by that country {3.6.4}. The costs imposed by land degradation are felt disproportionately by low-income nations, the same nations that are increasingly depended upon for the provision of raw materials and agricultural commodities to the rest of the world (*established but incomplete*) {3.6.4}. The globalized nature of many commodity supply chains can elevate the relative importance of global-scale factors such as trade agreements, market prices and exchange rates as potential drivers of local land degradation {3.6.4}; it also amplifies the influence of international consumers and investors over that of national and regional governments and individual producers {2.2.3, 3.6.2.2}, and underscores the critical importance of global actors,

including multinational companies and financial institutions, in advancing sustainability everywhere {1.3.1.1, 1.3.2.2, 2.2.3.2, 3.6.4, 6.4.2.3, 6.4.2.4}. Increased market integration combined with rising global demand for land-based commodities can have the effect of offsetting the benefits of increased productivity, resulting in continued pressure to clear remaining areas of native vegetation {3.6.4}.

19. **The increasing separation and spatial disconnection between consumers and the ecosystems that produce the food and other commodities they depend upon has resulted in a growing lack of awareness and understanding of the implications of consumption choices for land degradation by these consumers (*established but incomplete*).** The prices of most internationally traded land-based commodities do not reflect the environmental and social externalities associated with the production, transportation and processing of those commodities (*well established*) {2.2.1.5, 6.4.2.3}. Internalizing and appropriately regulating the environmental and social costs of traded commodities, while also avoiding market distortions, such as protectionist policies and subsidies, that prevent a more accurate reflection of the environmental and social costs of traded commodities, could help boost demand for low-impact products {2.3.2, 3.6.2.3, 6.4.1}. However, incentives to encourage the production of more sustainably produced land-based commodities are often low or non-existent, as retail, consumer goods and trading companies often operate with low margins and are reluctant to lose market share {2.2.3.3, 6.4.2.3}.

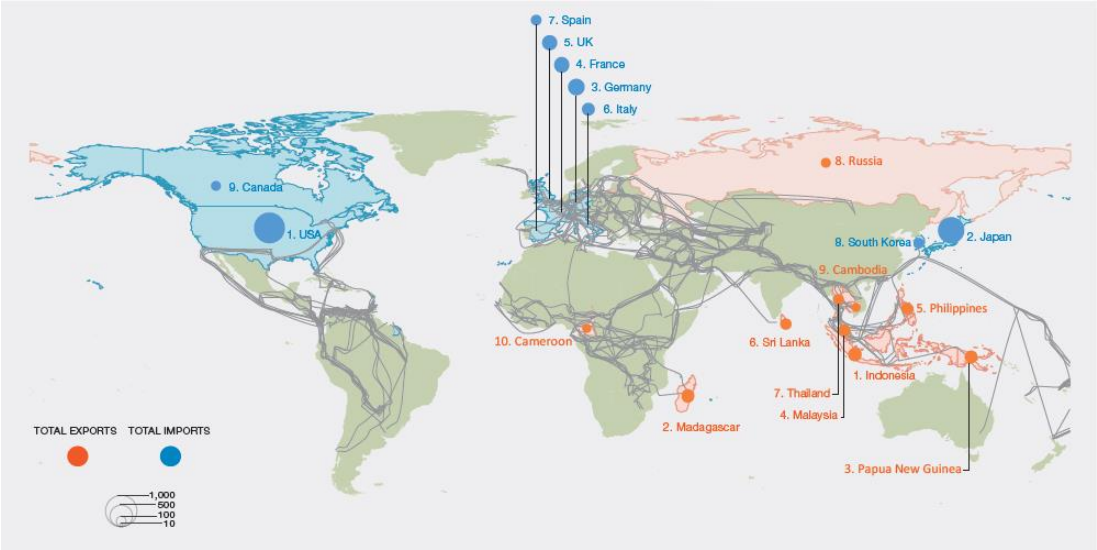
20. **Land degradation is almost always the result of multiple interacting causes (*well established*).** Human activities that are the direct causes of land degradation are ultimately determined by multiple underlying causes, including economic, demographic, technological, institutional and cultural drivers (*well established*) {Figure 1.2; 1.2.1, 1.2.2, 1.3.3.1, 1.4.8.1, 2.2.1.3, 3.6.1, 3.6.2.1, 5.2.2.2, 5.2.2.3, 7.3, 8.3.3–8.3.6, 8.4.1}. Overly simplified single-factor explanations for land degradation overlook such complexities and, as a result, are generally misleading. Similarly, restoration practices are also generally shaped by multiple drivers {1.3.1–1.3.3, 6.4.2, 8.2.2, 8.3.6, 8.4.2}. For example, increasing agricultural productivity—one of the most widespread recommendations to address land degradation—can reduce pressure on remaining areas of native vegetation, but only if strict conditions are met, including the adoption of sustainable land management practices and protection of areas of native vegetation, to prevent the result being an expansion of agricultural lands instead (*unresolved*) {3.6.3}.

21. **Extreme poverty, combined with resource scarcity and inequitable access to resources, can contribute to land degradation and unsustainable levels of natural resource use, but is rarely the major underlying cause of either (*well established*).** Single-factor explanations, such as extreme poverty, fail to address the multiplicity of underlying causes that typically lead to unsustainable land-use practices {5.2.2.2}. In many impoverished rural areas, these underlying causes typically include disputes over land rights, poor access to markets and financial credit, insufficient investment in research and development, sector-focused development plans that pay no attention to other sectors, and weak governance institutions (*well established*) {1.3.1.1, 1.3.1.4, 3.6.3, 5.2.2.2, 5.2.2.3, 6.4.3–6.4.5, 8.4}. Local land-use practices that degrade land have to be interpreted in the context of wider national policies and integration with regional and global markets {2.2.2.3, 5.2.2.2}. Sustainable land use often depends on collective action by communities {2.2.2.2, 2.2.3.1, 2.3.2.1, 5.2.2.3}. There is mounting evidence of the effectiveness of community-based approaches for the management of common pool environmental resources and the benefit of multi-stakeholder-led approaches for building long-term socioecological resilience {1.3.1.1, 1.3.1.5, 1.3.2.2, 2.2.2.3, 5.2.2.3, 6.4.2.4, 6.4.5, 8.3.2, 8.3.4}. However, developing the social networks to support collective action without substantial support from public, private or civil society actors is made very difficult by pervasive problems of land insecurity, household poverty and low levels of individual education and empowerment {2.2.2.3}.

Figure SPM.11

Illustration of the biodiversity impacts of international trade in 2000

This figure shows the top net exporters (orange) and importers (blue) of biodiversity impacts associated with international commodity trade. Dots are scaled to the total number of threatened species associated with the exports or imports of that particular country. The biodiversity footprint methodology used in this analysis uses a high-resolution input-output economic model that traces the commodities whose production is associated with threatened biodiversity, through several intermediate trade and transportation steps, to the country of final consumption. As is standard in all consumption-based accounting analyses, imported goods that are used and embodied in exported goods from the same country are not included in the consumption account for that country, but in the account of the country of final consumption. The underlying model, which links the Eora global trade database to the International Union for Conservation of Nature (IUCN) Red List of Threatened Species, tracks 18,000 species through more than 5 billion supply chains linking 15,000 sectors across 189 countries. The faint black lines illustrate a representative sample of biodiversity-implicated trade flows. This figure is intended to be illustrative, and the pattern of embedded biodiversity impacts of international trade in imports and exports changes year-on-year with changes in the dynamics of the global economy.



Source: Based on data from Lenzen et al. (2012).[23]

22. **Institutional, policy and governance responses to address land degradation have in many cases proven inadequate, since they are often insufficiently comprehensive or fail to address ultimate causes (*established but incomplete*).** National policy responses to land degradation are typically focused on short-term and local-level drivers and are often insufficiently resourced, including with skills, knowledge, technology, finance and institutional capacity {6.3.1, 6.3.2, 6.4.4, 6.5}. Attempted solutions are often incremental and reactive, focused on mitigating damage rather than proactively focused on avoiding initial harm. They are frequently poorly coordinated across the various sectors and ministries that share responsibility for the use of land and natural resources, and are often regionally uncoordinated and not sustained between different political dynamics such as electoral cycles {2.2.4, 2.3.1, 3.5, 8.3.4}. Effectiveness of land degradation and restoration policies is often further undermined by corruption, which erodes financial resources and confounds evaluation processes by inflating successes and omitting failures {3.6.2.1, 8.3.1.1}. Tackling corruption is enormously challenging, as practices are deeply rooted in local economy, history and culture {1.3.2.2, 3.6.1, 3.6.2.1, 6.4.5}. Addressing the multiple causality of land degradation—within the context of simultaneously trying to meet global goals for food, water, energy, climate stability and biodiversity protection—requires holistic policy responses that transcend narrowly-defined jurisdictions and policy agendas and put in place the enabling conditions necessary for long-term change {1.3.1.4, 2.2.4.3, 3.5, 6.3.2.4, 6.4.2.6, 6.4.3, 8.4}.

[23] Lenzen, M., Moran, D., Kanemoto, K., Foran, B., Lobefaro, L., and Geschke, A. (2012). International trade drives biodiversity threats in developing nations. *Nature*, *486*, 109–112. DOI: 10.1038/nature11145.

23. **Avoiding land degradation is always preferable to attempting post-degradation restoration.** Notwithstanding long-term benefits**,** restoration of degraded land is often slow and has high upfront costs, with both cost and difficulty increasing as degradation becomes more severe, extensive and protracted (*well established*). Restoration of degraded land depends upon a series of interdependent biophysical processes, many of which develop over decadal or centennial timescales, including: the arrival, establishment, growth and reproduction of recolonizing species; the formation of soil from parent materials; the rebuilding of soil carbon and nutrient pools; the recovery of hydrological functions such as infiltration and water retention; and the reestablishment of biotic interactions among species {1.3.3, 4.2.1, 4.2.2, 6.3.1.5, 6.3.2.3, 6.3.2.4}. In situations of severe land degradation, the unaided natural recovery of native species and biophysical processes may not be possible within realistic timeframes {4.1.3}. As ecosystem function is progressively impaired and biotic populations decline and disappear, the capacity of an ecosystem to self-restore becomes increasingly restricted. This is because key functional types of organisms are no longer present, populations become too small to sustain themselves, biotic interactions including competition, predation and pollination are lost, the environment becomes hostile to the establishment of new propagules or too distant from sources of replenishment to allow recolonization, and reserves of soil organic matter and nutrients, water-retention capacity and propagules become depleted {1.3.3.2, 1.4.3.1, 4.2.1–4.2.3, 6.3.1.5, 6.3.2.3, 6.3.2.4}. Inappropriate restoration techniques can further exacerbate land degradation. An example is the planting of trees where they did not historically occur (afforestation), which can have a similar impact as deforestation, including the reduction of biodiversity and disruption of water, energy and nutrient cycles {3.5}. Implemented appropriately, however, restoration can rehabilitate many ecosystem functions and services {5.2.3, 6.3.2}. Although it is expensive, restoration is typically more cost-effective than accepting the permanent loss of those functions and services {6.4.2.3}.

24. **Strong two-way interactions between climate change and land degradation mean that the two issues are best addressed in a coordinated way (*well established*).** Cultivation of crops, livestock management and land-use change are all substantial contributors of human-induced greenhouse gas emissions, amounting together to approximately one quarter of global emissions, with degradation-related emissions accounting for a large part of that quarter {4.2.8}. Deforestation alone contributes approximately 10 per cent of all human-induced greenhouse gas emissions, and can further alter the climate through changes in surface reflectivity and the generation of dust particles {4.2.8}. Land-based activities to mitigate the effects of climate change can have positive or negative effects on land degradation, depending on where and how they are implemented (*well established*) {6.3.1.1, 6.3.2.3, 7.2.5, 7.2.6}. For example, indiscriminate tree planting in previously non-forested habitats such as grasslands and savannas for the purpose of carbon sequestration and more widespread use of bioenergy crops to mitigate climate change could constitute forms of land degradation from the perspectives of loss of biodiversity, loss of food production and loss of water yield. Establishment of species-diverse, sustainably managed plantations on degraded land could restore ecological function, protect undegraded land by providing alternative sources of products, and help secure livelihoods {3.5, 7.2.6}.

25. Climate change threatens to become an increasingly important driver of land degradation throughout the twenty-first century, exacerbating both the extent and severity of land degradation as well as reducing the effectiveness and sustainability of restoration options {3.4}. Climate change can have a direct effect on agricultural yields, through changes in the means and extremes of temperature, precipitation and CO_2 concentrations, as well as on species distributions and population dynamics, for instance, pest species {3.4.1, 3.4.2, 3.4.4, 4.2.8, 7.2.6}. However, the greatest effects of climate change on land is likely to come from interactions with other degradation drivers {3.4.5}. Long-established sustainable land management and restoration practices may no longer be viable under future climatic regimes in the places where they were developed, requiring rapid adaptation and innovation, but also opening new opportunities {3.5}.

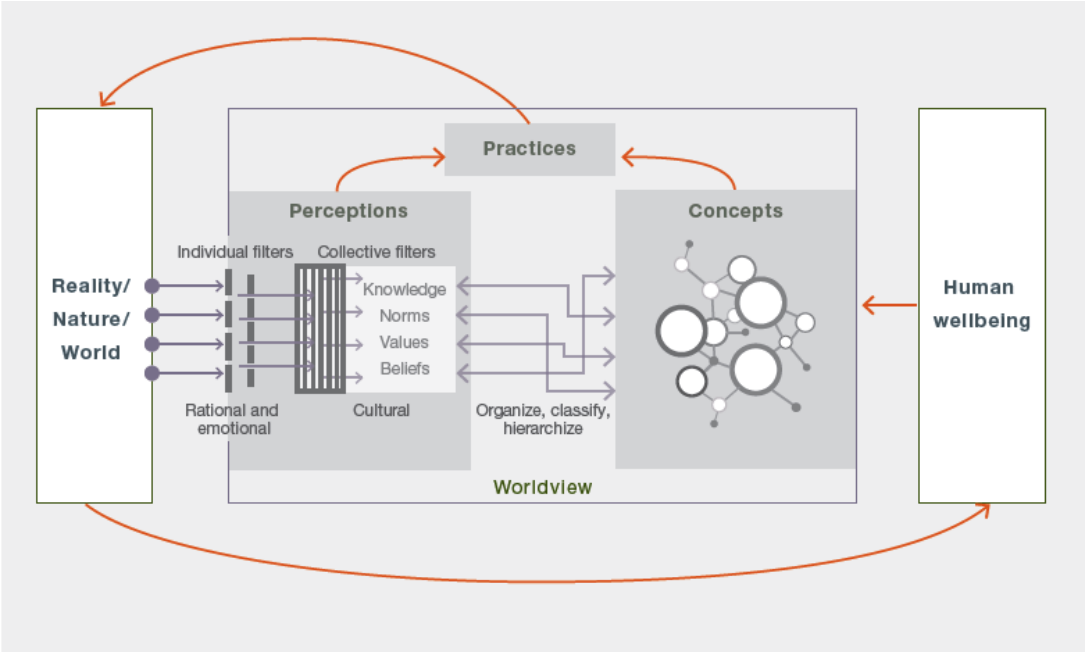
C. The implementation of known, proven actions to combat land degradation and thereby transform the lives of millions of people across the planet will become more difficult and costly over time. An urgent step change in effort is needed to prevent irreversible land degradation and accelerate the implementation of restoration measures

26. **World views influence the way individuals, communities and societies manage the environment (*well established*)** (Figure SPM.12). If prevailing world views result in land degradation, then promoting alternative world views can foster the shifts in individual and societies' beliefs, values and norms required for effective and enduring action to avoid, reduce and reverse land degradation (*well established*) {1.3.1, 1.3.2.1, 1.3.2.3, 2.1.2, 2.3.2.2; Figure 2.1}. Education has an important role

to play, empowering decision makers with knowledge on the extent, location, severity and trend of land degradation to enable them to choose and implement adequate response actions and to avoid transgressing tipping points beyond which restoration is difficult and costly {7.3.2, 8.2.1}.

Figure SPM.12

Perceptions are organized into a hierarchy of concepts dependent on collective systems of knowledge, norms, values and beliefs, which in turn guide cultural, governance and land management practices, as well as resource use and consumer behaviours. Taken together, these elements constitute a world view. When dominant or mainstream perceptions and concepts have an undesired impact on nature and its contributions to people, promoting alternative perceptions and concepts may transform practices towards more desired impacts. Policies defending new concepts and associated practices are expected by civil society, as environmental degradation affects human well-being.



27. **Education and awareness-raising at the individual level, especially among consumers, is also of great importance to expose the environmental impacts associated with the full chain of production, transportation and, ultimately, waste management related to consumer products and services (*well established*) {2.2.1.3, 2.3.2.2, 6.4.2.4}.** Internalizing the environmental costs of the production of food, clothing and other goods into prices is likely to stimulate demand for lower-impact products {2.2.1.5, 2.3.2.1, 6.4.2.4}. There is significant potential to build on current efforts to promote more land-friendly production and consumption choices through information and awareness-raising, as experimented with in some countries through voluntary eco-labelling, certification and corporate social responsibility (*established but incomplete*) {6.4.2.4}. Civil society has a major role to play in this shift towards increased awareness and understanding of the consequences of consumer choices {2.3.2, 2.3.2.2}.

28. **Information systems—including for baseline assessment, land-use planning, monitoring, verification and reporting —are needed to support the sustainable and adaptive long-term stewardship of land (*well established*).** We now have at our disposal a greater range of approaches, tools and actions for understanding and acting upon land degradation than at any other time in human history {6.3.2, 6.4.2–6.4.4}. Most of the current decision-support tools focus on assessing the biophysical state of the land; more-integrated tools are under development that combine socioeconomic and biophysical variables and are needed to capture social-ecological interactions and impacts {8.2, 8.3.5}. Recent years have seen new information technologies, including remote-sensing capabilities, mobile applications, open-access data and decision-support platforms, to inform decision-making and monitor the effectiveness of efforts to avoid, reduce and reverse land degradation, yet they are not commonly used {8.2.3}. Concerted multidisciplinary and cross-sectoral efforts to improve the conceptual, technical and operational harmonization of inputs and outputs of different decision support systems could lead to a substantial improvement in evidence-based decision-making {8.2.3}. Since local resource users are often the first to experience ecosystem changes and the impacts of land degradation, monitoring programmes and the design of restoration management plans can benefit from participatory approaches involving local ecosystem experts,

including indigenous and local knowledge holders, working together with scientific experts {1.3.1.4, 1.3.3.2, 2.2.2, 8.3.5}.

29. **Efforts to address land degradation and biodiversity loss require a multifaceted response (*well established*).** Adopting holistic policy responses to the multiple causes of land degradation requires transcending institutional, governance and sectoral boundaries to create the enabling conditions necessary for long-term change (*established but incomplete*) {Figure 1.2; 1.2, 1.3, 2.2.4.3, 6.4.1, 6.4.2, 6.4.3, 6.5, 8.4} (Table SPM.1). Integrated approaches that harmonize sectoral development policies can reduce land degradation, enhance the resilience of rural livelihoods and minimize environment-development trade-offs (*established but incomplete*) {1.2, 1.3.2, 6.4.2.3, 6.4.3, 8.4.3}. Participatory planning and monitoring, in addition to land capability and condition assessments that include local institutions and land users and incorporate both scientific and indigenous and local knowledge, are more likely to result in agreement among stakeholders on the nature of integrated use of landscapes and in monitoring of the effectiveness of land-use plans {1.3, 2.2.2.2, 2.2.2.4, 6.3.1.1, 6.3.1.2, 6.4.2.4, 6.4.3, 6.4.5, 8.3.4, 8.3.5}. Since financial resources, technical capacities and skill and knowledge gaps often constrain response options (*established but incomplete*) {6.4.4, 6.5} (Table SPM.3), there is a need to develop capacities for sustainable land management and associated information systems, particularly in developing countries that are prone to and most affected by land degradation. This may involve, for example, appropriate measures to enhance sharing of indigenous and local knowledge that has been effective in addressing land degradation problems in certain contexts (*established but incomplete*) {1.2.1, 1.3.1.2, 1.3.3.2, 1.3.3.7, 2.2.2.1, 6.4.2.2, 6.4.2.3}.

30. **Strategies and actions to combat land degradation that are well aligned with other decision-making areas can more effectively address multiple environmental and social challenges, while unlocking the potential to harness synergies (*well established*) (Table SPM.2).** Institutional coordination, multi-stakeholder engagement and the development of governance structures that bridge different government functions, types of knowledge, sectors and stakeholder groups (including consumers) are a prerequisite for reducing trade-offs, enhancing alignment and harnessing synergies among decision-making areas {1.3.1.5, 2.2.1.3, 2.2.4.3, 6.4.2, 6.4.3, 8.4.2, 8.4.3}. For example, national-level decisions seeking to ensure availability of adequate food through reduction of land degradation would be more effective if they considered the impacts of the selected strategies on achievement of policy goals regarding, for instance, water, energy and shelter provision for the growing population at other scales {2.2.1.3, 8.4.2}. Effective means for enhancing such coordination and collaboration include the engagement of scientists with leaders in government, business and civil society to develop the knowledge, tools and practices necessary to integrate social-ecological interactions into decision-making {1.3.2.1, 2.3.2.2, 6.4.3, 6.4.4, 8.2.3}, and cross-disciplinary and multi-actor collaboration in research, restoration planning and implementation {6.4.2.3, 6,4,3, 8.2.3}.

31. **Sound decision-making by landowners, communities, governments and private investors can be achieved through more inclusive analyses of the short-, medium- and long-term costs and benefits of avoiding and reversing land degradation (*established but incomplete*).** Most current economic analyses only consider financial or private benefits while overlooking biodiversity, non-market ecosystem services, public values and intergenerational benefits, among others. Furthermore, they often apply inappropriately high discount rates, which favour investments in land uses and management practices promising short-term gains over those with long-term benefits {2.2.3.1, 2.2.3.3, 2.3.1.2, 2.3.2.2, 6.4.2.3, 8.3.4}. Thus, the inclusion of a full range of market and non-market benefits and costs using socially appropriate discount rates in decision-making processes could help to avoid or reverse land degradation. Fulfilling national and subnational aspirations, such as land degradation neutrality aspirations, and attaining restoration goals can be achieved by creating incentives that encourage landowners, land managers and investors to recognize the public values of non-degraded land {1.3.1.1, 2.2.3.2, 2.2.3.3, 2.3.1.2, 6.4.2.3}.

Table SPM.1

Responses to address land degradation, their impacts and outcomes for biodiversity and ecosystem services

Sustainable land management practices and restoration, supported by coordinated policies, institutions, governance arrangements, better informed consumer demand and corporate social responsibility, can lead to significant improvements in land condition, reduce biodiversity loss and enhance the provision of environmental services essential for the future survival and well-being of the growing numbers of people adversely affected by land degradation.

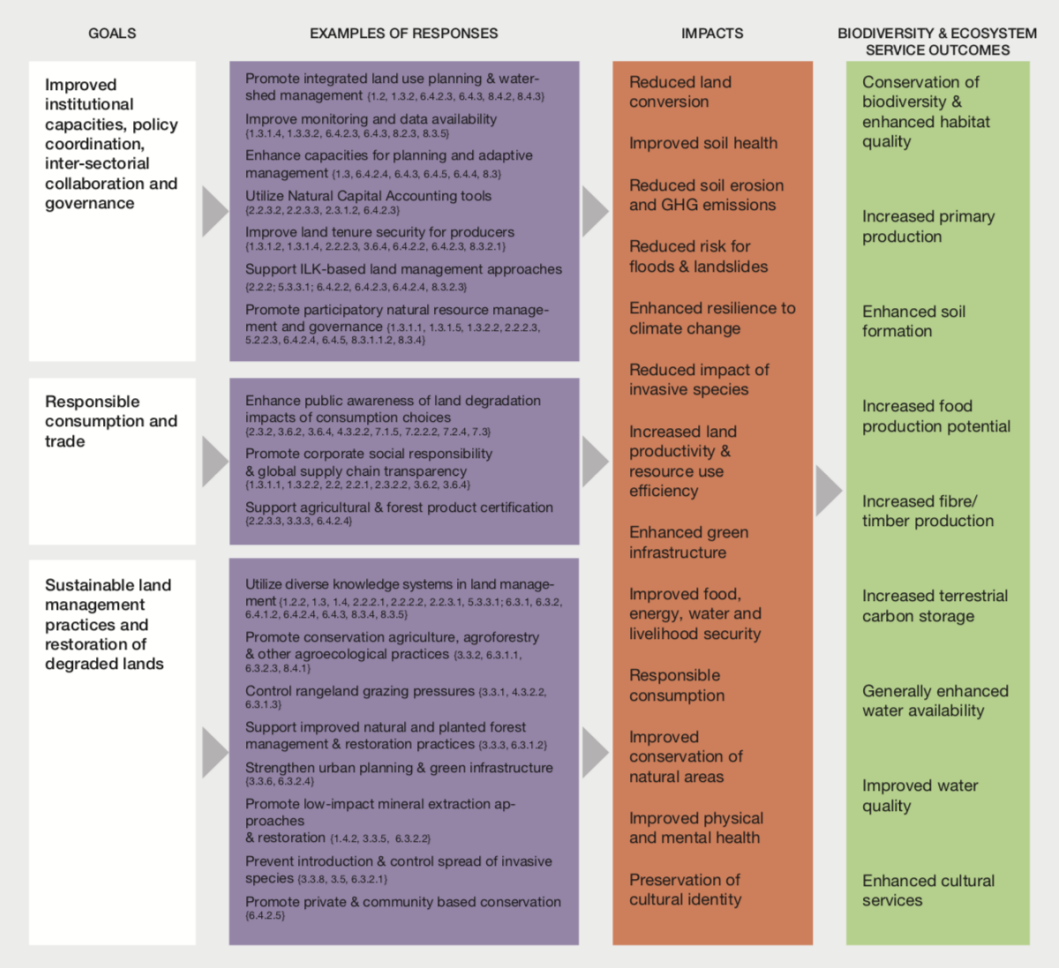


Table SPM.2
Aspirations for addressing land degradation and possible actions and pathways
The appropriateness and relevance of different aspirations varies from place to place, depending on regional and national contexts. The lists of actions are indicative, non-exhaustive and non-exclusive.

Aspirations	Possible actions and pathways
Safeguarded biodiversity	Greater protection of biodiversity through enlarged and more effective protected area systems, halting conversion of natural land, large-scale restoration of degraded land, biodiversity offsetting where land transformation is unavoidable
Low-consumption lifestyles	Lower per-capita consumption patterns, including the adoption of less land-degrading diets, such as more vegetable-based diets, and low- and renewable-energy-based housing, transportation and industrial systems
Global human population at near-zero growth	Improving gender equality and moving towards improved access to education, voluntary family-planning, and social-welfare for ageing populations
Circular economy	Reduced food loss and waste, sustainable waste and sanitation management systems, reuse and recycling of materials
Low-input production systems and resource management	More land-, energy-, water-, and material-efficient and low-emission production systems for food, fiber, bioenergy, mining, and other commodities
Sustainable land management	Sustainable land management practices in croplands, rangelands, forestry, water systems, human settlements, and their surrounding landscapes, specifically directed at avoiding, reducing and reversing land degradation

32. **Strengthening institutional competencies can enhance the effectiveness of policy instruments designed to avoid, reduce and reverse land degradation (*established but incomplete*).** There exist various market and non-market mechanisms to mitigate land degradation and to promote land restoration. Market mechanisms may include, among others, financial and economic instruments, payments for ecosystem services, farm subsidies, conservation tenders and biodiversity offsets. Effective implementation of such instruments requires institutional capacities and context-specific governance mechanisms {1.3.1.1, 1.3.2.2, 2.2.1.5, 6.4.2.3, 8.3.1, 8.3.3, 8.3.6}. However, the more markets are used to finance the restoration of complex ecosystems, the more institutional capacity and regulations are needed to ensure and safeguard the restoration outcomes {8.3.3}. For example, increasing agricultural productivity to minimize pressure on remaining areas of native vegetation is more likely to be effective where market demand for agricultural products is relatively inelastic to price change, and strong regulatory measures or other limits to expansion are in place (*unresolved*) {3.6.3}. Examples of non-market based approaches include joint mitigation and adaptation mechanisms, justice-based initiatives, ecosystem-based adaptation and integrated water co-management schemes. Building an adequate set of institutional competencies and appropriate governance mechanisms—based on the monitoring of response impacts and adaptive management—is crucial for the design, selection and implementation of effective policy instruments to avoid, reduce and reverse land degradation {1.3, 3.5, 6.4.2.4, 6.4.3, 6.4.5, 8.3}. In most countries, the design and implementation of national policies addressing land degradation is constrained by a lack of national-level information on ecosystems and their contribution to economic development {8.3.3, 6.4.2.3}. A shift in decision-making focus from narrowly-defined analysis based on affordability and effectiveness to an approach that includes the consideration of social acceptability and environmental sustainability would help to achieve desired outcomes of response actions {1.3.1.1, 2.3.1.2, 2.3.2.2, 6.4.2.3, 8.2.2}.

33. **Secure land tenure, property and land-use rights, vested in individuals and/or communities, in accordance with national legislation at the appropriate level, are enabling conditions for actions to prevent land degradation and biodiversity loss and restore degraded lands (*well established*).** The customary practices and knowledge used by indigenous peoples and within local communities can be effective for conserving biodiversity and avoiding, reducing and reversing land degradation {1.3.1.5, 2.2.2.1, 2.2.2.2, 5.3.3.1, 6.3.1, 6.3.2}. The continued viability of such practices is supported by, among other things, secure land tenure, property and land-use rights in accordance with national legislation at the appropriate level {1.3.1.2, 1.3.1.4, 6.4.2.2–6.4.2.4}. This can be achieved by formalizing customary practices and local knowledge, which requires adequate institutional competencies within communities for participation in decision-making and responsible

governance of land and natural resources, taking into account the voluntary guidelines on the responsible governance of tenure of land, fisheries and forests in the context of national food security, and in line with human rights principles {1.3.1.5, 2.2.2.3, 5.2.2.3, 5.3.3.1, 6.4.2.2, 6.4.2.3, 6.4.2.4, 8.3.2.1, 8.3.2.3}.

34. **A wide range of practices already exists to avoid, reduce and reverse land degradation in many ecosystems and urban areas and reduce the impacts of many land degradation drivers (*well established*).** Degradation of agricultural lands can be avoided or reversed through many well-tested practices and techniques, both traditional and modern. On croplands, these include, for example, reducing soil loss and improving soil quality/soil health, the use of salt-tolerant crops, agroforestry and agroecological practices, conservation agriculture and integrated crop and livestock and forestry systems (*well established*) {2.2.3.1, 6.3.1.1, 6.3.2.4, 6.3.2.5, 7.2.3}. On rangelands, they include: land capability and condition assessments and monitoring; grazing pressure management; pasture and forage crop improvement; silvopastoral management; and ecologically-sound weed and pest management (*well established*) {6.3.1.3}. The maintenance of appropriate[24] fire regimes, and the reinstatement or development of local livestock management practices and institutions in rangelands with traditional grazing, have proven effective in many dryland regions (*established but incomplete*) {4.3.2.2, 6.3.1.3}. A variety of passive or active forest management and restoration techniques have been successfully used to conserve biodiversity and avoid forest degradation, while yielding multiple economic, social and environmental benefits (*well established*) {6.3.1.2}—although adoption of more sustainable forest production systems continues to be slow {3.5, 5.3.2, 6.3.1.2}. Proven approaches to avoid, reduce and reverse land degradation in urban areas include urban planning, replanting with native species, green infrastructure development, remediation of contaminated and sealed soils, and wastewater treatment and river channel restoration {6.3.1.4, 6.3.2.4}.

35. Combating land degradation resulting from invasive species involves identification and monitoring of invasion pathways and the adoption of eradication and control measures (mechanical, cultural, biological and chemical) (*well established*) {3.5, 6.3.2.1}. Responses to land degradation from mineral resource extraction include on-site management of mining wastes (soils and water), reclamation of mine site topography, conservation and early replacement of topsoil, and restoration and rehabilitation measures to recreate functioning grassland, forest, wetland and other ecosystems (*well established*) {1.4.2, 6.3.2.2}. Effective responses to avoid, reduce and reverse wetland degradation include: controlling point and diffuse pollution sources; adopting integrated land and water management strategies {6.3.2.4}; and restoring wetland hydrology, biodiversity and ecosystem functions through restoration and rehabilitation measures, such as constructed wetlands (*well established*) {1.4.1; Box 2.3; 6.3.1.5, 6.3.2.4}. Similarly, effective responses to improve water quality include soil and water conservation practices, controlling pollution sources and purification (and where appropriate desalination) of wastewater (*established but incomplete*) {6.3.2.4}.

36. **Major, transformative changes in consumption patterns, demographic growth, technology and business models can contribute to avoid, reduce and reverse land degradation and achieve food, energy, water and livelihood security for all, while mitigating and adapting to climate change and halting biodiversity loss (*well established*).** No mid-century scenarios examined in this assessment simultaneously met the global goals for the avoidance of land degradation, limiting of climate change and halting of biodiversity loss given the accelerating growing demand for food, energy, fibre, timber, housing, infrastructure and water. The projected unprecedented growth in consumption, demography and technology will roughly quadruple the global economy in the first half of the twenty-first century {7.2.2.2}. Under these conditions, only transformative changes both within and across all sectors would be sufficient to meet the goals (*established but incomplete*) {3.6.2.1, 7.2, 7.3}. Adjustments towards lower consumption lifestyles in developed and emerging economies may include changes in food—particularly reductions in meat-intensive diets and in the consumption of water-, energy-, material- and space-intensive goods and services {7.2.2.2, 7.2.4, 7.3}. Adjustments to production systems may be achieved by sustainable improvements in agricultural productivity, in combination with strong environmental protection and social safeguards to avoid the environmental and social externalities of intensive production systems and damaging rebound effects {1.3.1.1, 1.3.2.2, 3.6.3}. Particular care is needed to ensure that increased demand for bioenergy does not exacerbate land degradation by replacing land previously used for food crops and driving agricultural land expansion {5.3.2.5, 7.2.6}. Finally, various interventions in infrastructure and information may improve the efficiency with which consumers use food, water and energy to and further their reuse, recycling and their reduction of waste {7.2.2, 7.2.4, 7.3}.

[24] Many ecosystems require fire to remain healthy and safe. The frequency and type of fire used depends on the circumstances and intent, which may use managed burns or simulate natural ignition and spread {3.3.7, 4.2.6.3}.

37. **The IPBES thematic assessment on land degradation and restoration provides clear evidence for the urgent need to address the unprecedented loss of ecosystem functions and services vital to all life on Earth.** Existing international agreements and conventions, such as the United Nations Convention to Combat Desertification, the United Nations Framework Convention on Climate Change and its associated agreements, the Convention on Biological Diversity, and the Ramsar Convention, already provide a range of mechanisms to support national and international responses to land degradation and can benefit greatly from the multidisciplinary knowledge base provided by this assessment (Box SPM.3).

Box SPM.3

United Nations Convention to Combat Desertification

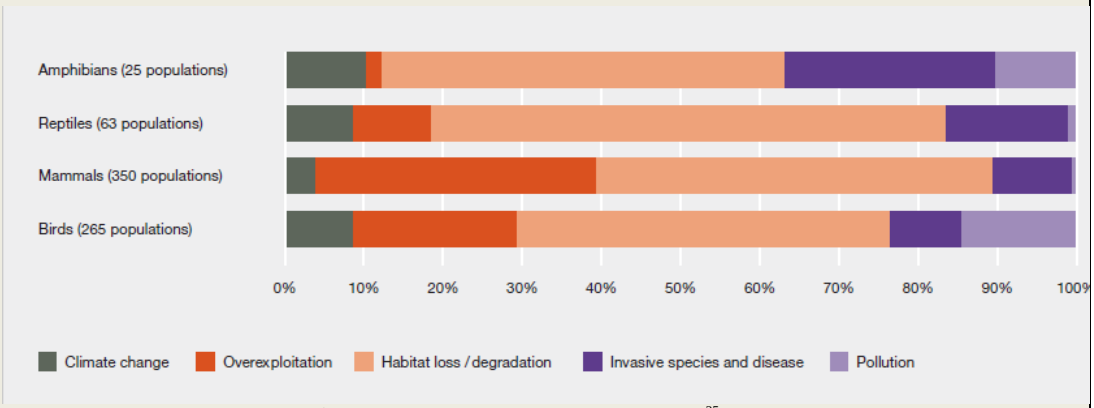
Land degradation in drylands is a reality affecting millions of people, and results from a combination of local, regional and global causes (*well established*). The diminishing capacity of dryland systems to support the needs of the populations of humans and other organisms that live there is widespread and demonstrated {1.4.7, 4.2.6.2, 4.3.2.2, 6.4}. The emerging view of dryland degradation—as primarily human-induced and the consequence of processes at the local, national, regional and global scales—differs substantively from earlier concepts of desertification, such as of the inexorable advance of deserts into formerly productive lands. It implies that the responsibility for addressing the underlying drivers of dryland degradation is found locally, nationally, regionally and globally. For instance, the achievement of land degradation neutrality by 2030 will only be achieved by a strong deviation from current trends and world views (*well established*) {2.2.1.3, 4.2.6.2, 6.2.1, 6.4.2.2, 6.5}.

Convention on Biological Diversity

Land degradation is accompanied, in almost all cases, by a reduction in the populations of wild organisms, and frequently by a loss of species (*well established*) {3.4.1, 3.4.2, 3.4.4, 4.2.7, 4.2.9, 4.3, 7.2.2}. Losses occur not only at the species level but also in genetic diversity of individual species. The distribution of declines is not geographically uniform; losses are greater in some land cover and land use types than in others: croplands, pastures and urban areas have the greatest decreases compared with undisturbed and recovering ecosystems. The main causes of biodiversity loss are habitat loss and fragmentation, overexploitation of species by humans, pollution and the impact of invasive species and diseases of wild organisms {4.2.6.3, 4.2.6.4, 4.2.7} (Figure SPM.13). The type and intensity of degradation drivers determines the magnitude of biodiversity loss, as well as options for restoration. Restoration of vegetation cover following degradation is possible and often successful, but seldom attains, within decades, the pre-degradation levels of ecosystem function or compositional biological diversity {1.4.2}.

Figure SPM.13

The most common drivers of biodiversity loss among some animal taxa



Note: Data includes 703 populations from the Living Planet Report (WWF, 2016).[25]

United Nations Framework Convention on Climate Change and its associated agreements

Climate change is already contributing to land degradation, and will be an increasingly important driver of land degradation throughout the twenty-first century {3.4, 4.2.3, 4.2.6.1, 4.2.6.2, 4.2.8, 6.3.1.1, 6.3.2.3}. Moreover, the strength of land ecosystem-based carbon sinks, the stability of soil carbon stocks and the ecosystem-based adaptive capacity are weakened by degradation {4.2.3.2}. Avoiding land degradation or restoring degraded land usually, but not always, helps to mitigate and adapt to climate change {1.4.3, 7.2.6}. Tapping into the potential of land-based climate change mitigation and adaptation requires strong protection measures, sustainable management and the development of agricultural and natural production systems that combine high yields and close-to-natural soil organic carbon levels as promoted by, among others, the Global Soil Partnership for Food Security and Climate Change Adaptation and Mitigation and the 4 per 1000 initiative (*established but incomplete*) {7.2.1.2, 7.2.5, 7.2.6}. Such agricultural systems can have positive or negative effects on land

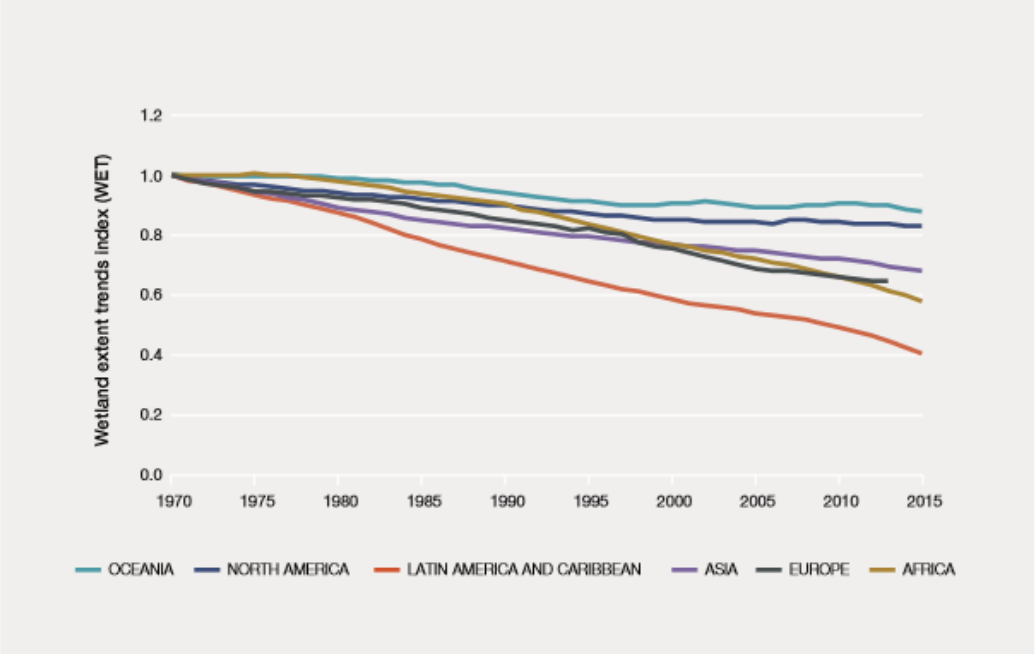
[25] WWF. (2016). *Living Planet Report 2016. Risk and resilience in a new era*. Gland, Switzerland: WWF International. Retrieved from http://wwf.panda.org/about_our_earth/all_publications/lpr_2016/.

degradation, depending on where and how they are practiced (*established but incomplete*) {4.2.3, 4.2.8, 6.3.1.1, 6.3.2.3}. Implementation of land-based climate mitigation actions that require more land than is available for restoration would exacerbate land degradation by displacing existing food or fibre crops or natural ecosystems.

Ramsar Convention

Despite comprising a small fraction of the global land area, wetlands provide a disproportionately large amount of critical ecosystem services, particularly those associated with the filtration and supply of fresh water and coastal protection (*well established*) {1.4.1, 4.2.3.3, 4.2.5.2} (Figure SPM.14). Wetlands also have high biodiversity importance, including being critical habitat for many migratory species. Treating wetlands as natural infrastructure can help meet a wide range of policy objectives, such as water and food security, as well as climate change mitigation and adaptation {6.3.1.5}. Restored wetlands recover most of their ecosystem services and functions within 50 to 100 years, providing a wide range of benefits for both biodiversity and human well-being {4.5.2.5, 5.4.4}. Considering the role of wetlands in freshwater catchments, river basins and coastal zones, future wetland restoration efforts could be greatly enhanced by the development of indicators and restoration targets aimed at evaluating and recovering the range of interactions between organisms and their abiotic environment {6.3.1.5}.

Figure SPM.14
The Wetland Extent Trends (WET) index representing the trends in natural wetland extent per region relative to 1970



Source: Based on Ramsar Convention secretariat and UNEP-WCMC (2017)[26] and Dixon et al. (2016).[27]

[26] Ramsar Convention secretariat and UNEP-WCMC (2017). *Wetland Extent Trends (WET) Index - 2017 Update*. Technical Update 2017. Gland, Switzerland: Ramsar Convention secretariat.

[27] Dixon, M. J. R., Loh, J., Davidson, N. C., Beltrame, C., Freeman, R., Walpole, M. (2016). Tracking global change in ecosystem area: The Wetland Extent Trends Index. *Biological Conservation*, *193*, 27–35. DOI: 10.1016/j.biocon.2015.10.023.

Table SPM.3

Critical gaps in knowledge and understanding of land degradation and restoration

The summary for policymakers of this assessment represents the current state of knowledge regarding the biophysical, social and economic consequences and drivers of land degradation and restoration as well as approaches for avoiding, reducing and reversing land degradation. The research areas listed below represent the highest priorities identified by the assessment team to further enable evidence-based decisions regarding land degradation and restoration.

The evidence base required to address land degradation	**Priority gaps in each area of knowledge**
What are the consequences of land degradation for biodiversity, ecosystem functioning, natures contributions to people, and human well-being?	Methods to effectively monitor and map changes in different forms of degradation over time and at relevant spatial scales and resolutions
	Spatial and temporal patterns of, and changes in, soil health
	Consequences of land degradation on freshwater and coastal ecosystems, including mangroves and seagrass systems
	Consequences of land degradation for physical and mental health and spiritual well-being
	Consequences of land degradation for infectious disease prevalence and transmission
	The potential for land degradation to exacerbate climate change
What are the causes of land degradation?	The social and environmental consequences of interactions between climate change and land degradation drivers, including for efforts to avoid land degradation and restore degraded land
	Linkages between land degradation and restoration and distant social, economic and political processes
	Interactions among land degradation, poverty, climate change and the risk of conflict and of migration
What are the key factors that can facilitate efforts to avoid, reduce and reverse land degradation?	Effectiveness of mechanisms for raising awareness and influencing the behaviour of actors across all stages of supply chains in ways that may improve the sustainability of internationally traded commodities
	The relative importance of various enabling conditions for avoiding, reducing and reversing land degradation in different social, cultural, economic and governance contexts, including regarding technical capacities, technologies, data and information access, knowledge-sharing, decision support tools and institutional competencies
	Methods for integrating conventional science and indigenous and local knowledge, in order to achieve a more broadly-based understanding of the causes and consequences of land degradation, its progression over time (including future projections) and potential solutions
	Methods and tools for achieving a more inclusive understanding of the short, medium and long-term monetary and non-monetary implications of various approaches to the restoration of degraded land
What needs to be done to avoid, reduce and reverse land degradation, and what is the effectiveness of different approaches available?	Interactions amongst policies and land and resource-management practices to address different Sustainable Development Goals and other multilateral agreements, and the consequences of these efforts for land degradation and restoration outcomes
	Methods for internalizing the environmental and social costs of unsustainable production practices into commodity prices, and the allocation of such costs to different stages of production, processing and consumption in the life cycle of a product
	Evaluation of the effectiveness of different policy instruments designed to avoid, reduce and reverse land degradation, including legal, regulatory, social and economic instruments, for both environmental and social outcomes
	Spatially-explicit multi-model scenarios of change in biodiversity and ecosystem services and the implications of these scenarios for achieving progress towards multilateral agreements, including land degradation neutrality at the national level

Appendix

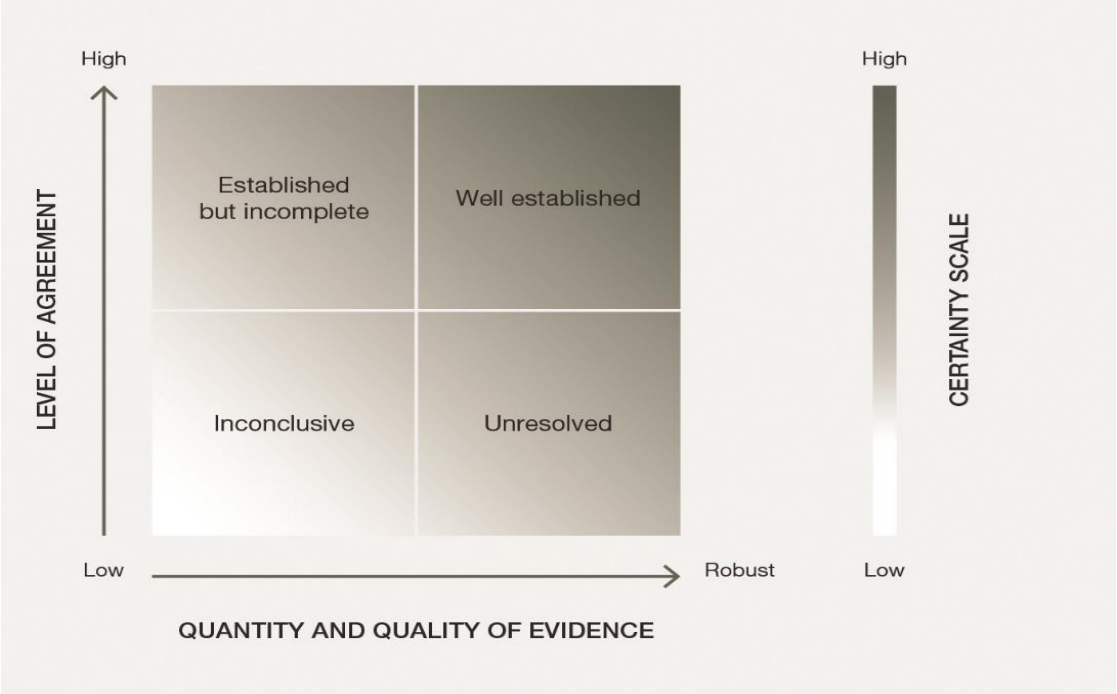
Communication of the degree of confidence

In this assessment, the degree of confidence in each main finding is based on the quantity and quality of evidence and the level of agreement regarding that evidence (Figure SPM.A1). The evidence includes data, theory, models and expert judgement. Further details of the approach are documented in the note by the secretariat on the information on work related to the guide on the production of assessments (IPBES/6/INF/17).

The summary terms to describe the evidence are:

- Well established: comprehensive meta-analysis or other synthesis or multiple independent studies that agree.
- Established but incomplete: general agreement although only a limited number of studies exist; no comprehensive synthesis and/or the studies that exist address the question imprecisely.
- Unresolved: multiple independent studies exist but conclusions do not agree.
- Inconclusive: limited evidence, recognizing major knowledge gaps.

Figure SPM.A1
The four-box model for the qualitative communication of confidence.
Confidence increases towards the top-right corner as suggested by the increasing strength of shading.



Source: IPBES, 2016.[28]

[28] IPBES, Summary for policymakers of the assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production. S.G. Potts, V. L. Imperatriz-Fonseca, H. T. Ngo, J. C. Biesmeijer, T. D. Breeze, L. V. Dicks, L. A. Garibaldi, R. Hill, J. Settele, A. J. Vanbergen, M. A. Aizen, S. A. Cunningham, C. Eardley, B. M. Freitas, N. Gallai, P. G. Kevan, A. Kovács-Hostyánszki, P. K. Kwapong, J. Li, X. Li, D. J. Martins, G. Nates-Parra, J. S. Pettis, R. Rader, and B. F. Viana (eds.)., secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany, 2016. Available from www.ipbes.net/sites/default/files/downloads/pdf/spm_deliverable_3a_pollination_20170222.pdf.

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BES

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Report of the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on the work of its seventh session

Addendum

Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

At its seventh session, in its decision IPBES-7/1, section II, paragraph 1 the Plenary of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services (IPBES) approved the summary for policymakers of the global assessment of biodiversity and ecosystem services as set out in the annex to the present addendum.

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Annex

Summary for policymakers of the global assessment report on biodiversity and ecosystem services of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services

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The designations employed and the presentation of material on the maps used in the present report do not imply the expression of any opinion whatsoever on the part of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services concerning the legal status of any country, territory, city or area or of its authorities, or concerning the delimitation of its frontiers or boundaries. These maps have been prepared for the sole purpose of facilitating the assessment of the broad biogeographical areas represented therein.

[1] Authors are listed with, in parentheses, their country or countries of citizenship, separated by a comma when they have more than one; and, following a slash, their country of affiliation, if different from that or those of their citizenship, or their organization if they belong to an international organization. The countries and organizations having nominated the experts are listed on the IPBES website.

Key messages

A. Nature and its vital contributions to people, which together embody biodiversity and ecosystem functions and services, are deteriorating worldwide.

Nature embodies different concepts for different people, including biodiversity, ecosystems, Mother Earth, systems of life and other analogous concepts. Nature's contributions to people embody different concepts, such as ecosystem goods and services and nature's gifts. Both nature and nature's contributions to people are vital for human existence and good quality of life (human well-being, living in harmony with nature, living well in balance and harmony with Mother Earth, and other analogous concepts).While more food, energy and materials than ever before are now being supplied to people in most places, this is increasingly at the expense of nature's ability to provide such contributions in the future, and frequently undermines nature's many other contributions, which range from water quality regulation to sense of place. The biosphere, upon which humanity as a whole depends, is being altered to an unparalleled degree across all spatial scales. Biodiversity – the diversity within species, between species and of ecosystems – is declining faster than at any time in human history.

A1 **Nature is essential for human existence and good quality of life. Most of nature's contributions to people are not fully replaceable, and some are irreplaceable**. Nature plays a critical role in providing food and feed, energy, medicines and genetic resources and a variety of materials fundamental for people's physical well-being and for maintaining culture. For example, more than 2 billion people rely on wood fuel to meet their primary energy needs, an estimated 4 billion people rely primarily on natural medicines for their health care and some 70 per cent of drugs used for cancer are natural or are synthetic products inspired by nature. Nature, through its ecological and evolutionary processes, sustains the quality of the air, fresh water and soils on which humanity depends, distributes fresh water, regulates the climate, provides pollination and pest control and reduces the impact of natural hazards. For example, more than 75 per cent of global food crop types, including fruits and vegetables and some of the most important cash crops, such as coffee, cocoa and almonds, rely on animal pollination. Marine and terrestrial ecosystems are the sole sinks for anthropogenic carbon emissions, with a gross sequestration of 5.6 gigatons of carbon per year (the equivalent of some 60 per cent of global anthropogenic emissions). Nature underpins all dimensions of human health and contributes to non-material aspects of quality of life – inspiration and learning, physical and psychological experiences, and supporting identities – that are central to quality of life and cultural integrity, even if their aggregated value is difficult to quantify. Most of nature's contributions are co-produced with people, but while anthropogenic assets – knowledge and institutions, technology infrastructure and financial capital – can enhance or partially replace some of those contributions, some are irreplaceable. The diversity of nature maintains humanity's ability to choose alternatives in the face of an uncertain future.

A2 **Nature's contributions to people are often distributed unequally across space and time and among different segments of society. There are often trade-offs in the production and use of nature's contributions.** Benefits and burdens associated with co-production and use of nature's contributions are distributed and experienced differently among social groups, countries and regions. Giving priority to one of nature's contributions to people, such as food production, can result in ecological changes that reduce other contributions. Some of these changes may benefit some people at the expense of others, particularly the most vulnerable, as may changes in technological and institutional arrangements. For example, although food production today is sufficient to satisfy global needs, approximately 11 per cent of the world's population is undernourished, and diet-related disease drives 20 per cent of premature mortality, related both to undernourishment and to obesity. The great expansion in the production of food, feed, fibre and bioenergy has occurred at the cost of many other contributions of nature to quality of life, including regulation of air and water quality, climate regulation and habitat provision. Synergies also exist, such as sustainable agricultural practices that enhance soil quality, thereby improving productivity and other ecosystem functions and services, such as carbon sequestration and water quality regulation.

A3 **Since 1970, trends in agricultural production, fish harvest, bioenergy production and harvest of materials have increased, but 14 of the 18 categories of contributions of nature that were assessed, mostly regulating and non-material contributions, have declined.** The value of agricultural crop production ($2.6 trillion in 2016) has increased approximately threefold since 1970 and raw timber harvest has increased by 45 per cent, reaching some 4 billion cubic metres in 2017, with the forestry industry providing about 13.2 million jobs. However, indicators of regulating contributions, such as soil organic carbon and pollinator diversity, have declined, indicating that gains

in material contributions are often not sustainable. Currently, land degradation has reduced productivity in 23 per cent of the global terrestrial area, and between $235 billion and $577 billion[2] in annual global crop output is at risk as a result of pollinator loss. Moreover, loss of coastal habitats and coral reefs reduces coastal protection, which increases the risk from floods and hurricanes to life and property for the 100 million to 300 million people living within coastal 100-year flood zones.

A4 **Nature across most of the globe has now been significantly altered by multiple human drivers, with the great majority of indicators of ecosystems and biodiversity showing rapid decline.** Seventy-five per cent of the land surface is significantly altered, 66 per cent of the ocean area is experiencing increasing cumulative impacts, and over 85 per cent of wetlands (area) has been lost. While the rate of forest loss has slowed globally since 2000, this is distributed unequally. Across much of the highly biodiverse tropics, 32 million hectares of primary or recovering forest were lost between 2010 and 2015. The extent of tropical and subtropical forests is increasing within some countries, and the global extent of temperate and boreal forests is increasing. A range of actions – from restoration of natural forest to planting of monocultures – contributes to these increases, but these actions have very different consequences for biodiversity and its contributions to people. Approximately half the live coral cover on coral reefs has been lost since the 1870s, with accelerating losses in recent decades due to climate change exacerbating other drivers. The average abundance of native species in most major terrestrial biomes has fallen by at least 20 per cent, potentially affecting ecosystem processes and hence nature's contributions to people; this decline has mostly taken place since 1900 and may be accelerating. In areas of high endemism, native biodiversity has often been severely impacted by invasive alien species. Population sizes of wild vertebrate species have tended to decline over the last 50 years on land, in freshwater and in the sea. Global trends in insect populations are not known but rapid declines have been well documented in some places. {BG 4, 5}

A5 **Human actions threaten more species with global extinction now than ever before.** An average of around 25 per cent of species in assessed animal and plant groups are threatened (Figure SPM.3), suggesting that around 1 million species already face extinction, many within decades, unless action is taken to reduce the intensity of drivers of biodiversity loss. Without such action, there will be a further acceleration in the global rate of species extinction, which is already at least tens to hundreds of times higher than it has averaged over the past 10 million years. {Figure SPM.4, BG 6}

A6 **Globally, local varieties and breeds of domesticated plants and animals are disappearing. This loss of diversity, including genetic diversity, poses a serious risk to global food security by undermining the resilience of many agricultural systems to threats such as pests, pathogens and climate change.** Fewer and fewer varieties and breeds of plants and animals are being cultivated, raised, traded and maintained around the world, despite many local efforts, which include those by indigenous peoples and local communities. By 2016, 559 of the 6,190 domesticated breeds of mammals used for food and agriculture (over 9 per cent) had become extinct and at least 1,000 more are threatened. In addition, many crop wild relatives that are important for long-term food security lack effective protection, and the conservation status of wild relatives of domesticated mammals and birds is worsening. Reductions in the diversity of cultivated crops, crop wild relatives and domesticated breeds mean that agroecosystems are less resilient against future climate change, pests and pathogens.

A7 **Biological communities are becoming more similar to each other in both managed and unmanaged systems within and across regions.** This human-caused process leads to losses of local biodiversity, including endemic species, ecosystem functions and nature's contributions to people.

A8 **Human-induced changes are creating conditions for fast biological evolution - so rapid that its effects can be seen in only a few years or even more quickly. The consequences can be positive or negative for biodiversity and ecosystems, but can create uncertainty about the sustainability of species, ecosystem functions and the delivery of nature's contributions to people.** Understanding and monitoring these biological evolutionary changes is as important for informed policy decisions as it is in cases of ecological change. Sustainable management strategies then can be designed to influence evolutionary trajectories so as to protect vulnerable species and reduce the impact of unwanted species (such as weeds, pests or pathogens). The widespread declines in geographic distribution and population sizes of many species make clear that, although evolutionary adaptation to human-caused drivers can be rapid, it has often not been sufficient to mitigate them fully.

[2] Value adjusted to 2015 United States dollars, taking into account inflation only.

B. Direct and indirect drivers of change have accelerated during the past 50 years

The rate of global change in nature during the past 50 years is unprecedented in human history. The direct drivers of change in nature with the largest global impact have been (starting with those with most impact): changes in land and sea use; direct exploitation of organisms; climate change; pollution; and invasion of alien species. Those five direct drivers result from an array of underlying causes – the indirect drivers of change – which are in turn underpinned by societal values and behaviours that include production and consumption patterns, human population dynamics and trends, trade, technological innovations and local through global governance. The rate of change in the direct and indirect drivers differs among regions and countries.

B1 **For terrestrial and freshwater ecosystems, land-use change has had the largest relative negative impact on nature since 1970, followed by the direct exploitation, in particular overexploitation, of animals, plants and other organisms, mainly via harvesting, logging, hunting and fishing. In marine ecosystems, direct exploitation of organisms (mainly fishing) has had the largest relative impact, followed by land-/sea-use change**. Agricultural expansion is the most widespread form of land-use change, with over one third of the terrestrial land surface being used for cropping or animal husbandry. This expansion, alongside a doubling of urban area since 1992 and an unprecedented expansion of infrastructure linked to growing population and consumption, has come mostly at the expense of forests (largely old-growth tropical forests), wetlands and grasslands. In freshwater ecosystems, a series of combined threats that include land-use change, including water extraction, exploitation, pollution, climate change and invasive species, are prevalent. Human activities have had a large and widespread impact on the world's oceans. These include direct exploitation, in particular overexploitation, of fish, shellfish and other organisms, land- and sea-based pollution, including from river networks, and land-/sea-use change, including coastal development for infrastructure and aquaculture.

B2 **Climate change is a direct driver that is increasingly exacerbating the impact of other drivers on nature and human well-being.** Humans are estimated to have caused an observed warming of approximately 1°C by 2017 relative to pre-industrial levels, with average temperatures over the past 30 years rising by 0.2°C per decade. The frequency and intensity of extreme weather events, and the fires, floods and droughts that they can bring, have increased in the past 50 years, while the global average sea level has risen by between 16 and 21 cm since 1900, and at a rate of more than 3 mm per year over the past two decades. These changes have contributed to widespread impacts in many aspects of biodiversity, including species distribution, phenology, population dynamics, community structure and ecosystem function. According to observational evidence, the effects are accelerating in marine, terrestrial and freshwater ecosystems and are already impacting agriculture, aquaculture, fisheries and nature's contributions to people. The compounding effects of drivers such as climate change, land-/sea-use change, overexploitation of resources, pollution and invasive alien species are likely to exacerbate the negative impacts on nature, as seen in different ecosystems including coral reefs, the Arctic systems and savannas.

B3 **Many types of pollution, as well as invasive alien species, are increasing, with negative impacts for nature.** Although global trends are mixed, air, water and soil pollution have continued to increase in some areas. Marine plastic pollution in particular has increased tenfold since 1980, affecting at least 267 species, including 86 per cent of marine turtles, 44 per cent of seabirds and 43 per cent of marine mammals. This can affect humans through food chains. Greenhouse gas emissions, untreated urban and rural waste, pollutants from industrial, mining and agricultural activities, oil spills and toxic dumping have had strong negative effects on soil, freshwater and marine water quality and on the global atmosphere. Cumulative records of alien species have increased by 40 per cent since 1980, associated with increased trade and human population dynamics and trends. Nearly one fifth of the Earth's surface is at risk of plant and animal invasions, impacting native species, ecosystem functions and nature's contributions to people, as well as economies and human health. The rate of introduction of new invasive alien species seems higher than ever before and shows no signs of slowing.

B4 **In the past 50 years, the human population has doubled, the global economy has grown nearly fourfold and global trade has grown tenfold, together driving up the demand for energy and materials.** A variety of economic, political and social factors, including global trade and the spatial decoupling of production from consumption, have shifted the economic and environmental gains and losses of production and consumption, contributing to new economic opportunities, but also to impacts on nature and its contributions to people. Levels of consumption of material goods (food, feed, timber and fibre) vary greatly, and unequal access to material goods can be associated with inequity and may lead to social conflict. Economic exchange contributes to aggregate economic

development, yet often is negotiated between actors and institutions of unequal power, which influences the distribution of benefits and long-term impacts. Countries at different levels of development have experienced different levels of deterioration of nature for any given gain in economic growth. Exclusion, scarcity and/or the unequal distribution of nature's contributions to people may fuel social instability and conflict in a complex interaction with other factors. Armed conflicts have an impact on ecosystems beyond their destabilizing effects on societies, and a range of indirect impacts, including the displacement of people and activities.

B5 **Economic incentives have generally favoured expanding economic activity, and often environmental harm, over conservation or restoration. Incorporating the consideration of the multiple values of ecosystem functions and of nature's contribution to people into economic incentives has, in the economy, been shown to permit better ecological, economic and social outcomes.** Local, national, regional and global governance initiatives have improved outcomes in this way by supporting policies, innovation and the elimination of environmentally harmful subsidies, introducing incentives in line with the value of nature's contribution to people, increasing sustainable land-/sea-use management and enforcing regulations, among other measures. Harmful economic incentives and policies associated with unsustainable practices in fisheries, aquaculture, agriculture (including fertilizer and pesticide use), livestock management, forestry, mining and energy (including fossil fuels and biofuels) are often associated with land-/sea-use change and overexploitation of natural resources, as well as inefficient production and waste management. Vested interests may oppose the removal of subsidies or the introduction of other policies. Yet policy reforms to deal with such causes of environmental harm offer the potential to both conserve nature and provide economic benefits, including when policies are based on more and better understanding of the multiple values of nature's contributions.

B6 **Nature managed by indigenous peoples and local communities is under increasing pressure. Nature is generally declining less rapidly in indigenous peoples' land than in other lands, but is nevertheless declining, as is the knowledge of how to manage it. At least a quarter of the global land area is traditionally owned, managed,[3] used or occupied by indigenous peoples.** These areas include approximately 35 per cent of the area that is formally protected and approximately 35 per cent of all remaining terrestrial areas with very low human intervention. In addition, a diverse array of local communities, including farmers, fishers, herders, hunters, ranchers and forest users, manage significant areas under various property and access regimes. Among the local indicators developed and used by indigenous peoples and local communities, 72 per cent show negative trends in nature that underpin local livelihoods and well-being. The areas managed (under various types of tenure and access regimes) by indigenous peoples and local communities are facing growing resource extraction, commodity production, mining and transport and energy infrastructure, with various consequences for local livelihoods and health. Some climate change mitigation programmes have had negative impacts on indigenous peoples and local communities. The negative impacts of all these pressures include continued loss of subsistence and traditional livelihoods resulting from ongoing deforestation, loss of wetlands, mining, the spread of unsustainable agriculture, forestry and fishing practices and impacts on health and well-being from pollution and water insecurity. These impacts also challenge traditional management, the transmission of indigenous and local knowledge, the potential for sharing of benefits arising from the use of, and the ability of indigenous peoples and local communities to conserve and sustainably manage, wild and domesticated biodiversity that are also relevant to broader society.

C. Goals for conserving and sustainably using nature and achieving sustainability cannot be met by current trajectories, and goals for 2030 and beyond may only be achieved through transformative changes[4] across economic, social, political and technological factors

Past and ongoing rapid declines in biodiversity, ecosystem functions and many of nature's contributions to people mean that most international societal and environmental goals, such as those embodied in the Aichi Biodiversity Targets and the 2030 Agenda for Sustainable Development, will not be achieved based on current trajectories. These declines will also undermine other goals, such as those specified in the Paris Agreement adopted under the United Nations Framework Convention on Climate Change and the 2050 Vision for

[3] These data sources define land management here as the process of determining the use, development and care of land resources in a manner that fulfils material and non-material cultural needs, including livelihood activities such as hunting, fishing, gathering, resource harvesting, pastoralism and small-scale agriculture and horticulture.

[4] A fundamental, system-wide reorganization across technological, economic and social factors, including paradigms, goals and values.

Biodiversity. The negative trends in biodiversity and ecosystem functions are projected to continue or worsen in many future scenarios in response to indirect drivers such as rapid human population growth, unsustainable production and consumption and associated technological development. In contrast, scenarios and pathways that explore the effects of low-to-moderate population growth, and transformative changes in the production and consumption of energy, food, feed, fibre and water, sustainable use, equitable sharing of the benefits arising from use and nature-friendly climate adaptation and mitigation will better support the achievement of future societal and environmental objectives.

C1 **The implementation of policy responses and actions to conserve nature and manage it more sustainably has progressed, yielding positive outcomes relative to scenarios of no intervention, but progress is not sufficient to stem the direct and indirect drivers of nature deterioration. It is therefore likely that most of the Aichi Biodiversity Targets for 2020 will be missed.** Some of the Aichi Biodiversity Targets will be partially achieved, for example those related to policy responses, such as the spatial extent of terrestrial and marine protected areas, the identification and prioritization of invasive alien species, national biodiversity strategies and action plans, and the Nagoya Protocol on Access to Genetic Resources and the Fair and Equitable Sharing of Benefits Arising from their Utilization to the Convention on Biological Diversity. However, while protected areas now cover 15 per cent of terrestrial and freshwater environments and 7 per cent of the marine realm, they only partly cover important sites for biodiversity and are not yet fully ecologically representative and effectively or equitably managed. There has been significant growth in official development assistance in support of the Convention on Biological Diversity and in funding provided by the Global Environment Facility, with biodiversity aid flows reaching $8.7 billion annually. However, current resource mobilization from all sources is not sufficient to achieve the Aichi Biodiversity Targets. In addition, only one in five of the strategic objective and goals across six global agreements[5] relating to nature and the protection of the global environment are demonstrably on track to be met. For nearly one third of the goals of these conventions, there has been little or no progress towards them or, instead, movement away from them.

C2 **Nature is essential for achieving the Sustainable Development Goals. However, taking into consideration that the Sustainable Development Goals are integrated, indivisible, and nationally implemented, current negative trends in biodiversity and ecosystems will undermine progress towards 80 per cent (35 out of 44) of the assessed targets of Goals related to poverty, hunger, health, water, cities, climate, oceans and land (Sustainable Development Goals 1, 2, 3, 6, 11, 13, 14, and 15).** Important positive synergies between nature and the Goals related to education, gender equality, reducing inequalities and promoting peace and justice (Sustainable Development Goals 4, 5, 10 and 16) were found. Land or resource tenure insecurity, as well as declines in nature, have greater impacts on women and girls, who are most often negatively impacted. However, the current focus and wording of the targets of these Goals obscures or omits their relationship to nature, thereby preventing their assessment here. There is a critical need for future policy targets, indicators and datasets to more explicitly account for aspects of nature and their relevance to human well-being in order to more effectively track the consequences of trends in nature on the Sustainable Development Goals. Some pathways chosen to achieve the Goals related to energy, economic growth, industry and infrastructure, and sustainable consumption and production (Sustainable Development Goals 7, 8, 9 and 12), as well as the targets related to poverty, food security and cities (Sustainable Development Goals 1, 2 and 11), could have substantial positive or negative impacts on nature and therefore on the achievement of the other Sustainable Development Goals.

C3 **Areas of the world projected to experience significant negative effects from global changes in climate, biodiversity, ecosystem functions and nature's contributions to people are also home to large concentrations of indigenous peoples and many of the world's poorest communities.** Because of their strong dependency on nature and its contributions for subsistence, livelihoods and health, those communities will be disproportionately hard-hit by those negative changes. Those negative effects also influence the ability of indigenous peoples and local communities to manage and conserve wild and domesticated biodiversity and nature's contributions to people. Indigenous peoples and local communities have been proactively confronting such challenges in partnership with each other and with an array of other stakeholders, through co-management systems and local and regional monitoring networks and by revitalizing and adapting local management systems. Regional and global

[5] Convention on the Conservation of Migratory Species of Wild Animals, Convention on International Trade in Endangered Species of Wild Fauna and Flora, Convention concerning the Protection of the World Cultural and Natural Heritage, International Plant Protection Convention, United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, and Convention on Wetlands of International Importance especially as Waterfowl Habitat.

scenarios lack an explicit consideration of the views, perspectives and rights of indigenous peoples and local communities, their knowledge and understanding of large regions and ecosystems, and their desired future development pathways.

C4 **Except in scenarios that include transformative change, negative trends in nature, in ecosystem functions and in many of nature's contributions to people are projected to continue to 2050 and beyond, due to the projected impacts of increasing land-/and sea-use change, exploitation of organisms and climate change**. Negative impacts arising from pollution and invasive alien species will likely exacerbate these trends. There are large regional differences in the projected patterns of future biodiversity and ecosystem functions and in the losses and changes in nature's contributions to people. These differences arise from the direct and indirect drivers of change, which are projected to impact regions in different ways. While regions worldwide face further declines in biodiversity in future projections, tropical regions face particular combined risks of declines due to the interactions between climate change, land-use change and fisheries exploitation. Marine and terrestrial biodiversity in boreal, subpolar and polar regions is projected to decline mostly because of warming, sea ice retreat and enhanced ocean acidification. The magnitude of the impacts and the differences between regions are much greater in scenarios with rapid increases in consumption or human population than in scenarios based on sustainability. Acting immediately and simultaneously on the multiple indirect and direct drivers has the potential to slow, halt and even reverse some aspects of biodiversity and ecosystem loss.

C5 **Climate change is projected to become increasingly important as a direct driver of changes in nature and its contributions to people in the next decades. Scenarios show that meeting the Sustainable Development Goals and the 2050 Vision for Biodiversity depends on taking into account climate change impacts in the definition of future goals and objectives**. The future impacts of climate change are projected to become more pronounced in the next decades, with variable relative effects depending on scenario and geographic region. Scenarios project mostly adverse climate change effects on biodiversity and ecosystem functioning, which worsen, in some cases exponentially, with incremental global warming. Even for global warming of 1.5°C to 2°C, the majority of terrestrial species ranges are projected to shrink dramatically. Changes in ranges can adversely affect the capacity of terrestrial protected areas to conserve species, greatly increase local species turnover and substantially increase the risk of global extinctions. For example, a synthesis of many studies estimates that the fraction of species at risk of climate-related extinction is 5 per cent at 2°C warming and rises to 16 per cent at 4.3°C warming. Coral reefs are particularly vulnerable to climate change and are projected to decline to 10 to 30 per cent of former cover at 1.5°C warming and to less than 1 per cent of former cover at 2°C warming. Therefore, scenarios show that limiting global warming to well below 2°C plays a critical role in reducing adverse impacts on nature and its contributions to people.

D. Nature can be conserved, restored and used sustainably while other global societal goals are simultaneously met through urgent and concerted efforts fostering transformative change

Societal goals, including those related to food, water, energy, health and the achievement of human well-being for all, mitigating and adapting to climate change and conserving and sustainably using nature, can be achieved in sustainable pathways through the rapid and improved deployment of existing policy instruments and new initiatives that more effectively enlist individual and collective action for transformative change. Since current structures often inhibit sustainable development and actually represent the indirect drivers of biodiversity loss, such fundamental, structural change is called for. By its very nature, transformative change can expect opposition from those with interests vested in the status quo, but such opposition can be overcome for the broader public good. If obstacles are overcome, a commitment to mutually supportive international goals and targets, supporting actions by indigenous peoples and local communities at the local level, new frameworks for private sector investment and innovation, inclusive and adaptive governance approaches and arrangements, multi-sectoral planning, and strategic policy mixes can help to transform the public and private sectors to achieve sustainability at the local, national and global levels.

D1 **The global environment can be safeguarded through enhanced international cooperation and linked, locally relevant measures. The review and renewal of internationally agreed environment-related goals and targets, based on the best available scientific knowledge and the widespread adoption and funding of action on conservation, ecological restoration and sustainable use by all actors, including individuals, are key to this safeguarding.** Such widespread adoption implies advancing and aligning local, national and international sustainability efforts and mainstreaming biodiversity and sustainability across all extractive and productive sectors, including

mining, fisheries, forestry and agriculture, so that together, individual and collective actions result in a reversal of the deterioration of ecosystem services at the global level. Yet these bold changes to the direct drivers of the deterioration of nature cannot be achieved without transformative change that simultaneously addresses the indirect drivers.

D2 **Five main interventions ("levers") can generate transformative change by tackling the underlying indirect drivers of the deterioration of nature: (1) incentives and capacity-building; (2) cross-sectoral cooperation; (3) pre-emptive action; (4) decision-making in the context of resilience and uncertainty; and (5) environmental law and implementation**. Using these levers will involve the following: (1) developing incentives and widespread capacity for environmental responsibility and eliminating perverse incentives; (2) reforming sectoral and segmented decision-making to promote integration across sectors and jurisdictions; (3) taking pre-emptive and precautionary actions in regulatory and management institutions and businesses to avoid, mitigate and remedy the deterioration of nature, and monitoring their outcomes; (4) managing for resilient social and ecological systems in the face of uncertainty and complexity, to deliver decisions that are robust in a wide range of scenarios; and (5) strengthening environmental laws and policies and their implementation, and the rule of law more generally. All five levers may require new resources, particularly in low-capacity contexts, such as in many developing countries.

D3 **Transformations towards sustainability are more likely when efforts are directed at the following key leverage points, where efforts yield exceptionally large effects (Figure SPM.9): (1) visions of a good life; (2) total consumption and waste; (3) values and action; (4) inequalities; (5) justice and inclusion in conservation; (6) externalities and telecouplings; (7) technology, innovation and investment; and (8) education and knowledge generation and sharing.** Specifically, the following changes are mutually reinforcing: (1) enabling visions of a good quality of life that do not entail ever-increasing material consumption; (2) lowering total consumption and waste, including by addressing both population growth and per capita consumption differently in different contexts; (3) unleashing existing, widely-held values of responsibility to effect new social norms for sustainability, especially by extending notions of responsibility to include the impacts associated with consumption; (4) addressing inequalities, especially regarding income and gender, which undermine the capacity for sustainability; (5) ensuring inclusive decision-making and the fair and equitable sharing of benefits arising from the use of and adherence to human rights in conservation decisions; (6) accounting for nature deterioration from local economic activities and socioeconomic and environmental interactions over distances (telecouplings), including, for example, international trade; (7) ensuring environmentally friendly technological and social innovation, taking into account potential rebound effects and investment regimes; and (8) promoting education, knowledge generation and the maintenance of different knowledge systems, including in the sciences and indigenous and local knowledge, regarding nature, conservation and its sustainable use.

D4 **The character and trajectories of transformation will vary across contexts, with challenges and needs differing, among others, in developing and developed countries. Risks related to the inevitable uncertainties and complexities in transformations towards sustainability can be reduced through governance approaches that are integrative, inclusive, informed and adaptive**. Such approaches typically take into account the synergies and trade-offs between societal goals and alternative pathways and recognize a plurality of values, diverse economic conditions, inequity, power imbalances and vested interests in society. Risk-reducing strategies typically include learning from experience that is based on a combination of precautionary measures and existing and emerging knowledge. These approaches involve stakeholders in the coordination of policies across sectors and in the creation of strategic, locally relevant mixes of successful policy instruments. The private sector can play a role in partnership with other actors, including national and subnational governments and civil society; for example, public-private partnerships in the water sector have been an important vehicle for financing investments to meet the Sustainable Development Goals. Some effective policy measures include the expansion and strengthening of ecologically representative, well-connected protected-area networks and of other effective area-based conservation measures; the protection of watersheds; and incentives and sanctions to reduce pollution {Table SPM.1}.

D5 **Recognizing the knowledge, innovations, practices, institutions and values of indigenous peoples and local communities, and ensuring their inclusion and participation in environmental governance, often enhances their quality of life and the conservation, restoration and sustainable use of nature, which is relevant to broader society. Governance, including customary institutions and management systems and co-management regimes that involve indigenous peoples and local communities, can be an effective way to safeguard nature and its contributions to people by incorporating locally attuned management systems and indigenous and local knowledge**. The positive contributions of indigenous peoples and local communities to sustainability can be facilitated through national recognition of land tenure, access and resource rights in accordance with national

legislation, the application of free, prior and informed consent, and improved collaboration, fair and equitable sharing of benefits arising from the use, and co-management arrangements with local communities.

D6 **Feeding humanity and enhancing the conservation and sustainable use of nature are complementary and closely interdependent goals that can be advanced through sustainable agriculture, aquaculture and livestock systems, the safeguarding of native species, varieties, breeds and habitats, and ecological restoration.** Specific actions include promoting sustainable agricultural and agroecological practices, such as multifunctional landscape planning and cross-sectoral integrated management, that support the conservation of genetic diversity and the associated agricultural biodiversity. Further actions to simultaneously achieve food security, biodiversity protection and sustainable use are context-appropriate climate change mitigation and adaptation; incorporating knowledge from various systems, including the sciences and sustainable indigenous and local practices; avoiding food waste; empowering producers and consumers to transform supply chains; and facilitating sustainable and healthy dietary choices. As part of integrated landscape planning and management, prompt ecological restoration, emphasizing the use of native species, can offset the current degradation and save many endangered species, but is less effective if delayed.

D7 **Sustaining and conserving fisheries and marine species and ecosystems can be achieved through a coordinated mix of interventions on land, in freshwater and in the oceans, including multilevel coordination across stakeholders on the use of open oceans**. Specific actions could include, for example, ecosystem-based approaches to fisheries management, spatial planning, effective quotas, marine protected areas, protecting and managing key marine biodiversity areas, reducing run-off pollution into oceans and working closely with producers and consumers {Table SPM.1}. It is important to enhance capacity-building for the adoption of best fisheries management practices; adopt measures to promote conservation financing and corporate social responsibility; develop new legal and binding instruments; implement and enforce global agreements for responsible fisheries; and urgently take all steps necessary to prevent, deter and eliminate illegal, unreported and unregulated fishing.

D8 **Land-based climate change mitigation activities can be effective and support conservation goals {Table SPM.1}. However, the large-scale deployment of bioenergy plantations and afforestation of non-forest ecosystems can come with negative side effects for biodiversity and ecosystem functions.** Nature-based solutions with safeguards are estimated to provide 37 per cent of climate change mitigation until 2030 needed to meet the goal of keeping climate warming below 2°C, with likely co-benefits for biodiversity. Therefore, land-use actions are indispensable, in addition to strong actions to reduce greenhouse gas emissions from fossil fuel use and other industrial and agricultural activities. However, the large-scale deployment of intensive bioenergy plantations, including monocultures, replacing natural forests and subsistence farmlands, will likely have negative impacts on biodiversity and can threaten food and water security as well as local livelihoods, including by intensifying social conflict.

D9 **Nature-based solutions can be cost-effective for meeting the Sustainable Development Goals in cities, which are crucial for global sustainability.** Increased use of green infrastructure and other ecosystem-based approaches can help to advance sustainable urban development while reinforcing climate mitigation and adaptation. Urban key biodiversity areas should be safeguarded. Solutions can include retrofitting green and blue infrastructure, such as creating and maintaining green spaces and biodiversity-friendly water bodies, urban agriculture, rooftop gardens and expanded and accessible vegetation cover in existing urban and peri-urban areas and new developments. Green infrastructure in urban and surrounding rural areas can complement large-scale “grey infrastructure” in areas such as flood protection, temperature regulation, cleaning of air and water, treating wastewater and the provision of energy, locally sourced food and the health benefits of interaction with nature.

D10 **A key component of sustainable pathways is the evolution of global financial and economic systems to build a global sustainable economy, steering away from the current, limited paradigm of economic growth.** That implies incorporating the reduction of inequalities into development pathways, reducing overconsumption and waste and addressing environmental impacts, such as externalities of economic activities, from the local to the global scales. Such an evolution could be enabled through a mix of policies and tools (such as incentive programmes, certification and performance standards) and through more internationally consistent taxation, supported by multilateral agreements and enhanced environmental monitoring and evaluation. It would also entail a shift beyond standard economic indicators such as gross domestic product to include those able to capture more holistic, long-term views of economics and quality of life.

BACKGROUND

A. Nature and its vital contributions to people, which together embody biodiversity and ecosystem functions and services, are deteriorating worldwide

1. **Nature underpins quality of life by providing basic life support for humanity (regulating), as well as material goods (material) and spiritual inspiration (non-material) (*well established*) {2.3.1, 2.3.2}. Most of nature's contributions to people (NCP) are co-produced by biophysical processes and ecological interactions with anthropogenic assets such as knowledge, infrastructure, financial capital, technology and the institutions that mediate them (*well established*) {2.3.2}** (Appendix I). For example, marine and freshwater-based food is co-produced by the combination of fish populations, fishing gear, and access to fishing grounds {2.3.3}. There is unequal access to nature's contributions and unequal impact of nature's contributions on different social groups (*established but incomplete*) {2.3.5}. Furthermore, increases in the production of some of nature's contributions cause declines in others (Figure SPM.1) {2.3.2, 2.3.5}, which also affects people differently (*well established*). For example, clearing of forest for agriculture has increased the supply of food, feed, (NCP 12) and other materials important for people (such as natural fibres and ornamental flowers: NCP 13), but has reduced contributions as diverse as pollination (NCP 2), climate regulation (NCP 4), water quality regulation (NCP 7), opportunities for learning and inspiration (NCP 15) and the maintenance of options for the future (NCP 18). However, very few large-scale systematic studies exist on those relationships {2.3.2}. Land degradation has reduced productivity in 23 per cent of the global terrestrial area, and between $235 billion and $577 billion in annual global crop output is at risk as a result of pollinator loss {2.3.5.3} *(established but incomplete).*

Figure 1. Global trends in the capacity of nature to sustain contributions to good quality of life from 1970 to the present, which show a decline for 14 of the 18 categories of nature's contributions to people analysed. Data supporting global trends and regional variations come from a systematic review of over 2,000 studies {2.3.5.1}. Indicators were selected on the basis of availability of global data, prior use in assessments and alignment with 18 categories. For many categories of nature's contributions, two indicators are included that show different aspects of nature's capacity to contribute to human well-being within that category. Indicators are defined so that an increase in the indicator is associated with an improvement in nature's contributions.

2. **Many of nature's contributions to people are essential for human health (*well established*) and their decline thus threatens a good quality of life (*established but incomplete*) {2.3.4}.** Nature provides a broad diversity of nutritious foods, medicines and clean water *(well established)* {2.3.5.2, 3.3.2.1, 3.3.2.2 (Sustainable Development Goal 3)}; can help to regulate disease and the immune system {2.3.4.2}; can reduce levels of certain air pollutants (*established but incomplete*) {2.3.4.2, 3.3.2.2}; and can improve mental and physical health through exposure to natural areas *(inconclusive)*, among other contributions {2.3.2.2, 2.3.4.2, 3.3.2.2 (Sustainable Development Goal 3)}. Nature is the

origin of most infectious diseases (negative impact), but also the source of medicines and antibiotics for treatment (positive contribution) (*well established*). Zoonotic diseases are significant threats to human health, with vector-borne diseases accounting for approximately 17 per cent of all infectious diseases and causing an estimated 700,000 deaths globally per annum *(established but incomplete)* {3.3.2.2}. Emerging infectious diseases in wildlife, domestic animals, plants or people can be exacerbated by human activities such as land clearing and habitat fragmentation (*established but incomplete*) or the overuse of antibiotics driving rapid evolution of antibiotic resistance in many bacterial pathogens *(well established)* {3.3.2.2}. The deterioration of nature and consequent disruption of benefits to people has both direct and indirect implications for public health (*well established*) {2.3.5.2} and can exacerbate existing inequalities in access to health care or healthy diets (*established but incomplete*) {2.3.4.2}. Shifting diets towards a diversity of foods, including fish, fruit, nuts and vegetables, significantly reduces the risk of certain preventable non-communicable diseases, which are currently responsible for 20 per cent of premature mortality globally (*well established*) {2.3.4.2, 2.3.5.2 (NCP 2 and 12)}.

3. **Most of nature's contributions are not fully replaceable, yet some contributions of nature are irreplaceable (*well established*).** Loss of diversity, such as phylogenetic and functional diversity, can permanently reduce future options, such as wild species that might be domesticated as new crops and be used for genetic improvement {2.3.5.3}. People have created substitutes for some other contributions of nature, but many of them are imperfect or financially prohibitive {2.3.2.2}. For example, high-quality drinking water can be realized either through ecosystems that filter pollutants or through human-engineered water treatment facilities {2.3.5.3}. Similarly, coastal flooding from storm surges can be reduced either by coastal mangroves or by dikes and sea walls {2.3.5.3}. In both cases, however, built infrastructure can be extremely expensive, incur high future costs and fail to provide synergistic benefits such as nursery habitats for edible fish or recreational opportunities {2.3.5.2}. More generally, human-made replacements often do not provide the full range of benefits provided by nature {2.3.2.2} (Figure SPM.1).

4. **Humanity is a dominant global influence on life on earth, and has caused natural terrestrial, freshwater and marine ecosystems to decline (*well established*) {2.2.5.2}** (Figure SPM.2). Global indicators of ecosystem extent and condition have shown a decrease by an average of 47 per cent of their estimated natural baselines, with many continuing to decline by at least 4 per cent per decade *(established but incomplete)* {2.2.5.2.1}. On land, particularly sensitive ecosystems include old-growth forests, insular ecosystems, and wetlands; and only around 25 per cent of land is sufficiently unimpacted that ecological and evolutionary processes still operate with minimal human intervention (*established but incomplete*) {2.2.3.4.1, 2.2.5.2.1}. In terrestrial "hotspots" of endemic species, natural habitats have generally undergone greater reductions to date in extent and condition, and tend to be experiencing more rapid ongoing decline, on average than other terrestrial regions {2.2.5.2.1}. Globally, the net rate of forest loss has halved since the 1990s, largely because of net increases in temperate and high latitude forests; high-biodiversity tropical forests continue to dwindle, and global forest area is now approximately 68 per cent of the estimated pre-industrial level *(established but incomplete)* {2.2.5.2.1}. Forests and natural mosaics sufficiently undamaged to be classed as "intact" (defined as being larger than 500 km^2 where satellites can detect no human pressure) were reduced by 7 per cent (919, 000 km2) between 2000 and 2013, shrinking in both developed and developing countries {2.2.5.2.1}. Inland waters and freshwater ecosystems show among the highest rates of decline. Only 13 per cent of the wetland present in 1700 remained by 2000; recent losses have been even more rapid (0.8 per cent per year from 1970 to 2008) *(established but incomplete)* {2.2.7.9}.

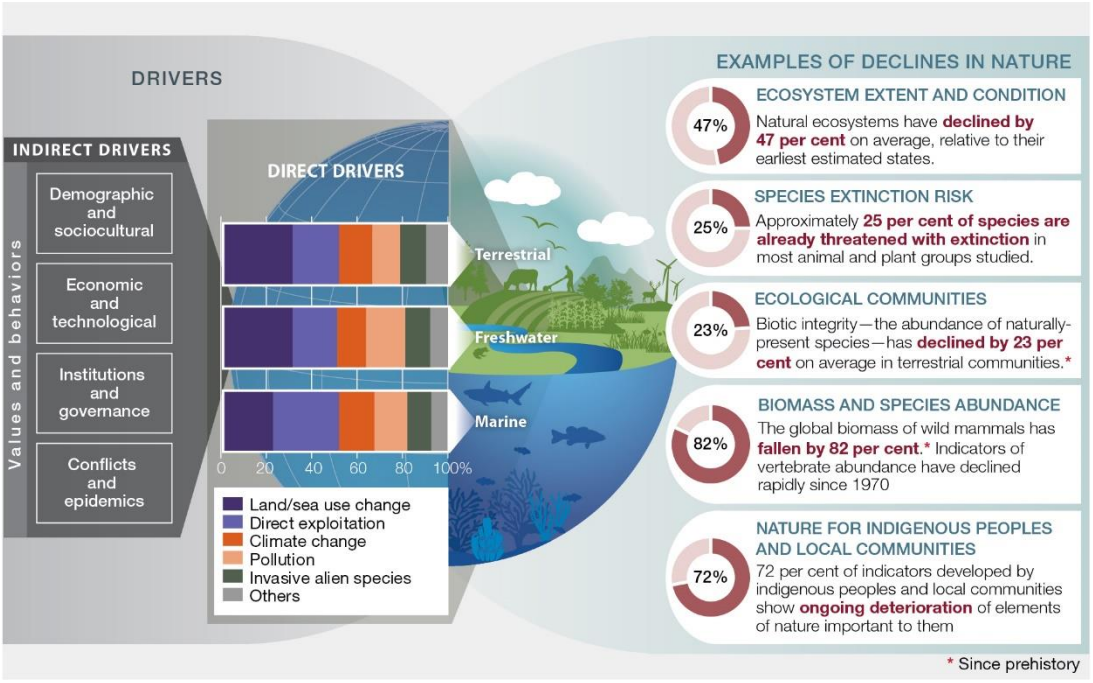


Figure 2. Examples of global declines in nature, emphasizing declines in biodiversity, that have been and are being caused by direct and indirect drivers of change. The direct drivers (land-/sea-use change; direct exploitation of organisms; climate change; pollution; and invasive alien species)[6] result from an array of underlying societal causes[7]. These causes can be demographic (e.g., human population dynamics), sociocultural (e.g., consumption patterns), economic (e.g., trade), technological, or relating to institutions, governance, conflicts and epidemics. They are called indirect drivers[8] and are underpinned by societal values and behaviours. The colour bands represent the relative global impact of direct drivers, from top to bottom, on terrestrial, freshwater and marine nature, as estimated from a global systematic review of studies published since 2005. Land- and sea-use change and direct exploitation account for more than 50 per cent of the global impact on land, in fresh water and in the sea, but each driver is dominant in certain contexts {2.2.6}. The circles illustrate the magnitude of the negative human impacts on a diverse selection of aspects of nature over a range of different time scales based on a global synthesis of indicators {2.2.5, 2.2.7}.

5. **Marine ecosystems, from coastal to deep sea, now show the influence of human actions, with coastal marine ecosystems showing both large historical losses of extent and condition as well as rapid ongoing declines (*established but incomplete*) {2.2.5.2.1, 2.2.7.15}** (Figure SPM.2). Over 40 per cent of ocean area was strongly affected by multiple drivers in 2008, and 66 per cent was experiencing increasing cumulative impacts in 2014. Only 3 per cent of the ocean was described as free from human pressure in 2014 *(established but incomplete)* {2.2.5.2.1, 3.2.1}. Seagrass meadows decreased in extent by over 10 per cent per decade from 1970 to 2000 *(established but incomplete)* {2.2.5.2.1}. Live coral cover on reefs has nearly halved in the past 150 years, the decline dramatically accelerating over the past two or three decades due to increased water temperature and ocean acidification interacting with and further exacerbating other drivers of loss *(well established)* {2.2.5.2.1}. These coastal marine ecosystems are among the most productive systems globally, and their loss and deterioration reduce their ability to protect shorelines, and the people and species that live there, from storms, as well as their ability to provide sustainable livelihoods *(well established)* {2.2.5.2.1, 2.3.5.2}. Severe impacts to ocean ecosystems are illustrated by 33 per cent of fish stocks being classified as overexploited and greater than 55 per cent of ocean area being subject to industrial fishing (*established but incomplete*) {2.1.11.1; 2.2.5.2.4, 2.2.7.16}.

6. **The global rate of species extinction is already at least tens to hundreds of times higher than the average rate over the past 10 million years and is accelerating (*established but incomplete*) {2.2.5.2.4}** (Figure SPM.3). Human actions have already driven at least 680 vertebrate species to extinction since 1500, including the Pinta Giant Tortoise in the Galapagos in 2012, even though successful conservation efforts have saved from extinction at least 26 bird species and 6 ungulate species, including the Arabian Oryx and Przewalski's Horse {3.2.1}. The threat of extinction is also accelerating: in the best-studied taxonomic groups, most of the total extinction risk to species is estimated to have arisen in the past 40 years (*established but incomplete*) {2.2.5.2.4}. The proportion

[6] The classification of direct drivers used throughout this assessment is in {2.1.12 - 2.1.17}

[7] The interactions among indirect and direct drivers are addressed in {2.1.11, 2.1.18}

[8] The classification of indirect drivers used throughout this assessment is in {2.1.12 - 2.1.17}

of species currently threatened with extinction according to the International Union for the Conservation of Nature's Red List criteria averages around 25 per cent across the many terrestrial, freshwater and marine vertebrate, invertebrate and plant groups that have been studied in sufficient detail to support a robust overall estimate (*established but incomplete*) {2.2.5.2.4, 3.2}. More than 40 per cent of amphibian species, almost a third of reef-forming corals, sharks and shark relatives and over a third of marine mammals are currently threatened {2.2.5.2.4, 3}. The proportion of insect species threatened with extinction is a key uncertainty, but available evidence supports a tentative estimate of 10 per cent (established but incomplete) {2.2.5.2.4}. Those proportions suggest that, of an estimated 8 million animal and plant species (75 per cent of which are insects), around 1 million are threatened with extinction *(established but incomplete)* {2.2.5.2.4}. A similar picture also emerges from an entirely separate line of evidence. Habitat loss and deterioration, largely caused by human actions, have reduced global terrestrial habitat integrity by 30 per cent relative to an unimpacted baseline; combining that with the longstanding relationship between habitat area and species numbers suggests that around 9 per cent of the world's estimated 5.9 million terrestrial species – more than 500,000 species – have insufficient habitat for long-term survival, and are committed to extinction, many within decades, unless their habitats are restored *(established but incomplete)*{2.2.5.2.4}. Population declines often give warning that a species' risk of extinction is increasing. The Living Planet Index, which synthesises trends in vertebrate populations, shows that species have declined rapidly since 1970, with reductions of 40 per cent for terrestrial species, 84 per cent for freshwater species and 35 per cent for marine species *(established but incomplete)* {2.2.5.2.4}. Local declines of insect populations such as wild bees and butterflies have often been reported, and insect abundance has declined very rapidly in some places even without large-scale land-use change, but the global extent of such declines is not known *(established but incomplete)* {2.2.5.2.4}. On land, wild species that are endemic (narrowly distributed) have typically seen larger-than-average changes to their habitats and shown faster-than-average declines *(established but incomplete)* {2.2.5.2.3, 2.2.5.2.4}.

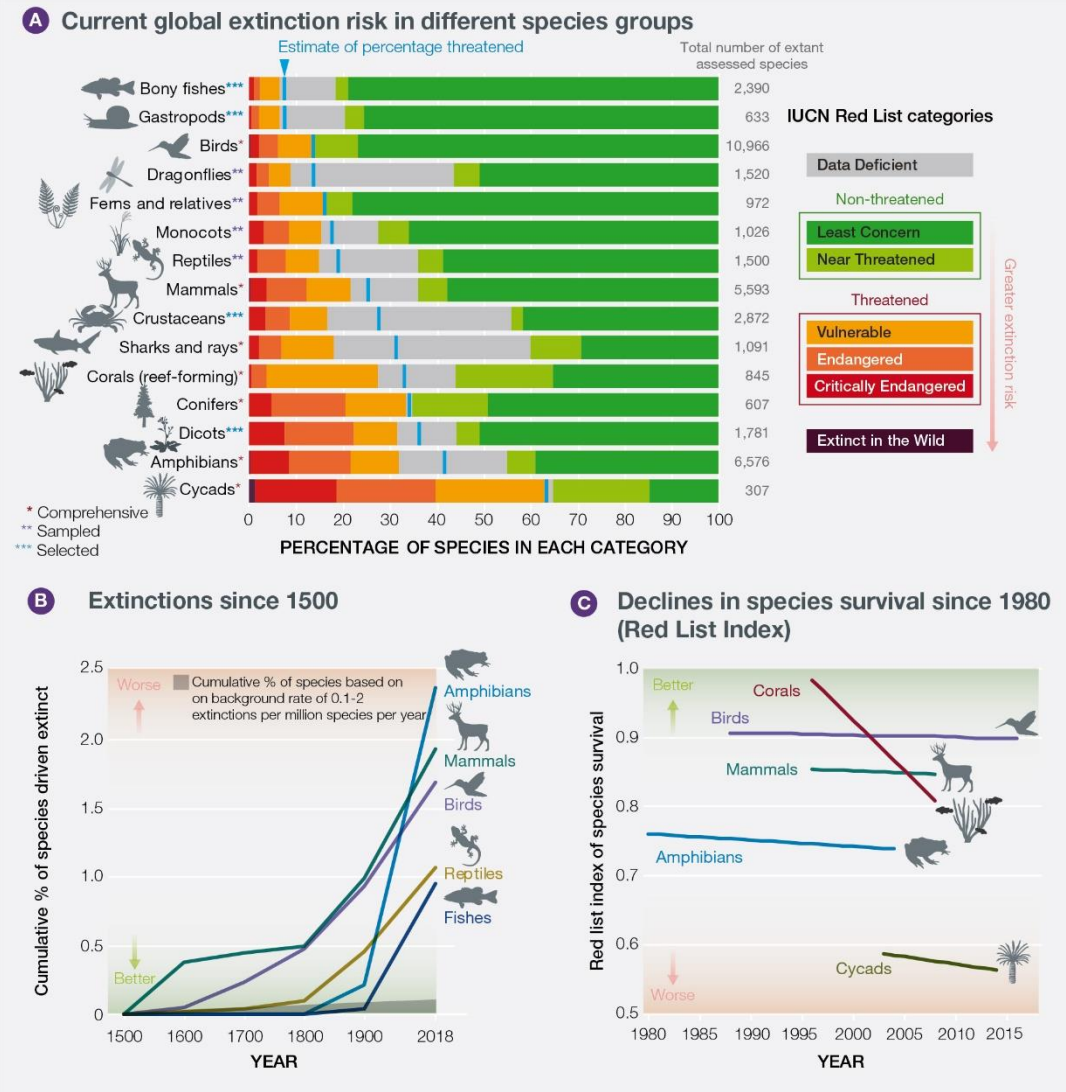


Figure 3. A substantial proportion of assessed species are threatened with extinction and overall trends are deteriorating, with extinction rates increasing sharply in the past century. (A) Percentage of species threatened with extinction in taxonomic groups that have been assessed comprehensively, or through a 'sampled' approach, or for which selected subsets have been assessed, by the International Union for Conservation of Nature (IUCN) Red List of Threatened Species. Groups are ordered according to the best estimate for the percentage of extant species considered threatened (shown by the vertical blue lines), assuming that data deficient species are as threatened as non-data deficient species. (B) Extinctions since 1500 for vertebrate groups. Rates for reptiles and fishes have not been assessed for all species. (C) Red List Index of species survival for taxonomic groups that have been assessed for the IUCN Red List at least twice. A value of 1 is equivalent to all species being categorized as Least Concern; a value of zero is equivalent to all species being classified as Extinct. Data for all panels derive from www.iucnredlist.org (see Chapter 3 Figure 3.4 and Chapter 2 Figure 2.7).

7. **The number of local varieties and breeds of domesticated plants and animals and their wild relatives has been reduced sharply as a result of land use change, knowledge loss, market preferences and large-scale trade (*well established*) {2.2.5.2.6, 2.2.5.3.1}**. Domestic varieties of plants and animals are the result of natural and human-managed selection, sometimes over centuries or millennia, and tend to show a high degree of adaptation (genotypic and phenotypic) to local conditions (*well established*) {2.2.4.4}. As a result, the pool of genetic variation which underpins food security has declined (*well established*) {2.2.5.2.6}. Ten per cent of domesticated breeds of mammals were recorded as extinct, as well as some 3.5 per cent of domesticated breeds of birds (*well established*) {2.2.5.2.6} Many hotspots of agrobiodiversity and crop wild relatives are also under threat or not formally protected. The conservation status of wild relatives of domesticated livestock has also deteriorated. These wild relatives represent critical reservoirs of genes and traits that may provide resilience against future climate change, pests and pathogens and may improve current heavily depleted gene pools of many crops and domestic animals {2.2.3.4.3}. The lands of indigenous peoples and local communities, including farmers, pastoralists and herders, are often important areas for in situ conservation of the remaining varieties and breeds (*well established*) {2.2.5.3.1}. Available data suggest that genetic diversity within wild species globally has been declining by about 1 per cent per decade since the mid-19th century; and genetic diversity within wild mammals and amphibians tends to be lower in areas where human influence is greater *(established but incomplete)* {2.2.5.2.6}.

8. **Human-driven changes in species diversity within local ecological communities vary widely, depending on the net balance between species loss and the influx of alien species, disturbance-tolerant species, other human-adapted species or climate migrant species (*well established*) {2.2.5.2.3}**. Even though human-dominated landscapes are sometimes species-rich, their species composition is markedly altered from that in natural landscapes (*well established*) {2.2.5.2.3, 2.2.7.10, 2.2.7.11}. As a result of human-caused changes in community composition, naturally occurring species in local terrestrial ecosystems worldwide are estimated to have lost at least 20 per cent of their original abundance on average, with hotspots of endemic species tending to have lost even more (*established but incomplete*) {2.2.5.2.3}. The traits of species influence whether they persist or even thrive in human-modified ecosystems (*well established*) {2.2.3.6, 2.2.5.2.5}. For example, species that are large, grow slowly, are habitat specialists or are carnivores – such as great apes, tropical hardwood trees, sharks and big cats – are disappearing from many areas. Many other species, including those with opposite characteristics, are becoming more abundant locally and are spreading quickly around the world; across a set of 21 countries with detailed records, the numbers of invasive alien species per country have risen by some 70 per cent since 1970 {2.2.5.2.3}. The effects of invasive alien species are often particularly severe for the native species and assemblages on islands and in other settings with high proportions of endemic species *(well established)* {2.2.3.4.1, 2.2.5.2.3}. Invasive alien species can have devastating effects on mainland assemblages as well: for example, a single invasive pathogen species, *Batrachochytrium dendrobatidis*, is a threat to nearly 400 amphibian species worldwide and has already caused a number of extinctions *(well established)* {2.2.5.2.3}. Many drivers add already widespread species to ecological communities in many places; and many drivers cause endemic species to decline in many places. These two processes have contributed to the widespread erosion of differences between ecological communities in different places, a phenomenon known as biotic homogenization or the "anthropogenic blender" (*well established)* {2.2.5.2.3}. The consequences of all these changes for ecosystem processes and hence nature's contributions to people can be very significant. For example, the decline and disappearance of large herbivores and predators has dramatically affected the structure, fire regimes, seed dispersal, land surface albedo and nutrient availability within many ecosystems *(well established)* {2.2.5.2.1}. However, the consequences of changes often depend on details of the ecosystem, remain hard to predict and are still understudied (*established but incomplete*) {2.2.5.2.3}.

9. **Many organisms show ongoing biological evolution so rapid that it is detectable within only a few years or even more quickly – in response to anthropogenic drivers (*well established*) {2.2.5.2.5, 2.2.5.2.6}. Management decisions that take those evolutionary changes into account will be noticeably more effective (*established but incomplete*) {Box 2.5}.** This human-driven contemporary evolution, which has long been recognized in microbes, viruses, agricultural insect pests and weeds (*well established*), is now being observed in some species within all major taxonomic groups (animals, plants, fungi and microorganisms). Such changes are known to occur in response to human activities or drivers, such as hunting, fishing, harvesting, climate change, ocean acidification, soil and water pollution, invasive species, pathogens, pesticides and urbanization (*established but incomplete*) {2.2.5.2.5}. However, management strategies typically assume that evolutionary changes occur only over much longer time periods and thus ignore rapid evolution. These policy considerations span many spheres in which management actions designed to slow or speed evolution can dramatically change outcomes, as the following examples indicate. Insects, weeds and pathogens evolve resistance to insecticides, herbicides and other control agents, yet management strategies such as refuges, crop rotation, and crop diversity can dramatically slow that undesirable evolution (*well established*) {Box 2.5}. Commercial fish populations have evolved to mature earlier under intensive harvesting, which sometimes can be minimized by mandating changes in fishing gear or fish size limits (*established but incomplete*) {2.2.5.2.5}. Climate change favours the evolution of seasonally earlier reproduction in many organisms, which can in principle be facilitated through the introduction of individuals from populations already adapted to such conditions (*established but incomplete*) {2.2.5.2.5}. Mosquitoes rapidly evolve resistance to efforts to control them, but evolutionarily informed management actions can dramatically slow that undesirable evolution (*established but incomplete*) {2.2.5.2.5}. Contemporary evolution is thus relevant to many policy concerns. Understanding and working with contemporary evolution can address important concerns surrounding pollination and dispersal, coral persistence in the face of ocean acidification, water quality, pest regulation, food production and options for the future (*established but incomplete*). The specific actions taken will typically be case-specific and therefore will require careful assessment of evolutionary potential and consequences. In many cases, the best strategy could be to simply maintain the ability of natural populations to respond evolutionarily on their own - rather than through direct human manipulation of evolution.

B. Direct and indirect drivers of change have accelerated during the past 50 years

10. **Today, humans extract more from the Earth and produce more waste than ever before *(well established*). Globally, land-use change is the direct driver with the largest relative impact on terrestrial and freshwater ecosystems, while direct exploitation of fish and seafood has the largest relative impact in the oceans (*well established*)** (Figure SPM.2) **{2.2.6.2}. Climate change, pollution and invasive alien species have had a lower relative impact to date but are accelerating (*established but incomplete*) {2.2.6.2, 3.2, 4.2}.** Although the pace of agricultural expansion into intact ecosystems {2.1.13} has varied from country to country, losses of intact ecosystems have occurred primarily in the tropics, home to the highest levels of biodiversity on the planet (for example, 100 million hectares of tropical forest from 1980 to 2000), due to cattle ranching in Latin America (~42 million ha) and plantations in South-East Asia (~7.5 million hectares, 80 per cent in oil palm) among others {2.1.13}, noting that plantations can also increase total forest area. Within land-use change, urban areas have more than doubled since 1992. In terms of direct exploitation, approximately 60 billion tons[9] of renewable and non-renewable resources {2.1.2} are being extracted each year. That total has nearly doubled since 1980, as population has grown considerably while the average per capita consumption of materials (e.g., plants, animals, fossil fuels, ores, construction material) has risen by 15 per cent since 1980 *(established but incomplete)* {2.1.6, 2.1.11, 2.1.14}. This activity has generated unprecedented impacts: since 1980, greenhouse gas emissions have doubled {2.1.11, 2.1.12}, raising average global temperatures by at least 0.7 °C {2.1.12}, while plastic pollution in oceans has increased tenfold {2.1.15}. Over 80 per cent of global wastewater is being discharged back into the environment without treatment, while 300–400 million tons of heavy metals, solvents, toxic sludge and other wastes from industrial facilities are dumped into the world's waters each year {2.1.15}. Excessive or inappropriate application of fertilizer can lead to run-off from fields and enter freshwater and coastal ecosystems, producing more than 400 hypoxic zones that affected a total area of more than 245,000 km^2 as early as 2008{2.1.15}. In some island countries, invasive alien species have a significant impact on biodiversity, with introduced species being a key driver of extinctions.

[9] All references to "tons" are to metric tons.

11. **Land-use change is driven primarily by agriculture, forestry and urbanization, all of which are associated with air, water and soil pollution.** Over one third of the world's land surface and nearly three-quarters of available freshwater resources are devoted to crop or livestock production {2.1.11}. Crop production occurs on some 12 per cent of total ice-free land. Grazing occurs on about 25 per cent of total ice-free lands and approximately 70 per cent of drylands {2.1.11}. Approximately 25 per cent of the globe's greenhouse gas emissions come from land clearing, crop production and fertilization, with animal-based food contributing 75 per cent of that. Intensive agriculture has increased food production at the cost of regulating and non-material contributions from nature, though environmentally beneficial practices are increasing. Small landholdings (less than 2 hectares) contribute approximately 30 per cent of global crop production and 30 per cent of the global food caloric supply, using around a quarter of agricultural land and usually maintaining rich agrobiodiversity {2.1.11}. Moving to logging, between 1990 and 2015, clearing and wood harvest contributed to a total reduction of 290 million hectares in native forest cover, while the area of planted forests grew by 110 million hectares {2.1.11}. Industrial roundwood harvest is falling within some developed countries but rising on average in developing countries {2.1.11}. Illegal timber harvests and related trade supply 10–15 per cent of global timber, and up to 50 per cent in certain areas, hurting revenues for state owners and livelihoods for the rural poor. All mining on land has increased dramatically and, while still using less than 1 per cent of the Earth's land, has had significant negative impacts on biodiversity, emissions of highly toxic pollutants, water quality and water distribution, and human health {2.1.11}. Mined products contribute more than 60 per cent of the GDP of 81 countries. There are approximately 17,000 large-scale mining sites in 171 countries, with the legal sites mostly managed by international corporations, but there is also extensive illegal and small-scale mining that is harder to trace, and both types of sites are often in locations relevant for biodiversity {2.1.11}.

12. **In marine systems, fishing has had the most impact on biodiversity (target species, non-target species and habitats) in the past 50 years alongside other significant drivers (*well established*) {2.1.11, 2.2.6.2}** (Figure SPM.2). Global fish catches have been sustained by expanding fishing geographically and penetrating into deeper waters (*well established*) {3.2.1}. An increasing proportion of marine fish stocks are overfished (33 per cent in 2015), including stocks of economically important species, while 60 per cent are maximally sustainably fished and only 7 per cent are underfished (*well established*) {Box 3.1}. Industrial fishing, concentrated in a few countries and corporations {2.1.11}, covers at least 55 per cent of the oceans, largely concentrated in the northeast Atlantic, the northwest Pacific and upwelling regions off South America and West Africa (*established but incomplete*) {2.1.11}. Small-scale fisheries account for more than 90 per cent of commercial fishers (over 30 million people), and nearly half of global fish catch (*established but incomplete*). In 2011, illegal, unreported or unregulated fishing represented up to one third of the world's reported catch (*established but incomplete*) {2.1.11}. Since 1992, regional fisheries bodies have been adopting sustainable development principles. For instance, more than 170 members of the Food and Agriculture Organization of the United Nations (FAO) adopted the Code of Conduct for Responsible Fisheries in 1995, and as of 1 April 2018, 52 countries and one member organization had become Parties to the Agreement on Port State Measures to Prevent, Deter and Eliminate Illegal, Unreported and Unregulated Fishing, in order to address the depletion of marine fisheries (*established but incomplete*) {2.1.11}, reduce by-catch {3, box 3.3} and lower damage to seabeds and reefs. In addition, the set of established marine protected areas has been growing (*well established*) {2.1.11.1, 2.2.7.16}.

13. **The direct driver with the second highest relative impact on the oceans is the many changes in the uses of the sea and coastal land (*well established*)** (Figure SPM.2) {2.2.6.2}. Coastal habitats, including estuaries and deltas critical for marine biota and regional economies, have been severely affected by sea-use changes (coastal development, offshore aquaculture, mariculture and bottom trawling) and land-use changes (onshore land clearance and urban sprawl along coastlines, plus pollution of rivers). Pollution from land sources is already a major driver of negative environmental change. Ocean mining, while relatively small, has expanded since 1981 to ~ 6,500 offshore oil and gas installations worldwide in 53 countries (60 per cent in the Gulf of Mexico by 2003) and likely will expand into the Arctic and Antarctic regions as the ice melts {2.1.11}. Ocean acidification from increased carbon dioxide levels largely affects shallow waters, with the ecosystems of the subarctic Pacific and western Arctic Ocean particularly affected. Plastic microparticles and nanoparticles are entering food webs in poorly understood ways {2.1.15.3}. Coastal waters hold the highest levels of metals and persistent organic pollutants from industrial discharge and agricultural run-off, poisoning coastal fish harvests. Severe effects from excess nutrient concentrations in certain locations include damage to fish and seabed biota. The dynamics of ocean and airborne transport of pollutants mean that the harm from inputs of plastics, persistent organic pollutants, heavy metals and ocean acidification is felt worldwide, including with consequences for human health.

14. **Climate change is already having an impact on nature, from genes to ecosystems. It poses a growing risk owing to the accelerated pace of change and interactions with other direct drivers (*well established*) {2.1.12, 2.1.18, 2.2.6.2}**. Shifts in species distribution, changes in phenology, altered population dynamics and changes in the composition of species assemblage or the structure and function of ecosystems, are evident {2.2.5.3.2, 2.2.5.2.3, 2.2.6.2} and accelerating in marine, terrestrial and freshwater systems (*well established*) {2.2.3.2}. Almost half (47 per cent) of threatened terrestrial mammals, excluding bats, and one quarter (23 per cent) of threatened birds may have already been negatively affected by climate change in at least part of their distribution (birds in North America and Europe suggest effects of climate change in their population trends since the 1980s) (*established but incomplete*) {2.2.6.2}. Ecosystems such as tundra and taiga and regions such as Greenland, previously little affected by people directly, are increasingly experiencing the impacts of climate change *(well established)* {2.2.7.5}. Large reductions and local extinctions of populations are widespread *(well established)* {2.2.6.2}. This indicates that many species are unable to cope locally with the rapid pace of climate change, through either evolutionary or behavioural processes, and that their continued existence will also depend on the extent to which they are able to disperse, to track suitable climatic conditions, and to preserve their capacity to evolve *(well established)* {2.2.5.2.5}. Many of these changes can have significant impacts on a number of important economic sectors, and cascading effects for other components of biodiversity. Island nations, in particular those in East Asia and the Pacific region, will be most vulnerable to sea-level rise (1m) as projected by all climate change scenarios, {2.1.1.7.1} which will displace close to 40 million people {2.1.1.7.1; 2.2.7.1.8}.

15. **Unsustainable use of the Earth's resources is underpinned by a set of demographic and economic indirect drivers that have increased, and that furthermore interact in complex ways, including through trade (*well established*) {2.1.6}**. The global human population has increased from 3.7 to 7.6 billion since 1970 unevenly across countries and regions, which has strong implications for the degradation of nature. Per capita consumption also has grown, and also is unequal, with wide variations in lifestyles and access to resources across and within regions, plus consequences for nature that are distributed globally through trade. Total gross domestic product is four times higher and is rising faster in developed than in least developed countries. Approximately 821 million people face food insecurity in Asia and Africa, while 40 per cent of the global population lacks access to clean, safe drinking water. Generally, environmentally-based health burdens, such as air and water pollution, are more prevalent in least developed countries {2.1.2., 2.1.15}

16. **Due to expansions of infrastructure, extensive areas of the planet are being opened up to new threats (*well established*) {2.1.11}**. Globally, paved road lengths are projected to increase by 25 million kilometres by 2050, with nine tenths of all road construction occurring within least developed and developing countries. The number of dams has increased rapidly in the past 50 years. Worldwide, there are now about 50,000 large dams (higher than 15 metres) and approximately 17 million reservoirs (larger than 0.01 hectares or 100m2) {2.1.11}. The expansions of roads, cities, hydroelectric dams and oil and gas pipelines can come with high environmental and social costs, including deforestation, habitat fragmentation, biodiversity loss, land grabbing, population displacement and social disruption, including for indigenous peoples and local communities *(established but incomplete).* Yet infrastructure can generate positive economic effects and even environmental gains, based on efficiency, innovation, migration, and urbanization, depending on where and how investment is implemented and governed (*well established*) {2.1.11}. Understanding this variation in impacts is critical.

17. **Long-distance transportation of goods and people, including for tourism, have grown dramatically in the past 20 years, with negative consequences for nature overall (*established but incomplete*).** The rise in airborne and seaborne transportation of both goods and people, including a threefold increase in travel from developed and developing countries in particular, has increased pollution and significantly increased the presence of invasive alien species (*well established*) {2.1.15}. Between 2009 and 2013, the carbon footprint from tourism rose 40 per cent to 4.5 gigatons of carbon dioxide, and overall, 8 per cent of total greenhouse gas emissions are from tourism-related transportation and food consumption {2.1.11, 2.1.15}. The demand for nature-based tourism or ecotourism has also risen, with mixed effects on nature and local communities, including some potential for contributions to local conservation, in particular when carried out at a smaller scale {2.1.11}.

18. **Distant areas of the world are increasingly connected, as consumption, production, and governance decisions increasingly influence materials, waste, energy, and information flows in other countries, generating aggregate economic gains while shifting economic and environmental costs, which can link to conflicts (*established but incomplete*)** (Figure SPM.4).

As per capita consumption has risen, developed countries and rapidly growing developing countries {2.1.2, 2.1.6}, while at times supporting efficient production for exports, often reduce water consumption and forest degradation nationally {2.1.6, 2.1.11} by importing crops and other resources, mainly from developing countries {2.1.6}. The latter, as a result, see declines in nature and its contributions to people (habitat, climate, air and water quality) different from the exported food, fibre and timber products (Figures SPM.1 and 5). Reduced, declining and unequal access to nature's contributions to people may, in a complex interaction with other factors, be a source of conflict within and among countries *(established but incomplete)*. Least developed countries, often rich in and more dependent upon natural resources, have suffered the greatest land degradation, have also experienced more conflict and lower economic growth, and have contributed to environmental outmigration by several million people {2.1.2, 2.1.4}. When indigenous peoples or local communities are expelled from or threatened on their lands, including by mining or industrial logging for export, this too can spark conflict – often between actors with different levels of power, as today a few actors can control large shares of any market or capital asset rivalling those of most countries {2.1.6}, while funds channelled through tax havens support most vessels implicated in illegal, unreported and unregulated fishing. More than 2,500 conflicts over fossil fuels, water, food and land are currently occurring across the planet, and at least 1,000 environmental activists and journalists were killed between 2002 and 2013 {2.1.11, 2.1.18}.

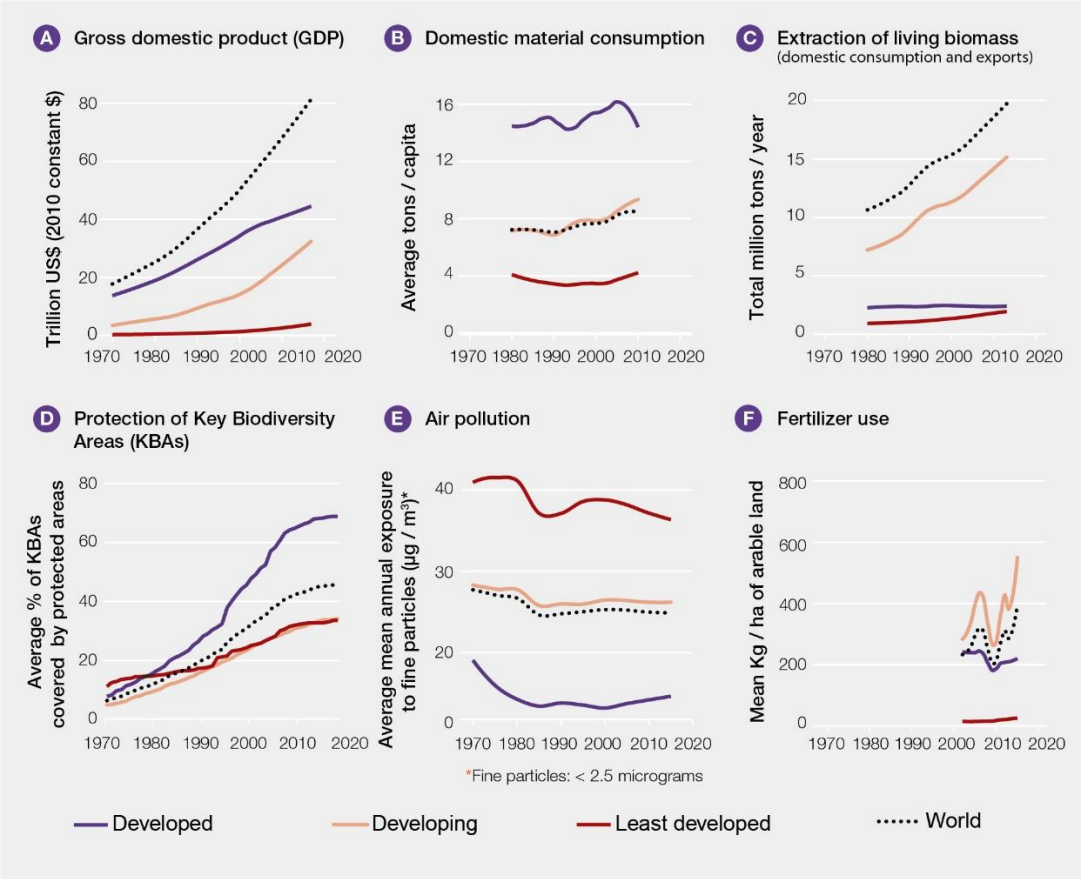


Figure 4. Development pathways since 1970 for selected key indicators of human-environment interactions, which show a large increase in the scale of global economic growth and its impacts on nature, with strong contrasts across developed, developing, and least developed countries. Countries are classified according to the United Nations World Economic Situation and Prospects (https://www.un.org/development/desa/dpad/publication/world-economic-situation-and-prospects-2019/). Global gross domestic product has risen fourfold in real terms, with the vast majority of growth occurring in developed and developing countries (A). Extraction of living biomass (e.g., crops, fish) to meet the demand for domestic consumption and for export is highest in developing countries and rising rapidly (B). However, material consumption per capita within each country (from imports and domestic production) is highest in developed countries (C). Overall protection of Key Biodiversity Areas is rising, being highest within developed countries (D). Air pollution is highest in least developed countries (E), while the challenges of non-point-source pollution from the use of fertilizers are highest in developing countries (F). Data sources: A, E, F: www.data.worldbank.org; B, C: www.materialflows.net; D: www.keybiodiversityareas.org, www.protectedplanet.net.

19. **Governance has at many levels moved slowly to further and better incorporate into policies and incentives the values of nature's contributions to people. However, around the globe, subsidies with harmful effects on nature have persisted (*well established*) {2.1, 3, 5, 6.4}**. The incorporation by society of the value of nature's contributions to people will entail shifts in governance even within private supply chains, for instance when civil society certifies and helps to reward desired practices, or when States block access to markets because of undesirable practices {2.1.7}. Successful local governance supported by recognition of local rights has often incorporated knowledge of how nature contributes to human wellbeing to motivate such behaviours {2.1.8}. National agencies have also promoted land management strategies that are more sustainable and introduced regulations, among other policy measures {2.1.9.2}, and have coordinated with other nations on global agreements to maintain nature's contributions to people (2.1.10}. Economic instruments that may be harmful to nature include subsidies, financial transfers, subsidized credit, tax abatements, and prices for commodities and industrial goods that hide environmental and social costs. Such instruments favour unsustainable production and, as a consequence, can promote deforestation, overfishing, urban sprawl, and wasteful uses of water. In 2015, agricultural support potentially harmful to nature amounted to $100 billion in countries belonging to the Organization for Economic Cooperation and Development, although some subsidy reforms to reduce unsustainable pesticide uses and adjust several other consequential development practices have been introduced {2.1.9.1, 6.4.5}. Fossil fuel subsidies valued at $345 billion result in global costs of $5 trillion when including the reduction of nature's contributions (coal accounts for about half of these costs, petroleum for about one third and natural gas for about one tenth {2.1.9.1.2}). In fisheries, subsidies to increase and maintain capacity, which in turn often lead to the degradation of nature, constitute perhaps a majority of the tens of US$ billions spent on supports {5.3.2.5}.

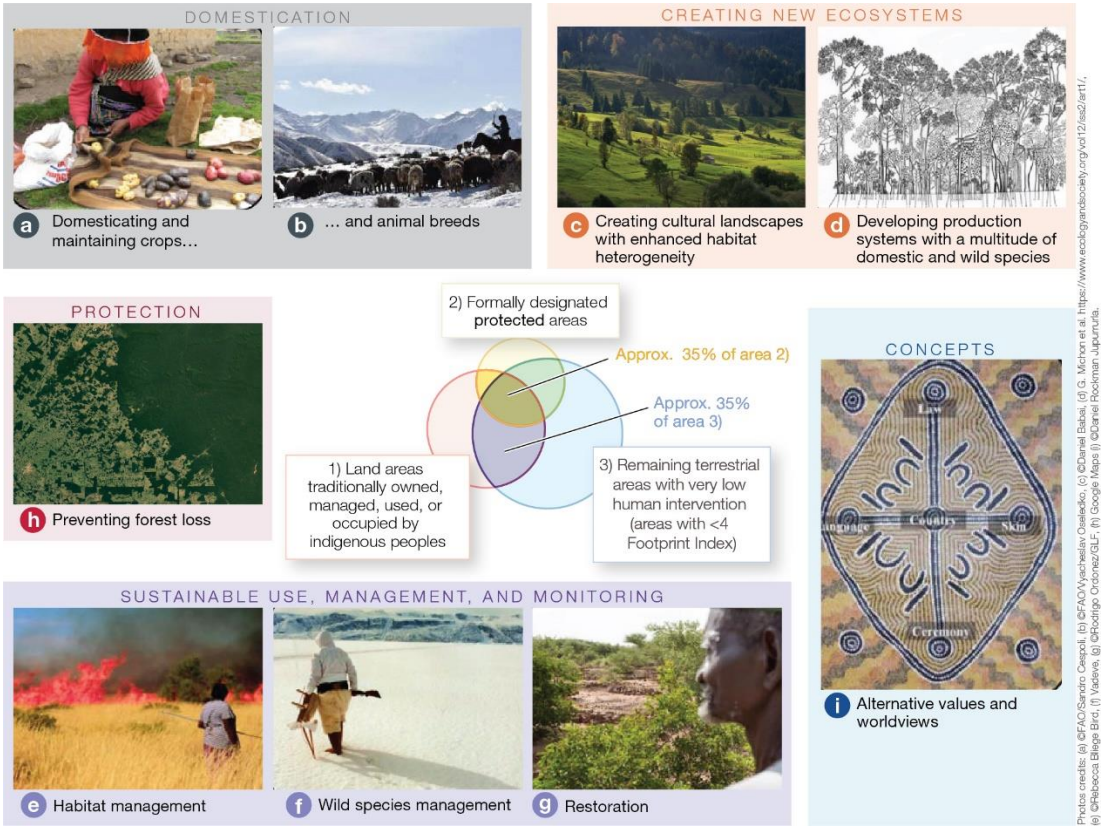


Figure 5. Contributions of indigenous peoples and local communities to the enhancement and maintenance of wild and domesticated biodiversity and landscapes. Indigenous and local knowledge systems are locally based, but regionally manifested and thus globally relevant. A wide diversity of practices actively and positively contributes to wild and domestic biodiversity through "accompanying" natural processes with anthropogenic assets (knowledge, practices and technology). Indigenous peoples often manage land and coastal areas based on culturally specific world views, applying principles and indicators such as the health of the land, caring for the country and reciprocal responsibility. As lifestyles, values and external pressures change with

globalization, however, unsustainable practices are becoming increasingly common in certain regions[10]. The image in the centre of the above figure shows the global overlap between 1) land areas traditionally owned, managed[11], used or occupied by indigenous peoples; 2) formally designated protected areas; and 3) remaining terrestrial areas with very low human intervention (areas that score <4 on the Human Footprint Index[12]). Circles and overlapping sections are proportional in area. Land areas traditionally owned, managed[11], used, or occupied by indigenous peoples overlap with approximately 35 per cent of the area that is formally protected, and approximately 35 per cent of all remaining terrestrial areas with very low human intervention. The topics and pictures in the figure aim to illustrate, not represent, the types and diversity of the following contributions of indigenous peoples and local communities to biodiversity: (a) domestication and maintenance of locally adapted crop and fruit varieties (potatoes, Peru) and (b) animal breeds (rider and sheep, Kyrgyzstan) {2.2.4.4}; (c) creation of species-rich habitats and high ecosystem diversity in cultural landscapes (hay meadows, Central Europe) {2.2.4.1-2}; (d) identification of useful plants and their cultivation in high-diversity ecosystems (multi-species forest garden, Indonesia) {2.2.4.3}; (e) and (f) management and monitoring of wild species, habitats and landscapes for wildlife and for increased resilience ((e) - Australia, (f) - Alaska) {2.2.4.5-6}; (g) restoration of degraded lands (Niger) {3.2.4}; (h) prevention of deforestation in recognized indigenous territories (Amazon basin, Brazil) {2.2.4.7}; (i) offering alternative concepts of relations between humanity and nature (Northern Australia).

20. **Much of the world's terrestrial wild and domesticated biodiversity lies in areas traditionally managed, owned, used or occupied by indigenous peoples and local communities (*well established*)** (Figure SPM.5) {2.2.4}**. In spite of efforts at all levels, although nature on indigenous lands is declining less rapidly than elsewhere, biodiversity and the knowledge associated with its management are still deteriorating (*established but incomplete*) {2.2.4, 2.2.5.3}**. Despite a long history of resource use, conservation conflicts related to colonial expansion and land appropriation for parks and other uses {3.2} (*well established*), indigenous peoples and local communities have often managed their landscapes and seascapes in ways that were adjusted to local conditions over generations. These management methods often remain compatible with or actively support biodiversity conservation by "accompanying" natural processes with anthropogenic assets (*established but incomplete*) {2.2.4, 2.2.5.3.1} (Figure SPM.5). At least one quarter of the global land area is traditionally managed, owned, used or occupied by indigenous peoples[13]. These areas include approximately 35 per cent of the area that is formally protected, and approximately 35 per cent of all remaining terrestrial areas with very low human intervention *(established but incomplete)* {2.2.5.3.1}. Community-based conservation institutions and local governance regimes have often been effective, at times even more effective than formally established protected areas, in preventing habitat loss (*established but incomplete*). Several studies have highlighted contributions by indigenous peoples and local communities in limiting deforestation, as well as initiatives showing synergies between these different mechanisms (*well established*) {6.3.2, 2.2.5.3}. In many regions, however, the lands of indigenous peoples are becoming islands of biological and cultural diversity surrounded by areas in which nature has further deteriorated (*established but incomplete*) {2.2.5.3}. Among the local indicators developed and used by indigenous peoples and local communities, 72 per cent show negative trends in nature that underpinned local livelihoods (*established but incomplete*) {2.2.5.3.2}. Major trends include declining availability of resources – due in part to legal and illegal territory reductions, despite expanding indigenous populations – as well as declining health and populations of culturally important species; new pests and invasive alien species as climate changes; losses in both natural forest habitats and grazing lands; and declining productivity in remnant ecosystems. A more detailed global synthesis of trends in nature observed by indigenous peoples and local communities is hindered by the lack of institutions that gather data for these locations and then synthesize them within regional and global summaries {2.2.2}.

[10] In Stephen Garnett et al., "A spatial overview of the global importance of Indigenous lands for conservation", *Nature Sustainability*, Vol. 1 (July 2018) pp. 369–374.

[11] These data sources define land management here as the process of determining the use, development and care of land resources in a manner that fulfils material and non-material cultural needs, including livelihood activities such as hunting, fishing, gathering, resource harvesting, pastoralism, and small-scale agriculture and horticulture.

[12] Venter, O. et al. Global terrestrial Human Footprint maps for 1993 and 2009. *Sci. Data* **3**, sdata201667 (2016).

[13] These data sources define land management as the process of determining the use, development and care of land resources in a manner that fulfils material and non-material cultural needs, including livelihood activities such as hunting, fishing, gathering, resource harvesting, pastoralism, and small-scale agriculture and horticulture.

C. Goals for conserving and sustainably using nature and achieving sustainability cannot be met by current trajectories, and goals for 2030 and beyond may only be achieved through transformative[14] changes across economic, social, political and technological factors

21. **There has been good progress towards the components of 4 of the 20 Aichi Biodiversity Targets under the Strategic Plan for Biodiversity 2011–2020. Moderate progress has been achieved towards some components of 7 more targets, but for 6 others, poor progress has been made towards all components. There is insufficient information to assess progress towards some or all components of the remaining 3 targets (*established but incomplete*) {3.2}. Overall, the state of nature continues to decline (12 of 16 indicators show significantly worsening trends) (*well established*) {3.2}** (Figure SPM.6). By 2015, greater progress had been made in implementing policy responses and actions to conserve biodiversity for drivers with an impact on coral reefs and other ecosystems vulnerable to climate change (*established but incomplete*) {3.2}. Anthropogenic drivers of biodiversity loss, including habitat loss as a result of land-use and sea-use change (addressed by Aichi Target 5), unsustainable agriculture, aquaculture and forestry (Aichi Target 7), unsustainable fishing (Aichi Target 6), pollution (Aichi Target 8), and invasive alien species (Aichi Target 9) are increasing globally, despite national efforts to meet the Aichi Targets (*established but incomplete*) {3.2}.

[14] A fundamental, system-wide reorganization across technological, economic and social factors, including paradigms, goals and values.

Goal	Target	Target element (abbreviated)	Progress towards the Aichi Targets		
			Poor	Moderate	Good
A. Address the underlying drivers	1	1.1 Awareness of biodiversity			
		1.2 Awareness of steps to conserve			
	2	2.1 Biodiversity integrated into poverty reduction			
		2.2 Biodiversity integrated into planning			
		2.3 Biodiversity integrated into accounting			
		2.4 Biodiversity integrated into reporting			
	3	3.1 Harmful subsidies eliminated and reformed			
		3.2 Positive incentives developed and implemented			
	4	4.1 Sustainable production and consumption			
		4.2 Use within safe ecological limits			
B. Reduce direct pressures	5	5.1 Habitat loss at least halved			
		5.2 Degradation and fragmentation reduced			
	6	6.1 Fish stocks harvested sustainably			
		6.2 Recovery plans for depleted species	Unknown		
		6.3 Fisheries have no adverse impact			
	7	7.1 Agriculture is sustainable			
		7.2 Aquaculture is sustainable			
		7.3 Forestry is sustainable			
	8	8.1 Pollution not detrimental			
		8.2 Excess nutrients not detrimental			
	9	9.1 Invasive alien species prioritized			
		9.2 Invasive alien pathways prioritized	Unknown		
		9.3 Invasive species controlled or eradicated			
		9.4 Invasive introduction pathways managed			
	10	10.1 Pressures on coral reefs minimized			
		10.2 Pressures on vulnerable ecosystems minimized			
C. Improve biodiversity status	11	11.1 10 per cent of marine areas conserved			
		11.2 17 per cent of terrestrial areas conserved			
		11.3 Areas of importance conserved			
		11.4 Protected areas, ecologically representative			
		11.5 Protected areas, effectively and equitably managed			
		11.6 Protected areas, well-connected and integrated			
	12	12.1 Extinctions prevented			
		12.2 Conservation status of threatened species improved			
	13	13.1 Genetic diversity of cultivated plants maintained			
		13.2 Genetic diversity of farmed animals maintained			
		13.3 Genetic diversity of wild relatives maintained			
		13.4 Genetic diversity of valuable species maintained	Unknown		
		13.5 Genetic erosion minimized			
D. Enhance benefits to all	14	14.1 Ecosystems providing services restored and safeguarded			
		14.2 Taking account of women, IPLCs, and other groups	Unknown		
	15	15.1 Ecosystem resilience enhanced	Unknown		
		15.2 15 per cent of degraded ecosystems restored	Unknown		
	16	16.1 Nagoya Protocol in force			
		16.2 Nagoya Protocol operational			
E. Enhance implementation	17	17.1 NBSAPs developed and updated			
		17.2 NBSAPs adopted as policy instruments			
		17.3 NBSAPs implemented			
	18	18.1 ILK and customary use respected			
		18.2 ILK and customary use integrated	Unknown		
		18.3 IPLCs participate effectively	Unknown		
	19	19.1 Biodiversity science improved and shared			
		19.2 Biodiversity science applied	Unknown		
	20	20.1 Financial resources for Strategic Plan[a] increased			

Abbreviations: ILK: indigenous and local knowledge; IPLCs: indigenous peoples and local communities; NBSAPs: national biodiversity strategies and action plans.

[a] Strategic Plan for Biodiversity 2011–2020.

Figure 6. Summary of progress towards the Aichi Targets. Scores are based on a quantitative analysis of indicators, a systematic review of the literature, the fifth National Reports to the Convention on Biological Diversity and the information available on countries' stated intentions to implement additional actions by 2020. Progress towards target elements is scored as "Good" (substantial positive trends at a global scale relating to most aspects of the element); "Moderate" (the overall global trend is positive, but insubstantial or insufficient, or there may be substantial positive trends for some aspects of the element, but little or no progress for others; or the trends are positive in some geographic regions, but not in others); "Poor" (little or no progress towards the element or movement away from it; or, despite local, national or case-specific successes and positive trends for

some aspects, the overall global trend shows little or negative progress); or "Unknown" (insufficient information to score progress).

22. **Conservation actions, including protected areas, efforts to manage unsustainable use and address the illegal capture and trade of species, and the translocation and eradication of invasive species, have been successful in preventing the extinction of some species (*established but incomplete*).** For example, conservation investment during the period between 1996 and 2008 reduced the extinction risk for mammals and birds in 109 countries by a median value of 29 per cent per country, while the rate of decrease in extinction risk for birds, mammals and amphibians would have been at least 20 per cent higher without conservation action in recent decades. Similarly, it is likely that at least 6 species of ungulate (e.g., the Arabian Oryx and Przewalski's Horse) would now be extinct or surviving only in captivity without conservation measures. At least 107 highly threatened birds, mammals and reptiles (e.g., the Island Fox and the Seychelles Magpie-Robin) are estimated to have benefited from invasive mammal eradication on islands {3.2.2}. Although still few and spatially localized, such cases show that with prompt and appropriate action, it is possible to reduce human-induced extinction rates (*established but incomplete*) {2.2.5.2.4, 4}. There are, however, few other counterfactual studies assessing how trends in the state of nature or pressures upon nature would have been different in the absence of conservation efforts (*well established*) {3.2}.

23. **Biodiversity and ecosystem functions and services directly underpin the achievement of several of the Sustainable Development Goals, including those on water and sanitation, climate action, life below water and life on land (Sustainable Development Goals 6, 13, 14 and 15), *(well established)* {3.3.2.1}. Nature also plays an important and complex role in the achievement of the Sustainable Development Goals related to poverty, hunger, health and well-being and sustainable cities (Sustainable Development Goals 1, 2, 3 and 11) (*established but incomplete*) {3.3.2.2}** (Figure SPM.7)**.** Several examples illustrate the interdependencies between nature and the Sustainable Development Goals. For example, nature and its contributions may play an important role in reducing vulnerability to climate-related extreme events and other economic, social and environmental shocks and disasters, although anthropogenic assets are also involved (*established but incomplete*). Nature's underpinning of specific health targets varies across regions and ecosystems, is influenced by anthropogenic assets and remains understudied. The relationship can be positive or negative, as in the case of certain aspects of biodiversity and infectious diseases (see paragraph 2 of the present document). Nature directly underpins the livelihoods of indigenous peoples and local communities and the rural and urban poor, largely through direct consumption or through the income generated by trade in material contributions such as food (see paragraphs 2 and 36 of the present document) and energy (*well established*). Such contributions are generally underrepresented in poverty analyses (*established but incomplete*). Nature and its contributions are also relevant to the Goals for education, gender equality, reducing inequalities and promoting peace, justice and strong institutions (Sustainable Development Goals 4, 5, 10 and 16), but the current focus and wording of the related targets obscures or omits their relationship to nature (*established but incomplete*).

Selected Sustainable Development Goals	Selected targets (abbreviated)	Recent status and trends in aspects of nature and nature's contributions to people that support progress towards target *		Uncertain relationship
		Poor/Declining support	Partial support	
1 NO POVERTY — No poverty	1.1 Eradicate extreme poverty			U
	1.2 Halve the proportion of people in poverty			U
	1.4 Ensure that all have equal rights to economic resources			
	1.5 Build the resilience of the poor			
2 ZERO HUNGER — Zero hunger	2.1 End hunger and ensure access to food all year round			
	2.3 Double productivity and incomes of small-scale food producers			
	2.4 Ensure sustainable food production systems			
	2.5 Maintain genetic diversity of cultivated plants and farmed animals			
3 GOOD HEALTH AND WELL-BEING — Good health and well-being	3.2 End preventable deaths of newborns and children			U
	3.3 End AIDS, tuberculosis, malaria and neglected tropical diseases			U
	3.4 Reduce premature mortality from non-communicable diseases	Unknown		
	3.9 Reduce deaths and illnesses from pollution	Unknown		
6 CLEAN WATER AND SANITATION — Clean water and sanitation	6.3 Improve water quality			
	6.4 Increase water use and ensure sustainable withdrawals			
	6.5 Implement integrated water resource management			
	6.6 Protect and restore water-related ecosystems			
11 SUSTAINABLE CITIES AND COMMUNITIES — Sustainable cities and communities	11.3 Enhance inclusive and sustainable urbanization			
	11.4 Protect and safeguard cultural and natural heritage			
	11.5 Reduce deaths and the number of people affected by disasters			
	11.6 Reduce the adverse environmental impact of cities			
	11.7 Provide universal access to green and public spaces			
13 CLIMATE ACTION — Climate action	13.1 Strengthen resilience to climate-related hazards			
	13.2 Integrate climate change into policies, strategies and planning			
	13.3 Improve education and capacity on mitigation and adaptation	Unknown		
	13a Mobilize US$100 billion/year for mitigation by developing countries	Unknown		
	13b Raise capacity for climate change planning and management	Unknown		
14 LIFE BELOW WATER — Life below water	14.1 Prevent and reduce marine pollution			
	14.2 Sustainably manage and protect marine and coastal ecosystems			
	14.3 Minimize and address ocean acidification			
	14.4 Regulate harvesting and end overfishing			
	14.5 Conserve at least 10 per cent of coastal and marine areas			
	14.6 Prohibit subsidies contributing to overfishing			
	14.7 Increase economic benefits from sustainable use of marine resources			
15 LIFE ON LAND — Life on land	15.1 Ensure conservation of terrestrial and freshwater ecosystems			
	15.2 Sustainably manage and restore degraded forests and halt deforestation			
	15.3 Combat desertification and restore degraded land			
	15.4 Conserve mountain ecosystems			
	15.5 Reduce degradation of natural habitats and prevent extinctions			
	15.6 Promote fair sharing of benefits from use of genetic resources			
	15.7 End poaching and trafficking			
	15.8 Prevent introduction and reduce impact of invasive alien species			
	15.9 Integrate biodiversity values into planning and poverty reduction			
	15a Increase financial resources to conserve and sustainably use biodiversity			
	15b Mobilize resources for sustainable forest management			

* There were no targets that were scored as good/positive status and trends

Figure 7. Summary of recent status and trends in aspects of nature and nature's contributions to people that support progress towards achieving selected targets of the Sustainable Development Goals. The targets selected are those where the current evidence and wording of the target make it possible to assess the consequences of the trends in nature and nature's contribution to people as they relate to the achievement of the target. Chapter 3, Section 3.3 provides an assessment of the evidence of the links between nature and the Sustainable Development Goals. The scores for the targets are based on a systematic assessment of the literature and a quantitative analysis of the indicators, where possible. None of the targets scored "Full support" (that is, having a good status or substantial positive trends on a global scale). Consequently, the score of "Full support" was not included in the table. "Partial support" means that the overall global status and trends are positive, but still insubstantial or insufficient; or there may be substantial positive trends for some relevant aspects, but negative trends for others; or the trends are positive in some geographic regions, but negative in others. "Poor/Declining support" indicates poor status or substantial negative trends at a global scale. "Uncertain relationship" means that the relationship between nature and/or nature's contributions to people and the achievement of the target is uncertain. "Unknown" indicates that there is insufficient information to score the status and trends.

24. **To achieve the Sustainable Development Goals and the 2050 Vision for Biodiversity, future targets are likely to be more effective if they take into account the impacts of climate change *(well established)* {3.2, 3.3}**. For example, climate change is projected to greatly increase the number of species under threat, with fewer species expanding their ranges or experiencing more suitable climatic conditions than the number of species experiencing range contraction or less suitable conditions *(established but incomplete)* {4.2, 3.2}. The impact of climate change on the effectiveness of protected areas calls for a re-evaluation of conservation objectives; meanwhile, there are currently few protected areas whose objectives and management take climate change into account *(established but incomplete).* The Sustainable Development Goals for poverty, health, water and food security, and sustainability targets are closely linked through the impacts of multiple direct drivers, including climate change, on biodiversity and ecosystem functions and services, nature and nature's contributions to people and good quality of life. In a post-2020 global biodiversity framework, placing greater emphasis on the interactions between the targets of the Sustainable Development Goals {4.6, 3.7} may provide a way forward for achieving multiple targets, as synergies (and trade-offs) can be considered. Future targets are expected to be more effective if they take into account the impacts of climate change, including on biodiversity, and action to mitigate and adapt to climate change {4.6, 3.7}.

25. **The adverse impacts of climate change on biodiversity are projected to increase with increasing warming, so limiting global warming to well below 2°C would have multiple co-benefits for nature and nature's contributions to people and quality of life; however, it is projected that some large-scale land-based mitigation measures to achieve that objective will have significant impacts on biodiversity (*established but incomplete*) {4.2, 4.3, 4.4, 4.5}.** All climate model trajectories show that limiting human-induced climate change to well below 2°C requires immediate, rapid reductions in greenhouse gas emissions or a reliance on substantial carbon dioxide removal from the atmosphere. However, the land areas required for bioenergy crops (with or without carbon capture and storage), afforestation and reforestation to achieve the targeted carbon uptake rates are projected to be very large {4.2.4.3., 4.5.3}. The biodiversity and environmental impact of large-scale afforestation and reforestation depends to a large degree on where these occur (prior vegetation cover, state of degradation), and the tree species planted (*established but incomplete*). Likewise, large bioenergy crop or afforested areas are expected to compete with areas set aside for conservation, including restoration, or agriculture (*established but incomplete*). Consequently, large-scale land-based mitigation measures may jeopardize the achievement of other Sustainable Development Goals that depend on land resources (*well established*) {4.5.3}. In contrast, the benefits of avoiding and reducing deforestation and promoting restoration can be significant for biodiversity *(well established*) and are expected to have co-benefits for local communities (*established but incomplete*) {4.2.4.3}.

26. **Biodiversity and nature's regulating contributions to people are projected to decline further in most scenarios of global change over the coming decades, while the supply and demand for nature's material contributions to people that have current market value (food, feed, timber and bioenergy) are projected to increase (*well established*) {4.2, 4.3}** (for example, see Figure SPM.8). These changes arise from continued human population growth, increasing purchasing power, and increasing per capita consumption. The projected effects of climate change and land use change on terrestrial and freshwater biodiversity are mostly negative, increase with the degree of global warming and land use change, and have an impact on marine biodiversity through increased eutrophication and deoxygenation of coastal waters (*well established*) {4.2.2.3.2, 4.2.3, 4.2.4}. For instance, a synthesis of many studies estimates that the fraction of species at risk of extinction due to climate change is 5 per cent at 2°C warming, rising to 16 per cent at 4.3°C warming {4.2.1.1}. Climate change and business-as-usual fishing scenarios are expected to worsen the status of marine biodiversity (*well established*) {4.2.2.2, 4.2.2.3.1}. Climate change alone is projected to decrease ocean net primary production by between 3 and 10 per cent, and fish biomass by between 3 and 25 per cent (in low and high warming scenarios, respectively) by the end of the century (*established but incomplete*) {4.2.2.2.1}. Whether or not the current removal of nearly 30 per cent of anthropogenic carbon dioxide emissions by terrestrial ecosystems continues into the future varies greatly from one scenario to the next and depends heavily on how climate change, atmospheric carbon dioxide and land-use change interact. Important regulating contributions of nature, such as coastal and soil protection, crop pollination and carbon storage, are projected to decline (*established but incomplete*) {4.2.4, 4.3.2.1}. In contrast, substantial increases in food, feed, timber and bioenergy production are predicted in most scenarios (*well established*) {4.2.4, 4.3.2.2}. Scenarios that include substantial shifts towards sustainable management of resource exploitation and land use, market reform, globally equitable and moderate animal protein consumption, and reduction of food waste and losses result in low loss or even recovery of biodiversity (*well established*) {4.2.2.3.1, 4.2.4.2, 4.3.2.2, 4.5.3}.

27. **The magnitude of the impacts on biodiversity and ecosystem functions and services and the differences between regions are smaller in scenarios that focus on global or regional sustainability (*well established*)** (Figure SPM.8)**.** Sustainability scenarios that explore moderate and equitable consumption result in substantially lower negative impacts on biodiversity and ecosystems due to food, feed and timber production (*well established*) {4.1.3, 4.2.4.2, 4.3.2, 4.5.3}. The general patterns at the global level – namely, declines in biodiversity and regulating contributions versus increases in the production of food, bioenergy and materials – are evident in nearly all subregions {4.2.2, 4.2.3, 4.2.4, 4.3.3}. For terrestrial systems, most studies indicate that South America, Africa and parts of Asia will be much more significantly affected than other regions, especially in scenarios that are not based on sustainability objectives (see Figure SPM.8 as an example). That is due in part to regional climate change differences and in part to the fact that scenarios generally foresee the largest land use conversions to crops or bioenergy in those regions {4.1.5, 947 4.2.4.2}. Regions such as North America and Europe are expected to have low conversion to crops and continued reforestation {4.1.5, 4.2.4.2}.

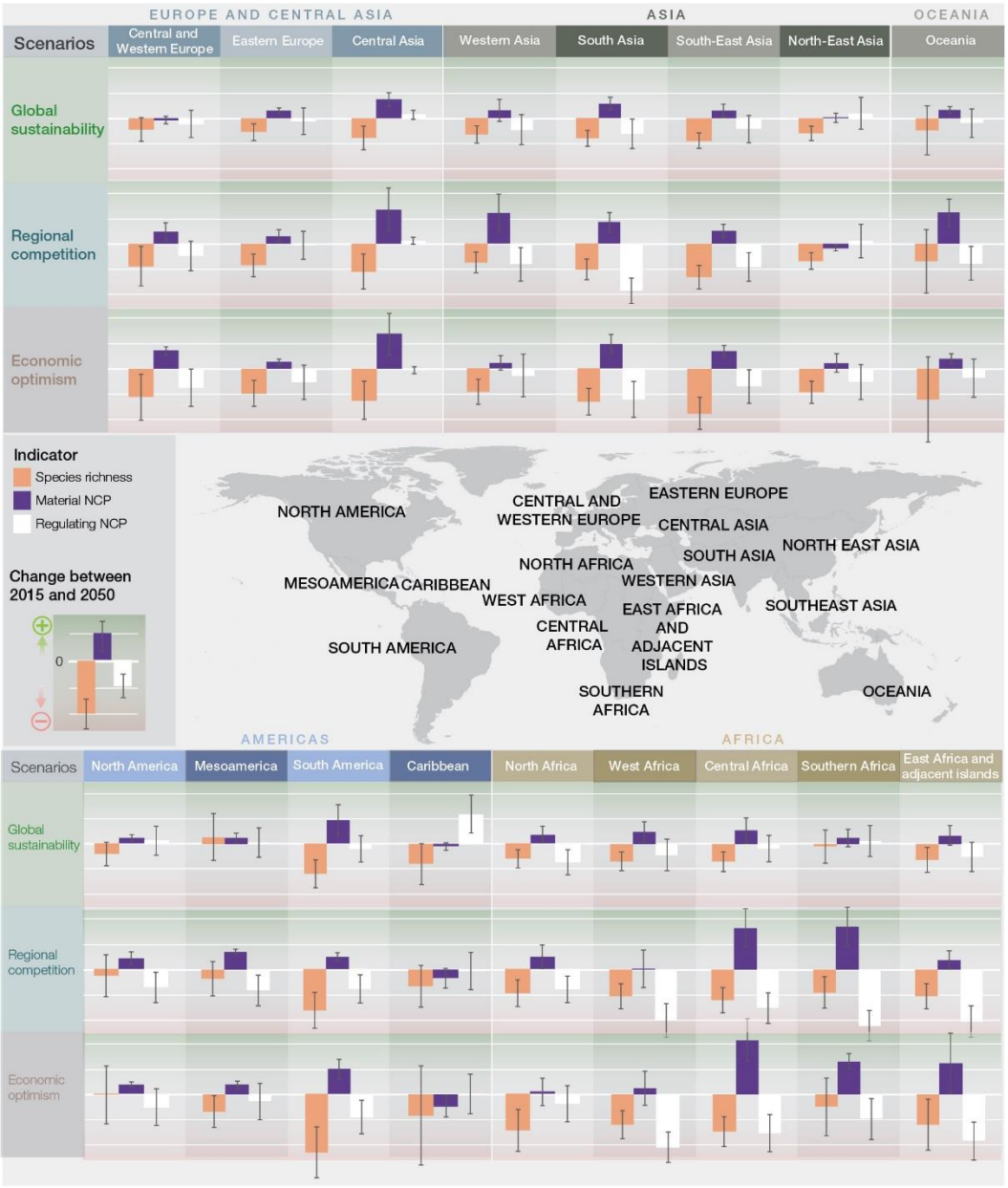


Figure 8. Projections of the impacts of land use and climate change on biodiversity and nature's material and regulating contributions to people between 2015 and 2050. This figure illustrates three main messages: i) the impacts on biodiversity and on nature's contributions to people (NCP) are the lowest in the "global sustainability" scenario in nearly all sub-regions, ii) regional differences in impacts are high in the regional competition and economic optimism scenario, and iii) material NCP increase the most in the regional competition and economic optimism scenarios, but this comes at the expense of biodiversity and regulating NCP. Projected impacts are based on a subset of the Shared Socioeconomic Pathway (SSP) scenarios and greenhouse gas

emissions trajectories (RCP) developed in support of Intergovernmental Panel on Climate Change assessments. This figure does not cover the scenarios that include transformative change that are discussed in Chapter 5.

- The "**Global sustainability**" scenario combines proactive environmental policy and sustainable production and consumption with low greenhouse gas emissions (SSP1, RCP2.6; top rows in each panel);
- The "**Regional competition**" scenario combines strong trade and other barriers and a growing gap between rich and poor with high emissions (SSP3, RCP6.0; middle rows); and
- The "**Economic optimism**" scenario combines rapid economic growth and low environmental regulation with very high greenhouse emissions (SSP5, RCP8.5; bottom rows).

Multiple models were used with each of the scenarios to generate the first rigorous global-scale model comparison estimating the impact on biodiversity (change in species richness across a wide range of terrestrial plant and animal species at regional scales; orange bars), material NCP (food, feed, timber and bioenergy: purple bars) and regulating NCP (nitrogen retention, soil protection, crop pollination, crop pest control and ecosystem carbon storage and sequestration: white bars). The bars represent the normalized means of multiple models and the whiskers indicate the standard errors. The global means of percentage changes in individual indicators can be found in Figure 4.2.14.

28. **Climate change impacts also play a major role in regionally-differentiated projections of biodiversity and ecosystem functioning in both marine and terrestrial systems. Novel communities, where species will co-occur in historically unknown combinations, are expected to emerge (*established but incomplete*) {4.2.1.2., 4.2.4.1}** Substantial climate change-driven shifts of terrestrial biome boundaries, in particular in boreal, subpolar and polar regions and in (semi-)arid environments, are projected for the coming decades; a warmer, drier climate will reduce productivity in many places (*well established*) {4.2.4.1}. In contrast, rising atmospheric carbon dioxide concentrations can be beneficial for net primary productivity and can enhance woody vegetation cover, especially in semi-arid regions (*established but incomplete*) {4.2.4.1}. For marine systems, impacts are expected to be geographically variable, with many fish populations projected to move poleward due to ocean warming, meaning that local species extinctions are expected in the tropics (*well established*) {4.2.2.2.1}. However, that does not necessarily imply an increase in biodiversity in the polar seas, because of the rapid rate of sea ice retreat and the enhanced ocean acidification of cold waters (*established but incomplete*) {4.2.2.2.4}. Along coastlines, the upsurge in extreme climatic events, sea level rise and coastal development are expected to cause increased fragmentation and loss of habitats. Coral reefs are projected to undergo more frequent extreme warming events, with less recovery time in between, declining by a further 70–90 per cent at global warming of 1.5°C, and by more than 99 per cent at warming of 2°C, causing massive bleaching episodes with high coral mortality rates (*well established*) {4.2.2.2.2}.

D. Nature can be conserved, restored and used sustainably while simultaneously meeting other global societal goals through urgent and concerted efforts fostering transformative change

29. **The Sustainable Development Goals and the 2050 Vision for Biodiversity cannot be achieved without transformative change, the conditions for which can be put in place now (*well established*) {2, 3, 5, 6.2}** (Figure SPM.9). Increasing awareness of interconnectedness in the context of the environmental crisis and new norms regarding interactions between humans and nature would support that change *(well established)* {5.3, 5.4.3}. In the short term (before 2030), all decision makers could contribute to sustainability transformations, including through enhanced and improved implementation and enforcement of effective existing policy instruments and regulations, and the reform and removal of harmful existing policies and subsidies (*well established*). Additional measures are necessary to enable transformative change over the long term (up to 2050) to address the indirect drivers that are the root causes of the deterioration of nature (*well established*), including changes in social, economic and technological structures within and across nations {6.2, 6.3, 6.4, SPM Table.1}.

30. **Sustainability transformations call for cross-sectoral thinking and approaches** (Figure SPM.9). **Sectoral policies and measures can be effective in particular contexts, but often fail to account for indirect, distant and cumulative impacts, which can have adverse effects, including the exacerbation of inequalities (*well established*).** Cross-sectoral approaches, including landscape approaches, integrated watershed and coastal zone management, marine spatial planning, bioregional scale planning for energy, and new urban planning paradigms offer opportunities to reconcile multiple interests, values and forms of resource use, provided that these cross-sectoral approaches recognize trade-offs and uneven power relations between stakeholders (*established but incomplete*) {5.4.2, 5.4.3, 6.3, 6.4}.

31. **Transformative change is facilitated by innovative governance approaches that incorporate existing approaches, such as integrative, inclusive, informed and adaptive governance. While such approaches have been extensively practised and studied separately, it is increasingly recognized that together, they can contribute to transformative change (*established but incomplete*) {6.2}.** They help to address governance challenges that are common to many sectors and policy domains and create the conditions for implementing transformative change. Integrative approaches, such as mainstreaming across government sectors, are focused on the relationships between sectors and policies, and help to ensure policy coherence and effectiveness (*well established*). Inclusive approaches help to reflect a plurality of values and ensure equity (*established but incomplete*), including through equitable sharing of benefits arising from their use and rights-based approaches (*established but incomplete*). Informed governance entails novel strategies for knowledge production and co-production that are inclusive of diverse values and knowledge systems (*established but incomplete*). Adaptive approaches, including learning from experience, monitoring and feedback loops, contribute to preparing for and managing the inevitable uncertainties and complexities associated with social and environmental changes (*established but incomplete*) {6.2, 5.4.2}.

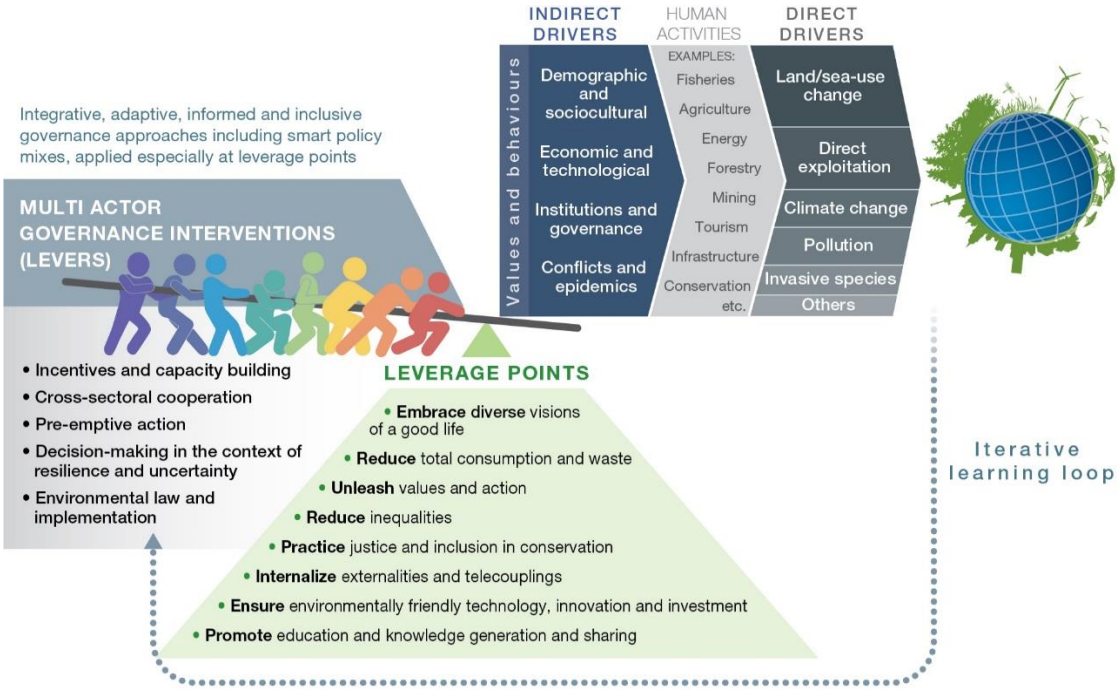


Figure 9. Transformative change in global sustainability pathways. Collaborative implementation of priority governance interventions (levers) targeting key points of intervention (leverage points) could enable transformative change from current trends towards more sustainable ones. Most levers can be applied at multiple leverage points by a range of actors, such as intergovernmental organizations, governments, non-governmental organizations, citizen and community groups, indigenous peoples and local communities, donor agencies, science and educational organizations, and the private sector, depending on the context. Implementing existing and new instruments through place-based governance interventions that are integrative, informed, inclusive and adaptive, using strategic policy mixes and learning from feedback, could enable global transformation.

32. **A summary of the evidence related to the components of pathways to sustainability suggests that there are five overarching types of management interventions, or levers, and eight leverage points that are key for achieving transformative change** (Figure SPM.9; D3 and D4 above) {5.4.1, 5.4.2}. The notion of levers and leverage points recognizes that complex global systems cannot be managed simply, but that in certain cases, specific interventions can be mutually reinforcing and can generate larger-scale changes towards achieving shared goals *(well established)* (Table SPM.1). For example, changes in laws and policies can enable and underpin changes in resource management and consumption, and in turn, changes in individual and collective behaviour and habits can facilitate the implementation of policies and laws {5.4.3}.

33. **Changes towards sustainable production and consumption and towards reducing and transforming residues and waste, particularly changes in consumption among the affluent, is recognized by some individuals and communities worldwide as central to sustainable development and reducing inequalities. While actual reductions have been limited, actions already being taken at different levels can be improved, coordinated and scaled up *(well established)*.** Those include introducing and improving standards, systems and relevant regulations

aimed at internalizing the external costs of production, extraction and consumption (such as pricing wasteful or polluting practices, including through penalties); promoting resource efficiency and circular and other economic models; voluntary environmental and social certification of market chains; and incentives that promote sustainable practices and innovation. Importantly, they also involve a change in the definition of what a good quality of life entails – decoupling the idea of a good and meaningful life from ever-increasing material consumption. All those approaches are more effective when they are mutually reinforcing. Actions that help to voluntarily unleash existing social values of responsibility in the form of individual, collective and organizational actions towards sustainability can have a powerful and lasting effect in shifting behaviour and cultivating stewardship as a normal social practice (*established but incomplete*) {5.4.1.2, 5.4.1.3, 6.4.2, 6.4.3}.

34. **Expanding and effectively managing the current network of protected areas, including terrestrial, freshwater and marine areas, is important for safeguarding biodiversity (*well established*), particularly in the context of climate change. Conservation outcomes also depend on adaptive governance, strong societal engagement, effective and equitable benefit-sharing mechanisms, sustained funding, and monitoring and enforcement of rules (*well established*) {6.2, 5.4.2}.** National Governments play a central role in supporting primary research, effective conservation and the sustainable use of multi-functional landscapes and seascapes. This entails planning ecologically representative networks of interconnected protected areas to cover key biodiversity areas and managing trade-offs between societal objectives that represent diverse worldviews and multiple values of nature (*established but incomplete*) {6.3.2.3, 6.3.3.3}. Safeguarding protected areas into the future also entails enhancing monitoring and enforcement systems, managing biodiversity-rich land and sea beyond protected areas, addressing property rights conflicts and protecting environmental legal frameworks against the pressure of powerful interest groups. In many areas, conservation depends on building capacity and enhancing stakeholder collaboration, involving non-profit groups as well as indigenous peoples and local communities to establish and manage marine protected areas and marine protected area networks, and proactively using instruments such as landscape-scale and seascape-scale participatory scenarios and spatial planning, including transboundary conservation planning (*well established*) {5.3.2.3, 6.3.2.3, 6.3.3.3}. Implementation beyond protected areas includes combating wildlife and timber trafficking through effective enforcement and ensuring the legality and sustainability of trade in wildlife. Such actions include prioritizing the prosecution of wildlife trafficking in criminal justice systems, using community-based social marketing to reduce demand and implementing strong measures to combat corruption at all levels (*established but incomplete*) {6.3.2.3}.

35. **Integrated landscape governance entails a mix of policies and instruments that together ensure nature conservation, ecological restoration and sustainable use, sustainable production (including of food, materials and energy), and sustainable forest management and infrastructure planning, and that address the major drivers of biodiversity loss and nature deterioration (*well established*) {6.3.2, 6.3.6}.** Policy mixes that are harmonized across sectors, levels of governance and jurisdictions can account for ecological and social differences across and beyond the landscape, build on existing forms of knowledge and governance and address trade-offs between tangible and non-tangible benefits in a transparent and equitable manner (*established but incomplete*). Sustainable landscape management can be better achieved through multifunctional, multi-use, multi-stakeholder and community-based approaches (*well established*), using a combination of measures and practices, including: (a) well-managed and connected protected areas and other effective area-based conservation measures; (b) reduced impact logging, forest certification, payment for ecosystem services, among other instruments, and reduced emissions from deforestation and forest degradation; (c) support for ecological restoration; (d) effective monitoring, including public access and participation as appropriate; (e) addressing illegal activities; (f) the effective implementation of multilateral environmental agreements and other relevant international agreements by their parties; and (g) promoting sustainable, biodiversity-based food systems. (*well established*) {6.3.2.1, 6.3.2.3, 6.3.2, 6.3.2.4}.

36. **Feeding the world in a sustainable manner, especially in the context of climate change and population growth, entails food systems that ensure adaptive capacity, minimize environmental impacts, eliminate hunger, and contribute to human health and animal welfare (*established but incomplete*) {5.3.2.1, 6.3.2.1}. Pathways to sustainable food systems entail land-use planning and sustainable management of both the supply/producer and the demand/consumer sides of food systems (*well established*) {5.3.2.1, 6.3.2.1, 6.4}.** Options for sustainable agricultural production are available and continue to be developed, with some having more impacts on biodiversity and ecosystem functions than others {6.3.2.1}. These options include integrated pest and nutrient management, organic agriculture, agroecological practices, soil and water conservation practices, conservation agriculture, agroforestry, silvopastoral systems, irrigation

management, small or patch systems and practices to improve animal welfare. These practices could be enhanced through well-structured regulations, incentives and subsidies, the removal of distorting subsidies {2.3.5.2, 5.3.2.1, 5.4.2.1, 6.3.2}, and – at landscape scales – by integrated landscape planning and watershed management. Ensuring the adaptive capacity of food production entails the use of measures that conserve the diversity of genes, varieties, cultivars, breeds, landraces and species, which also contributes to diversified, healthy and culturally-relevant nutrition. Some incentives and regulations may contribute to positive changes at both the production and consumption ends of supply chains, such as the creation, improvement and implementation of voluntary standards, certification and supply-chain agreements (e.g., the Soy Moratorium) and the reduction of harmful subsidies. Regulatory mechanisms could also address the risks of co-option and lobbying, where commercial or sectoral interests may work to maintain high levels of demand, monopolies and continued use of pesticides and chemical inputs {5.3.2.1}. Non-regulatory alternatives are also important, and potentially include technical assistance – especially for small-holders – and appropriate economic incentive programs, for example, some payment for ecosystem services programmes and other non-monetary instruments {5.4.2.1}. Options that address and engage other actors in food systems (including the public sector, civil society, consumers and grassroots movements) include participatory on-farm research, the promotion of low-impact and healthy diets and the localization of food systems. Such options could help reduce food waste, overconsumption, and the demand for animal products that are produced unsustainably, which could have synergistic benefits for human health (*established but incomplete*) {5.3.2.1, 6.3.2.1}.

37. **Ensuring sustainable food production from the oceans while protecting biodiversity entails policy action to apply sustainable ecosystem approaches to fisheries management; spatial planning (including the implementation and expansion of marine protected areas); and more broadly, policy action to address drivers such as climate change and pollution (*well established*) {5.3.2.5, 6.3.3}**. Scenarios show that the pathways to sustainable fisheries entail conserving, restoring and sustainably using marine ecosystems, rebuilding overfished stocks (including through targeted limits on catches or fishing efforts and moratoria), reducing pollution (including plastics), managing destructive extractive activities, eliminating harmful subsidies and illegal, unreported and unregulated fishing, adapting fisheries management to climate change impacts and reducing the environmental impact of aquaculture (*well established*) {4, 5.3.2.5, 6.3.3.3.2}. Marine protected areas have demonstrated success in both biodiversity conservation and improved local quality of life when managed effectively and can be further expanded through larger or more interconnected protected areas or new protected areas in currently underrepresented regions and key biodiversity areas (*established but incomplete*) {5.3.2.5; 6.3.3.3.1}. Due to major pressures on coasts (including from development, land reclamation and water pollution), implementing marine conservation initiatives, such as integrated coastal planning, outside of protected areas is important for biodiversity conservation and sustainable use (*well established*) {6.3.3.3}. Other measures to expand multi-sectoral cooperation on coastal management include corporate social responsibility measures, standards for building and construction, and eco-labelling (*well established*) {6.3.3.3.2, 6.3.3.3.4}. Additional tools could include both non-market and market-based economic instruments for financing conservation, including for example payment for ecosystem services, biodiversity offset schemes, blue-carbon sequestration, cap-and-trade programmes, green bonds and trust funds and new legal instruments, such as the proposed international, legally binding instrument on the conservation and sustainable use of marine biological diversity in areas beyond national jurisdiction under the United Nations Convention on the Law of the Sea (*established but incomplete*) {6.3.3.2, 6.3.3.1.3, 5.4.2.1, 5.4.1.7}.

38. **Sustaining freshwater in the context of climate change, rising demand for water extraction and increased levels of pollution involves both cross-sectoral and sector-specific interventions that improve water-use efficiency, increase storage, reduce sources of pollution, improve water quality, minimize disruption and foster the restoration of natural habitats and flow regimes (*well established*) {6.3.4}.** Promising interventions include practising integrated water resource management and landscape planning across scales; protecting wetland biodiversity areas; guiding and limiting the expansion of unsustainable agriculture and mining; slowing and reversing the de-vegetation of catchments; and mainstreaming practices that reduce erosion, sedimentation, and pollution run-off and minimize the negative impact of dams (*well established*) {6.3.4.6}. Sector-specific interventions include improved water-use efficiency techniques (including in agriculture, mining and energy), decentralized rainwater collection (for example, household-based), integrated management of surface and groundwater (e.g., “conjunctive use”), locally-developed water conservation techniques, and water pricing and incentive programmes (such as water accounts and payment for ecosystem services programmes) {6.3.4.2, 6.3.4.4}. With regard to watershed payment for ecosystem services programmes, their effectiveness and efficiency can be enhanced by acknowledging multiple values in their design, implementation and evaluation and setting up impact evaluation systems (*established but incomplete*) {6.3.4.4}. Investment in infrastructure, including in

green infrastructure, is important, especially in developing countries, but it can be undertaken in a way that takes into account ecological functions and the careful blending of built and natural infrastructure {5.3.2.4, 6.3.4.5}.

39. **Meeting the Sustainable Development Goals in cities and making cities resilient to climate change entails solutions that are sensitive to social, economic and ecological contexts. Integrated city-specific and landscape-level planning, nature-based solutions and built infrastructure, and responsible production and consumption can all contribute to sustainable and equitable cities and make a significant contribution to the overall climate change adaptation and mitigation effort.** Urban planning approaches to promote sustainability include encouraging compact communities, designing nature-sensitive road networks and creating low-impact infrastructure and transportation systems (from an emissions and land-use perspective), including active, public and shared transport {5.3.2.6, 6.3.5}. However, given that most urban growth between now and 2030 will take place in the Global South, major sustainability challenges include creatively and inclusively addressing the lack of basic infrastructure (water, sanitation and mobility), the absence of spatial planning, and the limited governance capacity and financing mechanisms. Those challenges also offer opportunities for locally-developed innovation and experimentation, which will create new economic opportunities. A combination of bottom-up and city-level efforts through public, private, community and Government partnerships, can be effective in promoting low-cost and locally-adapted solutions to maintaining and restoring biodiversity and ecosystem functions and services. Nature-based options include combining grey and green infrastructure (such as wetland and watershed restoration and green roofs), enhancing green spaces through restoration and expansion, promoting urban gardens, maintaining and designing for ecological connectivity, and promoting accessibility for all (with benefits for human health). Additional solutions include disseminating new, low-cost technologies for decentralized wastewater treatment and energy production and creating incentives to reduce over-consumption {6.3.5}. Integrating cross-sectoral planning at the local, landscape and regional levels is important, as is involving diverse stakeholders (*well established*). Particularly important at the regional scale are policies and programmes that promote sustainability-minded collective action {5.4.1.3}, protect watersheds beyond city jurisdictions and ensure the connectivity of ecosystems and habitats (e.g., through green belts). At the regional scale, cross-sectoral approaches to mitigating the impact of infrastructure and energy projects entail support for comprehensive environmental impact assessments and strategic environmental assessments of local and regional cumulative impacts {6.3.6.4, 6.3.6.6}.

40. **Decision makers have a range of options and tools for improving the sustainability of economic and financial systems (*well established*) {6.4}. Achieving a sustainable economy involves making fundamental reforms to economic and financial systems and tackling poverty and inequality as vital parts of sustainability (*well established*) {6.4}.** Governments could reform subsidies and taxes to support nature and its contributions to people, removing perverse incentives and instead promoting diverse instruments such as payments linked to social and environmental metrics, as appropriate (*established but incomplete*) {6.4.1}. At the international level, options for reacting to the challenges generated by the displacement of the impacts of unsustainable consumption and production on nature include both rethinking established instruments and developing new instruments to account for long-distance impacts. Trade agreements and derivatives markets could be reformed to promote equity and prevent the deterioration of nature, although there are uncertainties associated with implementation (*established but incomplete*) {6.4.4}. Alternative models and measures of economic welfare (such as inclusive wealth accounting, natural capital accounting and degrowth models) are increasingly considered as possible approaches to balancing economic growth and the conservation of nature and its contributions and to recognizing trade-offs, the pluralism of values, and long-term goals (*established but incomplete*) {6.4.5}. Structural changes to economies are also key to shifting action over long timescales. Such changes include technological and social innovation regimes and investment frameworks that internalize environmental impacts, such as the externalities of economic activities, including by addressing environmental impacts in socially just and appropriate ways (*well established*) {5.4.1.7}. Although such market-based policy instruments as payments for ecosystem services, voluntary certification and biodiversity offsetting have increased in use, their effectiveness is mixed, and they are often contested; thus, they should be carefully designed and applied to avoid perverse effects in context (*established but incomplete*) {5.4.2.1, 6.3.2.2, 6.3.2.5, 6.3.6.3}. The widespread internalization of environmental impacts, including externalities associated with long-distance trade, is considered both an outcome and a component of national and global sustainable economies (*well established*) {5.4.1.6, 6.4}.

Table SPM.1. Approaches for sustainability and possible actions and pathways for achieving them. The appropriateness and relevance of different approaches varies according to place, system, decision-making process and scale. The list of actions and pathways in the following table is illustrative rather than exhaustive and uses examples from the assessment report.

Approaches for sustainability	Possible actions and pathways to achieve transformative change Key actors: (IG=intergovernmental organizations, G=Governments, NGOs =non-governmental organizations, CG=citizen and community groups, IPLC = indigenous peoples and local communities, D=donor agencies, SO= science and educational organizations, P=private sector)
Enabling integrative governance to ensure policy coherence and effectiveness	• Implementing **cross-sectoral approaches** that consider linkages and interconnections between sectoral policies and actions (e.g., IG, G, D, IPLC) {6.2} {D1}. • **Mainstreaming biodiversity** within and across different sectors (e.g., agriculture, forestry, fisheries, mining, tourism) (e.g., IG, G, NGO, IPLC, CG, P, D) {6.2, 6.3.5.2} {D5}. • **Encouraging integrated planning and management for sustainability at the landscape and seascape levels** (e.g., IG, G, D) {6.3.2} {D5}. • **Incorporating environmental and socioeconomic impacts**, including externalities, into public and private decision-making (e.g., IG, G, P) {5.4.1.6} {B5}. • **Improving existing policy instruments** and using them **strategically and synergistically** in smart policy mixes (e.g., IG, G) {6.2; 6.3.2; 6.3.3.3.1; 6.3.4.6; 6.3.5.1; 6.3.6.1} {D4}.
Promoting inclusive governance approaches through stakeholder engagement and the inclusion of indigenous peoples and local communities to ensure equity and participation	• **Recognizing and enabling the expression of different value systems and diverse interests** while formulating and implementing policies and actions (e.g., IG, G, IPLCs, CG, NGO, SO, D) {6.2} {B5, D5}. • **Enabling the inclusion and participation** of indigenous peoples and local communities, and women and girls in environmental governance, and **recognizing and respecting the knowledge, innovations, practices, institutions and values** of indigenous peoples and local communities, in accordance with national legislation (e.g., G, IPLC, P) {6.2; 6.2.4.4} {D5}. • **Facilitating national recognition for land tenure, access and resource rights** in accordance with national legislation, and the application of **free, prior and informed consent and fair and equitable benefit-sharing arising from their use** (e.g., G, IPLC, P) {D5}. • Improving **collaboration and participation among** indigenous peoples and local communities, other relevant stakeholders, policymakers and scientists to generate novel ways of conceptualizing and achieving transformative change towards sustainability (e.g., G, IG, D, IPLC, CG, SO) {D5}.
Practicing informed governance for nature and nature's contributions to people	• **Improving the documentation of nature** (e.g., biodiversity inventory and other inventories) **and the assessment of the multiple values of nature, including the valuation of natural capital** by both private and public entities (e.g., SO, D, G, IG, P) {6.2} {D2}. • **Improving the monitoring and enforcement** of existing laws and policies through **better documentation and information-sharing** and **regular, informed and adaptive readjustments** to ensure transparent and enhanced results as appropriate (e.g., IG, G, IPLC, P) {D2}. • Advancing knowledge co-production and **including and recognizing different types of knowledge**, including indigenous and local knowledge and education, that enhances the legitimacy and effectiveness of environmental policies (e.g., SO, IG, G, D) {B6, D3}.
Promoting adaptive governance and management	• **Enabling locally tailored choices** about conservation, restoration, sustainable use and development connectivity that account for uncertainty in environmental conditions and scenarios of climate change (e.g., G, IPLC, CG, P) {D3}. • **Promoting public access to relevant information as appropriate** in decision-making and responsiveness to assessments by improving monitoring, including setting goals and objectives with multiple relevant stakeholders, who often have competing interests (e.g., IG, G). • **Promoting awareness-raising activities** around the principles of adaptive management, including through using short, medium and long-term goals that are regularly reassessed towards international targets (e.g., IG, G, SO, CG, D) {D4}. • Piloting and testing **well-designed policy innovations** that experiment with scales and models (e.g., G, D, SO, CG, IPLC) {D4}.

Approaches for sustainability	Possible actions and pathways to achieve transformative change Key actors: (IG=intergovernmental organizations, G=Governments, NGOs =non-governmental organizations, CG=citizen and community groups, IPLC = indigenous peoples and local communities, D=donor agencies, SO= science and educational organizations, P=private sector)
	• Increasing the **effectiveness of current and future international biodiversity targets and goals** (such as those of the post-2020 global biodiversity framework and of the Sustainable Development Goals), (e.g., IG, G, D) {6.2; 6.4}.
Managing sustainable and multifunctional landscapes and seascapes and some of the actions they may entail	
Producing and consuming food sustainably	• **Promoting sustainable agricultural practices**, including good agricultural practices, agroecology, among others multifunctional landscape planning and cross-sectoral integrated management {6.3.2}. • **Sustainable use of genetic resources in agriculture,** including by conserving gene diversity, varieties, cultivars, breeds, landraces and species (e.g., SO, IPLC, CG) {6.3.2.1} {A6}. • **Promoting the use of biodiversity-friendly management practices** in crop and livestock production, forestry, fisheries and aquaculture, including, where relevant, the use of traditional management practices associated with indigenous peoples and local communities {6.3.2.1} {D6}. • **Promoting areas of natural or semi-natural habitat** within and around production systems, including those that are intensively managed, and restoring or reconnecting damaged or fragmented habitats where necessary. {6.3.2.1} {D6}. • Improving **food market transparency** (e.g., traceability of biodiversity impacts, transparency in supply chains) through tools such as labelling and sustainability certification. • **Improving equity in food distribution and in the localization of food systems**, where appropriate and where beneficial to nature or nature's contributions to people (NCP). • **Reducing food waste from production to consumption.** • Promoting **sustainable and healthy diets** {6.3.2.1} {D6}.
Integrating multiple uses for sustainable forests	• Promoting **multifunctional, multi-use and multi-stakeholder approaches and improving community-based approaches** to forest governance and management to achieve sustainable forest management (e.g., IG, G, CG, IPLC, D, SO, P) {6.3.2.2} {A4}. • Supporting the **reforestation and ecological restoration** of degraded forest habitats with appropriate species, giving priority to native species (e.g., G, IPLC, CG, D, SO) {6.3.2.2} {A4}. • **Promoting and strengthening community-based management and governance, including customary institutions and management systems, and co-management regimes involving** indigenous peoples and local communities (e.g., IG, G, CG, IPLC, D, SO, P) {6.3.2.2} {D5}. • **Reducing the negative impact of** unsustainable **logging** by improving and implementing sustainable forest management and **addressing illegal logging** (e.g., IG, G, NGO, P) {6.3.2.2} {D1}. • **Increasing efficiency in forest product use**, including incentives for adding value to forest products (such as sustainability labelling or public procurement policies), as well as promoting intensive production in well-managed forests so as to reduce pressures elsewhere (e.g., P, D, NGO) {6.3.2.2} {B1}.
Conserving, effectively managing and sustainably using terrestrial landscapes	• **Supporting, expanding and promoting effectively managed and ecologically representative networks** of well-connected protected areas and other multifunctional conservation areas, such as other effective area-based conservation measures (e.g., IG, G, IPLC, CG, D) {3.2.1, 6.3.2.3} {C1, D7}. • **Using extensive, proactive and participatory landscape-scale spatial planning** to prioritize land uses that balance and further safeguard nature and **to protect and manage key biodiversity areas** and other important sites for present and future biodiversity (e.g., IG, G, D) {B1, D7}. • Managing and restoring biodiversity beyond protected areas (e.g., IG, G, CG, IPLC, P, NGO, D) {B1}. • **Developing robust and inclusive decision-making processes** that facilitate the positive contributions of indigenous peoples and local communities to sustainability by incorporating locally-attuned management systems and indigenous and local knowledge {B6, D5}.

Approaches for sustainability	Possible actions and pathways to achieve transformative change Key actors: (IG=intergovernmental organizations, G=Governments, NGOs =non-governmental organizations, CG=citizen and community groups, IPLC = indigenous peoples and local communities, D=donor agencies, SO= science and educational organizations, P=private sector)
	• **Improving and expanding the levels of financial support** for conservation and sustainable use through a variety of innovative options, including through partnerships with the private sector {6.3.2.5} {D5, D7, D10}. • **Prioritizing land-based adaptation and mitigation measures that do not have negative impacts on biodiversity** (e.g., reducing deforestation, restoring land and ecosystems, improving the management of agricultural systems such as soil carbon, and preventing the degradation of wetlands and peatlands) {D8}. • **Monitoring the effectiveness and impacts of protected areas** and other effective area-based conservation measures.
Promoting sustainable governance and management of seascapes, oceans and marine systems	• Promoting shared and **integrated ocean governance, including for biodiversity, beyond national jurisdictions** (e.g., IG, G, NGO, P, SO, D) {6.3.3.2} {D7}. • **Expanding, connecting and effectively managing marine protected area networks** (e.g., IG, G, IPLC, CG {5.3.2.3} {D7}, including protecting and managing priority marine key biodiversity areas and other important sites for present and future biodiversity, and i**ncreasing protection and connectivity.** • **Promoting the conservation and/or restoration of marine ecosystems** through rebuilding overfished stocks; preventing, deterring and eliminating illegal, unreported and unregulated fishing; encouraging ecosystem-based fisheries management; and controlling pollution through the removal of derelict gear and through addressing plastic pollution (e.g., IG, G, P, IPLC, CG, SO, D) {B1, D7}. • **Promoting ecological restoration, remediation and the multifunctionality of coastal structures**, including through marine spatial planning (e.g., IG, G, NGO, P, CG, IPLC, SO, D) {6.3.3.3.1} {B1, D7}. • Integrating **ecological functionality concerns into the planning phase of coastal construction** (e.g., IG, G, NGO, P, CG, IPLC, SO, D) {6.3.3.3.1} {B1, D7}. • **Expanding multi-sectoral cooperation** by increasing and improving corporate social responsibility measures and regulation in building and construction standards, eco-labelling and best practices (e.g., IG, G, NGO, P, CG, IPLC, SO, D) {6.3.3.3.1} {B1, D7}. • **Encouraging effective fishery reform strategies** through incentives with positive impacts on biodiversity and through the removal of environmentally harmful subsidies (e.g., IG, G) {6.3.3.2} {D7}. • **Reducing the environmental impacts of aquaculture** by voluntary certification and by using best practices in fisheries and aquaculture production methods (e.g., G, IPLC, NGO, P) {6.3,3,3,5} {6.3.3.3.2} {B1, D7}. • **Reducing point and nonpoint source pollution,** including by managing marine microplastic and macroplastic pollution through effective waste management, incentives and innovation (e.g., G, P, NGO) {6.3.3.3.1} {B1, D7}. • **Increasing ocean conservation funding** (e.g., G, D, P) {6.3.3.1.3} {D7}.
Improving freshwater management, protection and connectivity	• **Integrating water resource management and landscape planning,** including through increased protection and connectivity of freshwater ecosystems, improving transboundary water cooperation and management, addressing the impacts of fragmentation caused by dams and diversions, and incorporating regional analyses of the water cycle (e.g., IG, G, IPLC, CG, NGO, D, SO, P) {6.3.4.6; 6.3.4.7} {B1}. • **Supporting inclusive water governance,** e.g., through developing and implementing invasive alien species management with relevant stakeholders (e.g., IG, G, IPLC, CG, NGO, D, SO, P) {6.3.4.3} {D4}. • **Supporting co-management regimes for collaborative water management** and **to foster equity** between water users (while maintaining a minimum ecological flow for the aquatic ecosystems), and engaging stakeholders and using transparency to minimize environmental, economic and social conflicts {D4}. • Mainstreaming practices that **reduce soil erosion, sedimentation and pollution run-off** (e.g., G, CG, P) {6.3.4.1}.

Approaches for sustainability	Possible actions and pathways to achieve transformative change Key actors: (IG=intergovernmental organizations, G=Governments, NGOs =non-governmental organizations, CG=citizen and community groups, IPLC = indigenous peoples and local communities, D=donor agencies, SO= science and educational organizations, P=private sector)
	• **Reducing the fragmentation of freshwater policies** by coordinating international, national and local regulatory frameworks (e.g., G, SO) {6.3.4.7; 6.3.4.2}. • **Increasing water storage** by facilitating groundwater recharge, wetlands protection and restoration, alternative storage techniques and restrictions on groundwater abstraction. (e.g., G, CG, IPLC, P, D) {6.3.4.2} {B1, B3}. • **Promoting investment in water projects** with clear sustainability criteria (e.g., G, P, D, SO) {6.3.4.5} {B1, B3}.
Building sustainable cities that address critical needs while conserving nature, restoring biodiversity, maintaining and enhancing ecosystem services	• Engaging **sustainable urban planning** (e.g., G, CG, IPLC, NGO, P) {6.3.5.1} {D9}. • **Encouraging densification for compact communities**, including through brownfield development and other strategies {6.3.5.3}. • **Including biodiversity protection, biodiversity offsetting, river basin protection and ecological restoration in regional planning** {6.3.5.1}. • **Safeguarding urban key biodiversity areas** and ensuring that they do not become isolated through incompatible uses of surrounding land {6.3.5.2; SM 6.4.2}. • **Promoting biodiversity mainstreaming through stakeholder engagement and integrative planning** (e.g., G, NGO, CG, IPLC) {6.3.5.3}. • **Encouraging alternative business models and incentives for urban conservation** {6.3.2.1}. • **Promoting sustainable production and consumption** {6.3.6.4}. • **Promoting nature-based solutions** (e.g., G, NGO, SO, P) {6.3.5.2} {D8, D9}. • **Promoting, developing, safeguarding or retrofitting green and blue infrastructure** for water management while improving grey (hard) infrastructure to address biodiversity outcomes {6.3.5.2}. • **Promoting ecosystem-based adaptation within communities** {3.7; 5.4.2.2}. • Maintaining and designing for **ecological connectivity within urban spaces,** particularly with native species {6.3.5.2; SM 6.4.1}. • **Increasing urban green spaces and improving access to them** {6.3.2}. • **Increasing access to urban services for low-income communities,** with priorities for sustainable water management, integrated sustainable solid waste management and sewage systems and safe and secure shelter and transport (e.g., G, NGO) {6.3.5.4} {D9}.
Promoting sustainable energy and infrastructure projects and production	• Developing **sustainable strategies, voluntary standards and guidelines** for sustainable renewable energy and bioenergy projects (e.g., G, SO, P) {6.3.6} {D8}. • Strengthening and promoting **biodiversity-inclusive environmental impact assessments,** laws and guidelines {6.3.6.2} {B1}. • **Mitigating environmental and social impacts** where possible and **promoting innovative financing and restoration** when necessary (e.g., G, P, NGO, D) {6.3.6.3} {B1}, including by redesigning **incentive programmes and policies** to promote bioenergy systems that optimize trade-offs between biodiversity loss and benefits (e.g., through life cycle analysis) {D8}. • **Supporting community-based management and decentralized** sustainable energy production (e.g., G, CG, IPLC, D) {6.3.6.4} {6.3.6.5} {D9}. • **Reducing energy demands** so as to reduce the demand for biodiversity-impacting infrastructure (e.g., through energy efficiency, new clean energy and reducing unsustainable consumption) (e.g., G, P) {B1}.
Improving the sustainability of economic and financial systems	• **Developing and promoting incentive structures** to protect biodiversity (e.g., removing harmful incentives) (e.g., IG, G) {6.4} {D10}. • Promoting **sustainable production and consumption,** such as through sustainable sourcing, resource efficiency and reduced production **impacts**, circular and other economic models, corporate social responsibility, life-cycle assessments that include biodiversity, trade agreements and public procurement policies (e.g., G, CA, NGO, SO) {6.4.3, 6.3.2.1} {D10}. • **Exploring alternative methods of economic accounting,** such as natural capital accounting and Material and Energy Flow Accounting, among others (e.g., IG, G, SO) {6.4.5} {D10}.

Approaches for sustainability	Possible actions and pathways to achieve transformative change Key actors: (IG=intergovernmental organizations, G=Governments, NGOs =non-governmental organizations, CG=citizen and community groups, IPLC = indigenous peoples and local communities, D=donor agencies, SO= science and educational organizations, P=private sector)
	• **Encouraging policies that combine poverty reduction** with measures to increase the provision of nature's contributions and the conservation and sustainable use of nature (e.g., IG, G, D) {3.2.1} {C2}. • **Improving market-based instruments,** such as payment for ecosystem services, voluntary certification and biodiversity offsetting, to address challenges such as equity and effectiveness (e.g., G, P, NGO, IPLC, CG, SO) {B1}. • **Reducing consumption** (e.g., encouraging consumer information to reduce overconsumption and waste, using public policies and regulations and internalizing environmental impacts) (e.g., G, P, NGO) {B4, C2}. • **Creating and improving supply-chain models** that reduce the impact on nature {D3}.

Appendix I

Conceptual framework and definitions

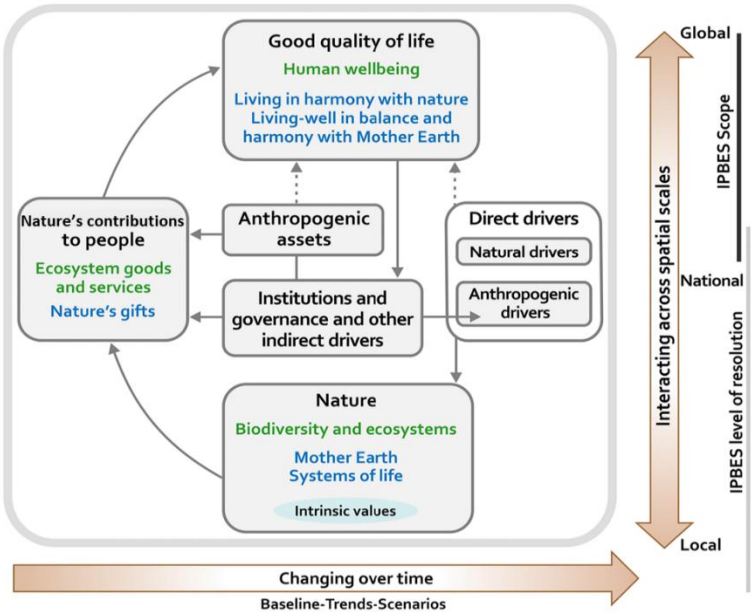


Figure 10. The IPBES Conceptual Framework is a highly simplified model of the complex interactions between the natural world and human societies. The model identifies the main elements (boxes within the main panel outlined in grey), together with their interactions (arrows in the main panel), that are most relevant to the Platform's goal. "Nature", "nature's contributions to people" and "good quality of life" (indicated as black headlines and defined in each corresponding box) are inclusive categories that were identified as meaningful and relevant to all stakeholders involved in IPBES during a participatory process, including various disciplines of the natural and social sciences and the humanities, and other knowledge systems, such as those of indigenous peoples and local communities. Text in green denotes scientific concepts, and text in blue denotes concepts originating in other knowledge systems. The solid arrows in the main panel denote influence between elements, and dotted arrows denote links that are acknowledged as important, but that are not the main focus of the Platform. The thick coloured arrows below and to the right of the central panel indicate the scales of time and space, respectively. This conceptual framework was accepted by the Plenary in decision IPBES/2/4, and the Plenary took note of an update presented in IPBES/5/INF/24 and in decision IPBES/5/1. Further details and examples of the concepts defined in the box can be found in the glossary and in Chapter 1.

Nature, in the context of the Platform, refers to the natural world, with an emphasis on biodiversity. Within the context of science, it includes categories such as biodiversity, ecosystems, ecosystem functioning, evolution, the biosphere, humankind's shared evolutionary heritage, and biocultural diversity. Within the context of other knowledge systems, it includes categories such as Mother Earth and systems of life. Other components of nature, such as deep aquifers, mineral and fossil reserves, and wind, solar, geothermal and wave power, are not the focus of the Platform. Nature contributes to societies through the provision of contributions to people.

Anthropogenic assets refers to built-up infrastructure, health facilities, knowledge (including indigenous and local knowledge systems and technical or scientific knowledge, as well as formal and non-formal education), technology (both physical objects and procedures), and financial assets, among others. Anthropogenic assets have been highlighted to emphasize that a good life is achieved by a co-production of benefits between nature and societies.

Nature's contributions to people refers to all the benefits that humanity obtains from nature. Ecosystem goods and services, considered separately or in bundles, are included in this category. Within other knowledge systems, nature's gifts and similar concepts refer to the benefits of nature from which people derive good quality of life. Aspects of nature that can be negative to people (detriments), such as pests, pathogens or predators, are also included in this broad category.

Nature's regulating contributions to people refers to functional and structural aspects of organisms and ecosystems that modify the environmental conditions experienced by people, and/or sustain and/or regulate the generation of material and non-material contributions. For example, these contributions include water purification, climate regulation and the regulation of soil erosion.

Nature's material contributions to people refers to substances, objects or other material elements from nature that sustain people's physical existence and the infrastructure (i.e. the basic physical and organizational structures and facilities, such as buildings, roads, power supplies) needed for the operation of a society or enterprise. They are typically physically consumed in the process of being experienced, such as when plants or animals are transformed into food, energy, or materials for shelter or ornamental purposes.

Nature's non-material contributions to people refers to nature's contribution to people's subjective or psychological quality of life, individually and collectively. The entities that provide these intangible contributions can be physically consumed in the process (e.g., animals in recreational or ritual fishing or hunting) or not (e.g., individual trees or ecosystems as sources of inspiration).

Drivers of change refers to all those external factors that affect nature, anthropogenic assets, nature's contributions to people and good quality of life. They include institutions and governance systems and other indirect drivers, and direct drivers (both natural and anthropogenic).

Institutions and governance systems and other indirect drivers are the ways in which societies organize themselves and the resulting influences on other components. They are the underlying causes of environmental change that are exogenous to the ecosystem in question. Because of their central role, influencing all aspects of human relationships with nature, they are key levers for decision-making. "Institutions" encompasses all formal and informal interactions among stakeholders and the social structures that determine how decisions are taken and implemented, how power is exercised, and how responsibilities are distributed. To varying degrees, institutions determine the access to and control, allocation and distribution of the components of nature and of anthropogenic assets and their contributions to people. Examples of institutions are systems of property and access rights to land (e.g., public, common-pool or private), legislative arrangements, treaties, informal social norms and rules, including those emerging from indigenous and local knowledge systems, and international regimes such as agreements against stratospheric ozone depletion or for the protection of endangered species of wild fauna and flora. Economic policies, including macroeconomic, fiscal, monetary or agricultural policies, play a significant role in influencing people's decisions and behaviour and the way in which they relate to nature in the pursuit of benefits. However, many of the drivers of human behaviour and preferences, which reflect different perspectives on a good quality of life, work largely outside the market system.

Direct drivers, both natural and anthropogenic, affect nature directly. "Natural drivers" are those that are not the result of human activities and are beyond human control. These include earthquakes, volcanic eruptions and tsunamis, extreme weather or ocean-related events such as prolonged drought or cold periods, tropical cyclones and floods, the El Niño/La Niña Southern Oscillation and extreme tidal events. The direct anthropogenic drivers are those that are the result of human decisions, namely, of institutions and governance systems and other indirect drivers. Anthropogenic drivers include habitat conversion, e.g., degradation of land and aquatic habitats, deforestation and afforestation, exploitation of wild populations, climate change, pollution of soil, water and air and species introductions. Some of these drivers, such as pollution, can have negative impacts on nature; others, as in the case of habitat restoration, or the introduction of a natural enemy to combat invasive species, can have positive effects.

Good quality of life is the achievement of a fulfilled human life, a notion which varies strongly across different societies and groups within societies. It is a context-dependent state of individuals and human groups, comprising access to food, water, energy and livelihood security, and also health, good social relationships and equity, security, cultural identity, and freedom of choice and action. From virtually all standpoints, a good quality of life is multidimensional, having material as well as immaterial and spiritual components. What a good quality of life entails, however, is highly dependent on place, time and culture, with different societies espousing different views of their relationships with nature and placing different levels of importance on collective versus individual rights, the material versus the spiritual domain, intrinsic versus instrumental values, and the present time versus the past or the future. The concept of human well-being used in many western societies and its variants, together with those of living in harmony with nature and living well in balance and harmony with Mother Earth, are examples of different perspectives on a good quality of life.

Appendix II

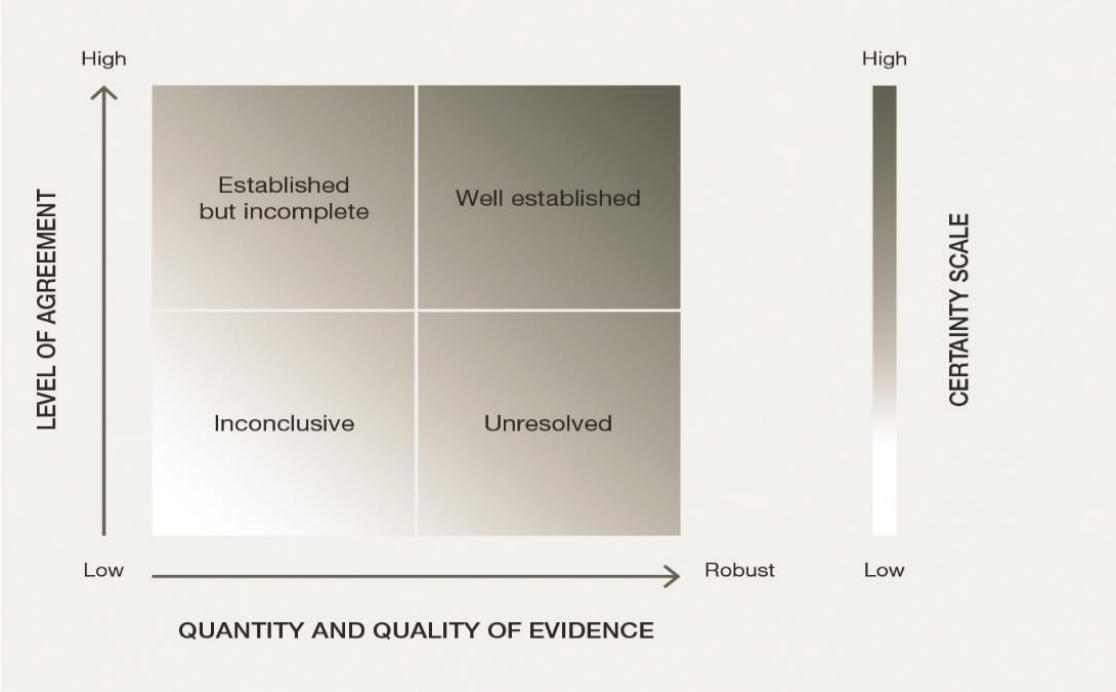
Communication of the degree of confidence

In this assessment, the degree of confidence in each main finding is based on the quantity and quality of evidence and the level of agreement regarding that evidence (Figure SPM.A1). The evidence includes data, theory, models and expert judgement. Further details of the approach are documented in the note by the secretariat on the information on work related to the guide on the production of assessments (IPBES/6/INF/17).

The summary terms to describe the evidence are:

- Well established: there is a comprehensive meta-analysis or other synthesis or multiple independent studies that agree.
- Established but incomplete: there is general agreement, although only a limited number of studies exist; there is no comprehensive synthesis, and/or the studies that exist address the question imprecisely.
- Unresolved: multiple independent studies exist but their conclusions do not agree.
- Inconclusive: there is limited evidence and a recognition of major knowledge gaps.

Figure SPM.A1
The four-box model for the qualitative communication of confidence.
Confidence increases towards the top-right corner as suggested by the increasing strength of shading.



Source: IPBES, 2016.[15]

[15] IPBES, Summary for policymakers of the assessment report of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services on pollinators, pollination and food production. S.G. Potts, V. L. Imperatriz-Fonseca, H. T. Ngo, J. C. Biesmeijer, T. D. Breeze, L. V. Dicks, L. A. Garibaldi, R. Hill, J. Settele, A. J. Vanbergen, M. A. Aizen, S. A. Cunningham, C. Eardley, B. M. Freitas, N. Gallai, P. G. Kevan, A. Kovács-Hostyánszki, P. K. Kwapong, J. Li, X. Li, D. J. Martins, G. Nates-Parra, J. S. Pettis, R. Rader, and B. F. Viana (eds.)., secretariat of the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services, Bonn, Germany, 2016. Available at http://doi.org/10.5281/zenodo.2616458.

Appendix III

Knowledge gaps

In the course of conducting this assessment key information needs were identified. See draft table Appendix IV.

- Data, inventories and monitoring on nature and the drivers of change
- Gaps on biomes and units of analysis
- Taxonomic gaps
- NCP-related gaps
- Links between nature, nature's contributions to people and drivers with respect to targets and goals
- Integrated scenarios and modelling studies
- Potential policy approaches
- Indigenous peoples and local communities

Appendix IV

Draft table of knowledge gaps

Disclaimer: This table of knowledge gaps was prepared by the experts of the global assessment and presented to and considered by a working group established by the Plenary at its seventh session. The Plenary did not approve this table as part of the summary for policymakers. It is therefore included in draft form, which does not imply working group or Plenary approval.

Sector	Knowledge gaps (in data, indicators, inventories, scenarios)[16]
Data, inventories and monitoring on nature and the drivers of change	● Data on ecosystem processes (including rates of change) that underpin nature's contributions to people and ecosystem health ● Data from monitoring of ecosystem condition (generally less well represented than ecosystem extent) ● Data on changing interactions among organisms and taxa ● Impacts of increasing CO_2 upon the total Net Primary Production of marine systems, and consequences for ecosystem function and nature's contributions to people ● Syntheses of how human impacts affect organismal traits and global patterns and trends in genetic composition ● Data on extinction risks and population trends, especially for insects, parasites and fungal and microbial species ● Indicators on the global extent and consequences of biotic homogenization, including genetic homogenization ● Global spatial datasets on key threats, e.g., data on patterns in the intensity of unsustainable exploitation of species and ecosystems ● More comprehensive understanding of how human-caused changes to any Essential Biodiversity Variable class (e.g., ecosystem structure) have impacts on others (e.g., community composition) and on nature's contributions to people. ● Data gaps in key inventories: World Database on Protected Areas, the World Database of Key Biodiversity Areas™, red lists of threatened species and ecosystems, and the Global Biodiversity Information Facility ● Monitoring of many listed species in the Convention on International Trade in Endangered Species of Wild Fauna and Flora. ● Monitoring of the long-term effects of dumped waste, especially radioactive material and plastics ● Data on the impacts of war and conflict on nature and nature's contributions to people
Gaps on biomes and units of analysis	● Inventories on under-studied ecosystems: freshwater, Arctic, marine/ocean, seabed, and wetlands ● Inventories in soil, benthic and freshwater environments, and the implications for ecosystem functions.
Taxonomic gaps	● Basic data on many taxa (86 per cent of existing species on Earth and 91 per cent of species in the ocean still await description) ● Extinction risks and population trends for the following taxonomic groups: insects, fungal species, microbial species (microorganisms) and parasites ● Data on the genetic diversity and conservation status of breeds of farmed and domestic plants and animals
NCP-related gaps	● Data on the status of species and nature's contributions to people linked to specific ecosystem functions ● Systematic indicators to report the status and trends for categories of nature's contributions to people ● Data on the impacts and extent of nature's contributions to people on quality of life, by major user group (also lacking an agreed typology on major user groups) ● Data on the interrelationships between gender equality, nature and nature's contributions to people ● Data and information on NCP 10: regulation of detrimental organisms and biological processes (populations of vectors and vector-borne diseases) and overlaps with vulnerable human populations and ecosystem interactions ● Data and information on NCP 9: the role of nature and nature's contributions to people in mitigating or reducing vulnerability to disasters

[16] This list of knowledge gaps in the IPBES Global Assessment on Biodiversity and Ecosystem services is not exhaustive.

Sector	Knowledge gaps (in data, indicators, inventories, scenarios)[16]
Links between nature, nature's contributions to people and drivers with respect to targets and goals	● Understanding on how nature contributes to achieving targets (the positive and negative relationships between nature and targets/goals like the Sustainable Development Goals) ● Disaggregated data on the impacts that nature has on good quality of life, particularly across regions, societies, governance systems, and ecosystems ● Need for indicators for some Sustainable Development Goals and Aichi Biodiversity Targets (e.g., Aichi Biodiversity Target 15 on ecosystem resilience and contribution of biodiversity to carbon stocks and Target 18 on integration of traditional knowledge and effective participation of indigenous and local communities.) ● Better quantitative data to assess the Sustainable Development Goals and Aichi Targets where qualitative indicators have been dominant (9 out of 44 targets under the Sustainable Development Goals reviewed) ● Data on the benefits to human mental health from exposure to natural environments ● Indicators that reflect the heterogeneity of indigenous peoples and local communities
Integrated scenarios and modelling studies	● Regional and global socioeconomic scenarios explicitly considering the knowledge, views and perspectives of indigenous peoples and local communities ● Regional and global socioeconomic scenarios developed for, by and in collaboration with indigenous peoples and local communities and their associated institutions ● Quantitative data showing how nature, its contributions to people, and good quality of life interact and change in time along different pathways ● Scenarios of the future of biodiversity which quantify the possible co-benefits related to nature's contributions to people ● Scenarios about nonmaterial benefits to people compared to material benefits and regulating benefits ● Integrated scenarios for areas projected to experience significant impacts and possible regime shifts (e.g., Arctic, semi-arid regions, and small islands) ● Knowledge about the interaction, feedback and spill-overs among regions within future global scenarios ● Assessment of nature's contributions to people across scenario archetypes with robust knowledge and quantitative estimates
Potential policy approaches	• Data to analyse the effectiveness of many policy options and interventions, including: a) Data on the comparative effectiveness of different area-based conservation mechanisms (e.g., protected areas, other effective area-based conservation measures) in conserving nature and nature's contributions to people and contributing to good quality of life b) Indicators of the effectiveness of different restoration methodologies and to assess restoration progress over time (including values) c) Data on the comparative effectiveness of different processes of access and benefit sharing to ensure fairness and equity d) Better data on the global extent and forms of wildlife trafficking and its impacts on nature and nature's contributions to people. e) Data on the comparative effectiveness of different models for reconciling bioenergy and biodiversity conservation f) Data on the effectiveness of different schemes and models for payment for ecosystem services (PES), particularly the trade-offs that arise between policy goals, the integration of multiple values in PES, data on the profiles of PES participants and long-term monitoring of relational and behavioural implications of participation g) Data on the comparative effectiveness of different models of marine governance relating to conservation ● Data on the extent of the participation of indigenous peoples and local communities in environmental governance ● Indicators on the impacts of environmentally harmful subsidies and trends and effectiveness of their removal at the global level ● Data on areas of uncertainty in applying the precautionary principle ● Data on the monitoring of policy effectiveness to adapt and adjust policies and to share lessons. ● Data on the impacts of resource mobilization, using robust program evaluation methods (e.g., examples of successful use of funding including impacts of donor funding for conservation and impacts of specific biodiversity financing projects). ● Data on the impacts of climate change on marine and coastal governance regimes ● Data on the impacts of mainstreaming biodiversity across sectors ● Better data to develop biodiversity and environmental quality standards

Sector	Knowledge gaps (in data, indicators, inventories, scenarios)[16]
Indigenous Peoples and Local Communities	● Agreed-upon methods to enable systematic processes of knowledge generation, collection and synthesis regarding indigenous and local knowledge (for assessments and elsewhere) and participation of indigenous peoples and local communities in this process. ● Syntheses of indigenous and local knowledge about the status and trends in nature ● Data to assess how progress in achieving goals and targets affects indigenous peoples and local communities, either in positive or in negative ways ● Trends in relation to the socioeconomic status of indigenous peoples and local communities (e.g., noting the lack of data differentiation in aggregate statistics)

General Assembly

Distr.: General
31 January 2008

Sixty-second session
Agenda item 54

Resolution adopted by the General Assembly on 17 December 2007

[*on the report of the Second Committee (A/62/419 (Part I))*]

62/98. Non-legally binding instrument on all types of forests

The General Assembly,

Recalling Economic and Social Council resolution 2006/49 of 28 July 2006, in which the Council requested the United Nations Forum on Forests to conclude and adopt at its seventh session a non-legally binding instrument on all types of forests,

1. *Decides* to adopt the non-legally binding instrument on all types of forests as contained in the annex to the present resolution;

2. *Invites* members of the governing bodies of the member organizations of the Collaborative Partnership on Forests to support the implementation of the non-legally binding instrument on all types of forests, consistent with the mandates of those organizations, and, to that end, invites the United Nations Forum on Forests to provide guidance to the Partnership;

3. *Also invites* donor Governments and other countries in a position to do so, financial institutions and other organizations to make voluntary financial contributions to the trust fund for the United Nations Forum on Forests so that the Forum may address, within the context of its multi-year programme of work, the implementation of the non-legally binding instrument and provide support for participants from developing countries and countries with economies in transition to attend its meetings;

4. *Decides* that the Forum will review the effectiveness of the non-legally binding instrument as part of the overall review of the effectiveness of the international arrangement on forests decided upon by the Economic and Social Council in its resolution 2006/49.

74th plenary meeting
17 December 2007

Annex

Non-legally binding instrument on all types of forests

Member States,

Recognizing that forests and trees outside forests provide multiple economic, social and environmental benefits, and emphasizing that sustainable forest

management contributes significantly to sustainable development and poverty eradication,

Recalling the Non-legally Binding Authoritative Statement of Principles for a Global Consensus on Management, Conservation and Sustainable Development of All Types of Forests (Forest Principles);[1] chapter 11 of Agenda 21;[2] the proposals for action of the Intergovernmental Panel on Forests/Intergovernmental Forum on Forests; resolutions and decisions of the United Nations Forum on Forests; the Johannesburg Declaration on Sustainable Development and the Plan of Implementation of the World Summit on Sustainable Development;[3] the Monterrey Consensus of the International Conference on Financing for Development;[4] the internationally agreed development goals, including the Millennium Development Goals; the 2005 World Summit Outcome;[5] and existing international legally binding instruments relevant to forests,

Welcoming the accomplishments of the international arrangement on forests since its inception by the Economic and Social Council in its resolution 2000/35 of 18 October 2000, and recalling the decision of the Council, in its resolution 2006/49 of 28 July 2006, to strengthen the international arrangement on forests,

Reaffirming their commitment to the Rio Declaration on Environment and Development,[6] including that States have, in accordance with the Charter of the United Nations and the principles of international law, the sovereign right to exploit their own resources pursuant to their own environmental and developmental policies and the responsibility to ensure that activities within their jurisdiction or control do not cause damage to the environment of other States or of areas beyond the limits of national jurisdiction, and to the common but differentiated responsibilities of countries, as set out in Principle 7 of the Rio Declaration,

Recognizing that sustainable forest management, as a dynamic and evolving concept, is intended to maintain and enhance the economic, social and environmental value of all types of forests, for the benefit of present and future generations,

Expressing their concern about continued deforestation and forest degradation, as well as the slow rate of afforestation and forest cover recovery and reforestation, and the resulting adverse impact on economies, the environment, including biological diversity, and the livelihoods of at least a billion people and their cultural heritage, and emphasizing the need for more effective implementation of sustainable forest management at all levels to address these critical challenges,

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[1] *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992*, vol. I, *Resolutions Adopted by the Conference* (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution 1, annex III.

[2] Ibid., annex II.

[3] *Report of the World Summit on Sustainable Development, Johannesburg, South Africa, 26 August–4 September 2002* (United Nations publication, Sales No. E.03.II.A.1 and corrigendum), chap. I, resolution 1, annex, and resolution 2, annex.

[4] *Report of the International Conference on Financing for Development, Monterrey, Mexico, 18-22 March 2002* (United Nations publication, Sales No. E.02.II.A.7), chap. I, resolution 1, annex.

[5] See resolution 60/1.

[6] *Report of the United Nations Conference on Environment and Development, Rio de Janeiro, 3-14 June 1992*, vol. I, *Resolutions Adopted by the Conference* (United Nations publication, Sales No. E.93.I.8 and corrigendum), resolution 1, annex I.

Recognizing the impact of climate change on forests and sustainable forest management, as well as the contribution of forests to addressing climate change,

Reaffirming the special needs and requirements of countries with fragile forest ecosystems, including those of low-forest-cover countries,

Stressing the need to strengthen political commitment and collective efforts at all levels, to include forests in national and international development agendas, to enhance national policy coordination and international cooperation and to promote intersectoral coordination at all levels for the effective implementation of sustainable management of all types of forests,

Emphasizing that effective implementation of sustainable forest management is critically dependent upon adequate resources, including financing, capacity development and the transfer of environmentally sound technologies, and recognizing in particular the need to mobilize increased financial resources, including from innovative sources, for developing countries, including least developed countries, landlocked developing countries and small island developing States, as well as countries with economies in transition,

Also emphasizing that implementation of sustainable forest management is also critically dependent upon good governance at all levels,

Noting that the provisions of this instrument do not prejudice the rights and obligations of Member States under international law,

Have committed themselves as follows:

I. Purpose

1. The purpose of this instrument is:

(*a*) To strengthen political commitment and action at all levels to implement effectively sustainable management of all types of forests and to achieve the shared global objectives on forests;

(*b*) To enhance the contribution of forests to the achievement of the internationally agreed development goals, including the Millennium Development Goals, in particular with respect to poverty eradication and environmental sustainability;

(*c*) To provide a framework for national action and international cooperation.

II. Principles

2. Member States should respect the following principles, which build upon the Rio Declaration on Environment and Development[6] and the Rio Forest Principles:[1]

(*a*) The instrument is voluntary and non-legally binding;

(*b*) Each State is responsible for the sustainable management of its forests and for the enforcement of its forest-related laws;

(*c*) Major groups as identified in Agenda 21,[7] local communities, forest owners and other relevant stakeholders contribute to achieving sustainable forest

[7] The major groups identified in Agenda 21 are women, children and youth, indigenous people and their communities, non-governmental organizations, local authorities, workers and trade unions, business and industry, scientific and technological communities, and farmers.

management and should be involved in a transparent and participatory way in forest decision-making processes that affect them, as well as in implementing sustainable forest management, in accordance with national legislation;

(*d*) Achieving sustainable forest management, in particular in developing countries as well as in countries with economies in transition, depends on significantly increased, new and additional financial resources from all sources;

(*e*) Achieving sustainable forest management also depends on good governance at all levels;

(*f*) International cooperation, including financial support, technology transfer, capacity-building and education, plays a crucial catalytic role in supporting the efforts of all countries, particularly developing countries as well as countries with economies in transition, to achieve sustainable forest management.

III. Scope

3. The present instrument applies to all types of forests.

4. Sustainable forest management, as a dynamic and evolving concept, aims to maintain and enhance the economic, social and environmental values of all types of forests, for the benefit of present and future generations.

IV. Global objectives on forests

5. Member States reaffirm the following shared global objectives on forests and their commitment to work globally, regionally and nationally to achieve progress towards their achievement by 2015:

Global objective 1

Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation;

Global objective 2

Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest-dependent people;

Global objective 3

Increase significantly the area of protected forests worldwide and other areas of sustainably managed forests, as well as the proportion of forest products from sustainably managed forests;

Global objective 4

Reverse the decline in official development assistance for sustainable forest management and mobilize significantly increased, new and additional financial resources from all sources for the implementation of sustainable forest management.

V. National policies and measures

6. To achieve the purpose of the present instrument, and taking into account national policies, priorities, conditions and available resources, Member States should:

(*a*) Develop, implement, publish and, as necessary, update national forest programmes or other strategies for sustainable forest management which identify actions needed and contain measures, policies or specific goals, taking into account the relevant proposals for action of the Intergovernmental Panel on Forests/Intergovernmental Forum on Forests and resolutions of the United Nations Forum on Forests;

(*b*) Consider the seven thematic elements of sustainable forest management,[8] which are drawn from the criteria identified by existing criteria and indicators processes, as a reference framework for sustainable forest management and, in this context, identify, as appropriate, specific environmental and other forest-related aspects within those elements for consideration as criteria and indicators for sustainable forest management;

(*c*) Promote the use of management tools to assess the impact on the environment of projects that may significantly affect forests, and promote good environmental practices for such projects;

(*d*) Develop and implement policies that encourage the sustainable management of forests to provide a wide range of goods and services and that also contribute to poverty reduction and the development of rural communities;

(*e*) Promote efficient production and processing of forest products, with a view, inter alia, to reducing waste and enhancing recycling;

(*f*) Support the protection and use of traditional forest-related knowledge and practices in sustainable forest management with the approval and involvement of the holders of such knowledge, and promote fair and equitable sharing of benefits from their utilization, in accordance with national legislation and relevant international agreements;

(*g*) Further develop and implement criteria and indicators for sustainable forest management that are consistent with national priorities and conditions;

(*h*) Create enabling environments to encourage private-sector investment, as well as investment by and involvement of local and indigenous communities, other forest users and forest owners and other relevant stakeholders, in sustainable forest management, through a framework of policies, incentives and regulations;

(*i*) Develop financing strategies that outline the short-, medium- and long-term financial planning for achieving sustainable forest management, taking into account domestic, private-sector and foreign funding sources;

(*j*) Encourage recognition of the range of values derived from goods and services provided by all types of forests and trees outside forests, as well as ways to reflect such values in the marketplace, consistent with relevant national legislation and policies;

(*k*) Identify and implement measures to enhance cooperation and cross-sectoral policy and programme coordination among sectors affecting and affected by forest policies and management, with a view to integrating the forest sector into national decision-making processes and promoting sustainable forest management, including by addressing the underlying causes of deforestation and forest degradation, and by promoting forest conservation;

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[8] The elements are (i) extent of forest resources; (ii) forest biological diversity; (iii) forest health and vitality; (iv) productive functions of forest resources; (v) protective functions of forest resources; (vi) socio-economic functions of forests; and (vii) legal, policy and institutional framework.

(*l*) Integrate national forest programmes, or other strategies for sustainable forest management, as referred to in paragraph 6 (*a*) above, into national strategies for sustainable development, relevant national action plans and poverty-reduction strategies;

(*m*) Establish or strengthen partnerships, including public-private partnerships, and joint programmes with stakeholders to advance the implementation of sustainable forest management;

(*n*) Review and, as needed, improve forest-related legislation, strengthen forest law enforcement and promote good governance at all levels in order to support sustainable forest management, to create an enabling environment for forest investment and to combat and eradicate illegal practices, in accordance with national legislation, in the forest and other related sectors;

(*o*) Analyse the causes of, and address solutions to, threats to forest health and vitality from natural disasters and human activities, including threats from fire, pollution, pests, disease and invasive alien species;

(*p*) Create, develop or expand, and maintain networks of protected forest areas, taking into account the importance of conserving representative forests, by means of a range of conservation mechanisms, applied within and outside protected forest areas;

(*q*) Assess the conditions and management effectiveness of existing protected forest areas with a view to identifying improvements needed;

(*r*) Strengthen the contribution of science and research in advancing sustainable forest management by incorporating scientific expertise into forest policies and programmes;

(*s*) Promote the development and application of scientific and technological innovations, including those that can be used by forest owners and local and indigenous communities to advance sustainable forest management;

(*t*) Promote and strengthen public understanding of the importance of and the benefits provided by forests and sustainable forest management, including through public awareness programmes and education;

(*u*) Promote and encourage access to formal and informal education, extension and training programmes on the implementation of sustainable forest management;

(*v*) Support education, training and extension programmes involving local and indigenous communities, forest workers and forest owners, in order to develop resource management approaches that will reduce the pressure on forests, particularly fragile ecosystems;

(*w*) Promote active and effective participation by major groups, local communities, forest owners and other relevant stakeholders in the development, implementation and assessment of forest-related national policies, measures and programmes;

(*x*) Encourage the private sector, civil society organizations and forest owners to develop, promote and implement in a transparent manner voluntary instruments, such as voluntary certification systems or other appropriate mechanisms, to develop and promote forest products from sustainably managed forests harvested in accordance with domestic legislation, and to improve market transparency;

(*y*) Enhance access by households, small-scale forest owners, forest-dependent local and indigenous communities, living in and outside forest areas, to forest resources and relevant markets in order to support livelihoods and income diversification from forest management, consistent with sustainable forest management.

VI. International cooperation and means of implementation

7. To achieve the purpose of the present instrument, Member States should:

(*a*) Make concerted efforts to secure a sustained high-level political commitment to strengthen the means of implementation of sustainable forest management, including financial resources, to provide support, in particular for developing countries and countries with economies in transition, as well as to mobilize and provide significantly increased, new and additional financial resources from private, public, domestic and international sources to and within developing countries, as well as countries with economies in transition;

(*b*) Reverse the decline in official development assistance for sustainable forest management and mobilize significantly increased, new and additional financial resources from all sources for the implementation of sustainable forest management;

(*c*) Take action to raise the priority of sustainable forest management in national development plans and other plans, including poverty-reduction strategies, in order to facilitate increased allocation of official development assistance and financial resources from other sources for sustainable forest management;

(*d*) Develop and establish positive incentives, in particular for developing countries as well as countries with economies in transition, to reduce the loss of forests, to promote reforestation, afforestation and rehabilitation of degraded forests, to implement sustainable forest management and to increase the area of protected forests;

(*e*) Support the efforts of countries, particularly developing countries as well as countries with economies in transition, to develop and implement economically, socially and environmentally sound measures that act as incentives for the sustainable management of forests;

(*f*) Strengthen the capacity of countries, in particular developing countries, to significantly increase the production of forest products from sustainably managed forests;

(*g*) Enhance bilateral, regional and international cooperation with a view to promoting international trade in forest products from sustainably managed forests harvested according to domestic legislation;

(*h*) Enhance bilateral, regional and international cooperation to address illicit international trafficking in forest products through the promotion of forest law enforcement and good governance at all levels;

(*i*) Strengthen, through enhanced bilateral, regional and international cooperation, the capacity of countries to combat effectively illicit international trafficking in forest products, including timber, wildlife and other forest biological resources;

(*j*) Strengthen the capacity of countries to address forest-related illegal practices, including wildlife poaching, in accordance with domestic legislation, through enhanced public awareness, education, institutional capacity-building,

technological transfer and technical cooperation, law enforcement and information networks;

(*k*) Enhance and facilitate access to and transfer of appropriate, environmentally sound and innovative technologies and corresponding know-how relevant to sustainable forest management and to efficient value-added processing of forest products, in particular to developing countries, for the benefit of local and indigenous communities;

(*l*) Strengthen mechanisms that enhance sharing among countries and the use of best practices in sustainable forest management, including through freeware-based information and communications technology;

(*m*) Strengthen national and local capacity in keeping with their conditions for the development and adaptation of forest-related technologies, including technologies for the use of fuelwood;

(*n*) Promote international technical and scientific cooperation, including South-South cooperation and triangular cooperation, in the field of sustainable forest management, through the appropriate international, regional and national institutions and processes;

(*o*) Enhance the research and scientific forest-related capacities of developing countries and countries with economies in transition, particularly the capacity of research organizations to generate and have access to forest-related data and information, and promote and support integrated and interdisciplinary research on forest-related issues, and disseminate research results;

(*p*) Strengthen forestry research and development in all regions, particularly in developing countries and countries with economies in transition, through relevant organizations, institutions and centres of excellence, as well as through global, regional and subregional networks;

(*q*) Strengthen cooperation and partnerships at the regional and subregional levels to promote sustainable forest management;

(*r*) As members of the governing bodies of the organizations that form the Collaborative Partnership on Forests, help ensure that the forest-related priorities and programmes of members of the Partnership are integrated and mutually supportive, consistent with their mandates, taking into account relevant policy recommendations of the United Nations Forum on Forests;

(*s*) Support the efforts of the Collaborative Partnership on Forests to develop and implement joint initiatives.

VII. Monitoring, assessment and reporting

8. Member States should monitor and assess progress towards achieving the purpose of the present instrument.

9. Member States should submit, on a voluntary basis, taking into account the availability of resources and the requirements and conditions for the preparation of reports for other bodies or instruments, national progress reports as part of their regular reporting to the Forum.

VIII. Working modalities

10. The Forum should address, within the context of its multi-year programme of work, the implementation of the present instrument.

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Item 5 (a) of the provisional agenda*
Forests in a changing environment

Forests and climate change

Report of the Secretary-General**

Summary

Climate change poses a very serious threat to forests throughout the world and to millions of people who depend on forests to various degrees for their livelihoods, shelter, food and water. The present report examines the impact of climate change on forests and sustainable forest management, addresses the important roles that forests can play in mitigating and adaptation to climate change and identifies possible actions on the part of the United Nations Forum on Forests to that end.

Globally, forest ecosystems in 2005 contained 638 billion tons of carbon, half of it (321 billion tons) in forest biomass and dead wood. The amount of carbon in forests is greater than the amount of carbon currently in the atmosphere. Deforestation and forest degradation are the primary drivers of carbon emissions from forests, accounting for 17.4 per cent of total human-generated carbon dioxide emissions in 2004. Reducing emissions from deforestation and forest degradation, and ensuring the sustainable management and conservation of forests can contribute significantly to mitigating climate change.

Any decision by the secretariat of the United Nations Framework Convention on Climate Change on issues regarding reducing emissions from deforestation and forest degradation may open up new prospects for a funding source for the sustainable management and conservation of forests in the post-2012 Kyoto Protocol commitment period.

* E/CN.18/2009/1.

** The issuance of the present report was delayed owing to the need for extended consultations.

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Consideration should be given to closer cooperation between the Forum on Forests and the secretariats of the Framework Convention on Climate Change, the Convention on Biological Diversity and the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, as well as among member organizations of the Collaborative Partnership on Forests, on the role of forests in mitigating and adapting to climate change.

Contents

I. Introduction

1. The non-legally binding instrument on all types of forests, hereinafter referred to as the forest instrument, agreed upon by the United Nations Forum on Forests at its seventh session, was adopted by the General Assembly on 17 December 2007 (see resolution 62/98, annex). In the preambular part of the forest instrument, Member States recognized the impact of climate change on forests and sustainable forest management, as well as the important contributions that forests can make to addressing climate change. At its seventh session, the Forum also adopted the multi-year programme of work for the period 2007-2015, which calls for the eighth session, to be held in 2009, to address the issue of forests in a changing environment, including the themes "forests and climate change", "reversing the loss of forest cover, preventing forest degradation in all types of forests and combating desertification, including in low forest cover countries" and "forests and biodiversity conservation, including protected areas". The present report addresses the first of those interconnected themes, the other two being the focus of separate reports of the Secretary-General. This issue is also of great importance to the member organizations of the Collaborative Partnership on Forests (CPF), which together have prepared a paper for the session entitled "Strategic framework for forests and climate change: a proposal by the Collaborative Partnership on Forests for a coordinated forest-sector response to climate change".

2. Although the issue of forests and climate change was discussed by the Forum's predecessors, the Intergovernmental Panel on Forests (IPF) and the Intergovernmental Forum on Forests (IFF), no proposals for action were agreed upon regarding the issue.[1] With the adoption of the programme of work for the period 2007-2015, the Forum has the opportunity to effectively engage in addressing and supporting the global climate change agenda as it pertains to forests.

3. The present report draws on various sources, including the work of the secretariat of the United Nations Framework Convention on Climate Change, the Intergovernmental Panel on Climate Change and general literature. Contributions from member organizations of the Collaborative Partnership on Forests, particularly the strategic framework, were important in its elaboration. Proposals and recommendations of the Secretary-General are presented in his report on recommendations for addressing key challenges of forests in a changing environment (E/CN.18/2009/8).

II. Forests as a microcosm of sustainable development

4. In addressing the issue of forests and climate change, care must be taken to consider the full scope of forests in sustainable development. Forests provide much more than the carbon sequestration valued in the context of climate change, and it would be a mistake to let that one issue dominate the global forest agenda. If a single good or service among the many covered by sustainable forest management is the subject of a disproportionate focus, including significant financing, there is a

[1] United Nations Forum on Forests secretariat, Subject index and thematic clustering of the IPF/IFF proposals for action, United Nations Forum on Forests resolutions and decisions and relevant Economic and Social Council resolutions, 2007 (*unpublished*).

risk that sustainable forest management could be distorted to the detriment of other goods and services.

5. In the forest instrument, Member States recognized that forests and trees outside forests provide multiple economic, social and environmental benefits and that sustainable forest management contributes significantly to sustainable development and poverty eradication. As is set out, in its statement of purpose, the forest instrument is aimed at enhancing the contribution of forests to the achievement of the internationally agreed development goals, including the Millennium Development Goals, in particular with respect to the eradication of extreme poverty and hunger and environmental sustainability.

6. Forests contribute to the livelihoods of at least 1.6 billion people. Some 60 million people, mainly indigenous communities, live within forests, and another 350 million people are highly dependent on forests. Forest industries, both formal and informal, employ 50 million people. It is estimated that the annual value of international trade in forest products is approximately $270 billion, with 20 per cent corresponding to developing countries. The forest sector continues to grow in economic importance.[2]

7. Forests are critically important for maintaining vital ecosystem functions and the services required for sustainable development, such as the conservation of biodiversity, soil conservation, carbon sequestration, water quality and supply, flood control and climate regulation. It is estimated that at least 80 per cent of the Earth's remaining terrestrial biodiversity is found in forests, which are also a major carbon sink for regulating the global climate (see sect. III below).

8. Given the importance of forests to sustainable development, societal well-being and the provision of key environmental services, climate change poses a very serious threat not only to forests and forest ecosystems but also to millions of people who depend on forests to various degrees for their livelihoods, shelter, food and water.

III. Forests in the climate change equation

9. Anthropogenic greenhouse gas emissions, principally carbon dioxide, are the main causes of climate change, including global warming. Over the past century, there has been an average temperature increase of 0.74°C, and 11 of the 12 years from 1995 to 2006 rank among the 12 warmest years since 1850. Projected increases in the frequency and intensity of storms, floods, heat waves and drought will affect the lives of billions of people worldwide. It has been projected by the Intergovernmental Panel on Climate Change that, if the current trend continues unabated, global temperature will have increased by 1.8 to 4°C by the end of this century, affecting most severely the planet's poorest and most vulnerable and disadvantaged people.[3]

10. According to the Intergovernmental Panel on Climate Change, the largest increase in greenhouse gas emissions in the period from 1970 to 2004 resulted from

[2] World Bank, *Forests Sourcebook* (World Bank, Washington, D.C., 2006).

[3] United Nations Environment Programme, *Global Environment Outlook: Environment for Development (GEO-4), Summary for Decision Makers* (Valletta, 2007), p. 8.

the energy supply, transport and industry sectors, with lower increases for residential and commercial buildings and the forest and agriculture sectors. In 2004, it was estimated that energy supply accounted for 25.9 per cent of all greenhouse gas emissions; industry, for 19.4 per cent; and forests, for 17.4 per cent, owing primarily to deforestation and forest degradation.[4]

11. The parties to the United Nations Framework Convention on Climate Change, in decision 5/CP.13, welcomed the fourth assessment report of the Intergovernmental Panel on Climate Change, recognizing it as the most comprehensive and authoritative assessment on climate change to date. The fourth assessment report addresses options for limiting greenhouse gas emissions and mitigating climate change, and concludes that unmitigated climate change would, in the long term, be likely to exceed the capacity of natural, managed and human systems to adapt. For the lowest mitigation scenario category assessed, emissions would need to peak by 2015, and for the highest, by 2090.[5]

A. Impact of climate change on forests

12. The impact of climate change on forests can be negative or positive, depending on their geographic location. The impact in drylands or lands with lower precipitation rates, particularly in Africa and Asia, of increased temperatures and a drop in rainfall will have far-reaching consequences for forests and the forest-dependent poor, who are already highly vulnerable. In other regions, such as eastern Central America, there have been increases in precipitation, which can be beneficial, although higher temperatures and drought during El Niño episodes can still adversely affect forest ecology.

13. Climate change is having a significant effect on forests through changes in their physiology, structure, species composition and health, largely resulting from changes in temperature and rainfall. Also at risk are the important environmental services that they provide. Of particular concern are the effects that increased temperatures and drought are having on forest health and productivity: more frequent outbreaks of pest infestations, more forest fires and increasing alterations in the populations of plant and animal species.

14. In its fourth assessment report, the Intergovernmental Panel on Climate Change projected that by 2050 increases in temperature and associated decreases in soil water would lead to the gradual replacement of tropical forests by savannahs in eastern Amazonia. Many tropical forests in Latin America will experience a loss in biodiversity.[6] It is projected that by 2030, productivity from forests will have declined over much of southern and eastern Australia and parts of eastern New Zealand as a result of drought and fire.[7]

15. One of the most publicized examples of the effects of climate change is the catastrophic infestation, owing to increased temperatures, of trees in Canada by the mountain pine beetle (*Dendroctonus ponderosae*), which has devastated large

[4] Intergovernmental Panel on Climate Change, *Climate Change 2007: Synthesis Report*, available at http://www.ipcc.ch/ipccreports/ar4-syr.htm.

[5] Ibid.

[6] Ibid.

[7] Ibid.

expanses of forests there. In the period from 1997 to 2007, an estimated 13 million hectares, or 130,000 km^2, were destroyed by that pest in western Canada. This destruction is one order of magnitude greater than that caused by any previous outbreak.[8]

16. Global warming due to climate change can also have some positive effects on forest ecosystems, for example by providing longer growing seasons, especially in temperate and boreal regions, leading to faster growth. However, unpredictable changes in composition of flora and fauna and other environmental factors should not be underestimated.

B. Impact of deforestation and forest degradation on climate

17. Carbon, which is stored in large amounts in trees, understory vegetation and forest soils, is the key component of the main greenhouse gas contributing to global warming. Globally, forest ecosystems contained 638 billion tons of carbon in 2005, half of it (321 billion tons) in forest biomass and dead wood. The amount of carbon in forests is greater than the amount of carbon currently in the atmosphere.[9]

18. Deforestation and forest degradation in developing countries are among the primary sources of carbon emissions from forests, as carbon stored in trees and soil is quickly released into the atmosphere by burning forests. In 2004, the forest sector accounted for release of approximately 8.5 billion tons of carbon dioxide, mostly from deforestation, which is equivalent to 17.4 per cent of total human-generated carbon dioxide emissions.[4]

19. In contributing to forest degradation and destruction, climate change is also exacerbating the release of carbon dioxide and further compounding global warming. For example, it is estimated that the cumulative impact of the destruction of forests in western Canada by the mountain pine beetle in the period from 2000 to 2020 as a result of warmer temperatures will be 270 million tons of carbon, an amount equivalent to the reduction in gas emissions by 2012 to which Canada committed itself under the Kyoto Protocol.[10]

IV. Role of forests in responding to climate change

20. Discussion of the role of forests in addressing climate change has been a long and ongoing process. The United Nations Framework Convention on Climate Change, which was adopted in 1992, recognizes the importance of forests as a sink for greenhouse gases. In article 4, paragraph 1 (d) of the Convention, parties commit themselves to promoting sustainable management, and promoting and cooperating in the conservation and enhancement, as appropriate, of sinks and reservoirs of all greenhouse gases not controlled by the Montreal Protocol, including biomass, forests and oceans as well as other terrestrial, coastal and marine ecosystems.

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[8] Brian Hoyle (2008), "Plight of the pines", *Nature Reports Climate Change*, available at http://www.nature.com/climate/2008/0805/full/climate.2008.35.html.

[9] Food and Agriculture Organization of the United Nations, *Global Forest Resources Assessment 2005*, Forestry Paper 147 (FAO, Rome, 2005), pp. 34 and 35.

[10] W. A. Kurtz and others, "Mountain pine beetle and forest carbon feedback to climate change", *Nature* (24 April 2008), pp. 987-990.

21. Several articles of the Kyoto Protocol, adopted in 1997, including, in particular, article 3, paragraph 3, make provision for the inclusion of land use, land-use change and forestry activities by parties as part of their efforts to implement the Protocol and contribute to the mitigation of climate change. Article 12 of the Protocol defines the clean development mechanism that allows emission-reduction projects in developing countries to earn certified emission reduction credits. Such credits can be traded, sold and used by industrialized countries to meet a part of their emission-reduction targets. It should be noted, however, that, under the clean development mechanism, with regard to forestry, only afforestation and reforestation activities are considered eligible.[11]

22. Despite the provision for the inclusion of afforestation and reforestation projects in the clean development mechanism, owing to various methodological and policy constraints, so far only a negligible number of such projects on forests have been registered.

23. More recently, forests have been receiving greater attention in climate change deliberations, not only because of their role in mitigating and adapting to climate change, but also because of growing concerns about carbon emissions resulting from deforestation and forest degradation in developing countries, where emissions are considerable and increasing. Deforestation and forest degradation are receiving particular attention owing to their significant contribution to global carbon emissions. Deforestation is causing 35 per cent of emissions in developing countries, and in the least developed countries the figure is as high as 65 per cent.[12]

24. The inclusion of the issue of deforestation and forest degradation in developing countries in the context of combating global warming is gaining ground in international negotiations and public discussions. The discussions include various options for public payments and market-based mechanisms to avoid deforestation and degradation.

25. The Bali Action Plan, adopted by the Conference of the Parties to the United Nations Framework Convention on Climate Change in December 2007 (decision 1/CP.13), is a two-year process aimed at finalizing a post-2012 regime for the Kyoto Protocol at the fifteenth session of the Conference of the Parties, to be held in December 2009. The Bali Action Plan established the Ad Hoc Working Group on Long-Term Cooperative Action under the Convention to conduct the long-term cooperative action process, which should be complete by the end of 2009. Issues to be considered include a shared vision for long-term cooperative action, mitigation, adaptation, technology development and transfer, as well as finance. In particular, the Bali Action Plan will address mitigation action by considering policy approaches and positive incentives on issues relating to reducing emissions from deforestation and forest degradation in developing countries; and the role of conservation, sustainable management of forests and enhancement of forest carbon stocks in developing countries.

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[11] See decision 17/CP.7 of the Conference of the Parties to the United Nations Framework Convention on Climate Change and decisions 3/CMP.1, 5/CMP.1, 6/CMP.1 and 16/CMP.1 of the Conference of the Parties serving as the Meeting of the Parties to the Kyoto Protocol.

[12] Food and Agriculture Organization of the United Nations, *State of the World's Forests 2007* (FAO, Rome, 2007), p. 75.

26. To this end, the forest instrument can provide a framework for closer cooperation and collaboration between the Forum on Forest and the Framework Convention on Climate Change. Global objectives on forests 1 and 3 of the forest instrument aim, respectively, to reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation, and to increase significantly the area of protected forests worldwide and other areas of sustainably managed forests, and increase the proportion of forest products from sustainably managed forests. Moreover, the IPF and IFF proposals for action and resolutions of the Forum provide a policy body of work which addresses the drivers of deforestation and forest degradation at the national and international levels that can contribute significantly to reducing emissions from deforestation and forest degradation and that can enhance forest carbon stocks through sustainable forest management.

V. Importance of reducing emissions from deforestation and forest degradation

27. Reducing emissions from deforestation and forest degradation was first addressed as an agenda item at the eleventh session of the Conference of the Parties to the of the United Nations Framework Convention on Climate Change, held in Montreal in 2005. Two years later, the Conference of the Parties adopted the Bali Action Plan. In anticipation of an agreement at the fifteenth session of the Conference of the Parties, a number of activities supported by substantial financial resources have been initiated in pursuit of the objectives relating to reducing emissions from deforestation and forest degradation since the thirteenth session of the Conference of the Parties.

28. In its decision 2/CP.13, entitled “Reducing emissions from deforestation in developing countries: approaches to stimulate action”, the Conference of the Parties acknowledged that deforestation and forest degradation result in global anthropogenic greenhouse gas emissions and that such emissions need to be urgently addressed. It also noted that the reduction of emissions from deforestation and forest degradation in developing countries requires stable and predictable resources. It also requested the Subsidiary Body for Scientific and Technological Advice of the Framework Convention on Climate Change to work on methodological issues — including estimating and monitoring changes in forest cover and associated carbon stocks and greenhouse gas emissions — related to a range of policy approaches and incentives for reducing emissions from deforestation and forest degradation in developing countries. At the twenty-ninth session of the Subsidiary Body for Scientific and Technological Advice, held during the fourteenth session of the Conference of the Parties, the Subsidiary Body adopted a number of significant conclusions in this regard.[13] The Subsidiary Body, inter alia,

(a) Requested its Chair to organize an expert meeting to focus on methodological issues relating to reference emission levels for deforestation and forest degradation; the relationship among the reference emission levels and

[13] See FCCC/SBSTA/2008/L.23. In due course, the relevant meeting reports will be available at the website of the United Nations Framework Convention on Climate Change.

relevant reference levels; and the role and contribution of conservation, sustainable management of forests, changes in forest cover and associated carbon stocks and greenhouse gas emissions and the enhancement of forest carbon stocks to enhance action on mitigation of climate change and to the consideration of reference levels;

(b) Recommended methodological guidance noting the importance of, inter alia, promoting the readiness of developing countries, and further mobilization of resources, in relation to decision 2/CP.13, and recognizing the need to promote the full and effective participation of indigenous people and local communities, taking into account national circumstances and noting relevant international agreements;

(c) Recommended taking into account methodological guidance, including, inter alia, the use of the *Revised 1996 IPCC Guidelines for National Greenhouse Inventories*, and encouraging the use of the *Good Practice Guidance for Land Use, Land-use Change and Forestry*, as appropriate;

(d) Requested the secretariat to prepare a technical paper on the cost of implementing methodologies and monitoring systems;

(e) Invited parties and accredited observers to submit, if appropriate, their views on issues relating to indigenous people and local communities for the development and application of methodologies;

(f) Recognized the importance of coordination among parties, organizations and relevant non-governmental organizations, and requested its Chair to explore ways of facilitating the coordination of the activities;

(g) Concluded that guidance from the Ad Hoc Working Group on Long-Term Cooperative Action would facilitate further progress on methodological issues.

29. Accordingly, in order for the initiative to reduce emissions from deforestation and forest degradation to be finalized, further negotiations are needed, including on technical, methodological and policy issues, such as the rights of stakeholders, in particular indigenous peoples, and the opportunity costs of other land uses and forest management systems. There is also a concern that it should not put at a disadvantage those countries that have already taken steps to eliminate or reduce deforestation and to manage their forests sustainably, including through conserving carbon held in forests. Another concern repeatedly expressed by stakeholders is the need for a comprehensive approach to forests and sustainable forest management that goes beyond emission and carbon potentials of forests.

30. Most of the current investment in and financial flows to the forest sector are not directed at addressing climate change, and less than 25 per cent is invested in developing countries and countries with economies in transition. Current financial and investment flows fall far short of what is needed in order for sustainable forest management to contribute to poverty alleviation, sustainable economic growth and the effective protection of critical environmental services in developing countries and countries with economies in transition.[14]

31. Reducing deforestation and forest degradation in the tropics has the biggest mitigation potential in the forest sector. The financial flow required for reducing

[14] United Nations Framework Convention on Climate Change, *Investment and financial flows to address climate change* (Bonn, Germany, 2007), p. 78.

deforestation and forest degradation is estimated as the opportunity cost of converting forests to other land uses, which can differ from one country to another according to the direct drivers (commercial agriculture, subsistence farming and wood extraction).[15] Based on the Global Forest Resources Assessment update (FRA 2005) figure that 12.9 million hectares of forest cover were lost per year in the period from 2000 to 2005, it is estimated that the opportunity cost for reducing emissions from deforestation and forest degradation is $12.2 billion per year. This would result in a reduction of 5.8 billion tons of carbon dioxide emissions by 2030.[16]

32. During the thirteenth session of the Conference of the Parties to the United Nations Framework Convention on Climate Change, held in Bali, the Government of Norway announced its willingness to provide $600 million annually towards efforts to reduce carbon emissions from deforestation and forest degradation in developing countries. The United Nations Environment Programme (UNEP), the United Nations Development Programme (UNDP) and the Food and Agriculture Organization of the United Nations (FAO) have established the United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries with the short-term aim of working with countries in the development of national strategies to build monitoring, reporting and verification capacity. The Collaborative Programme is expected to provide inputs on experiences gained for negotiations in the context of the Framework Convention on Climate Change, including the negotiation of a new international climate change agreement that takes into account emissions from deforestation and forest degradation, which should be concluded at the fifteenth session of the Conference of the Parties, to be held in Copenhagen in December 2009. The Collaborative Programme is initiating quick-start actions for pilot projects in six developing countries — two each in Africa, Asia and Latin America.[17]

VI. Opportunities and challenges for the forest sector

A. Opportunities

33. Forests provide great opportunities for adaptation to climate change by increasing the resilience of people and ecosystems. They will also be a major mitigation option over the next 30 to 40 years and represent a necessary transitional measure towards a low-carbon economy. However, given the wide range of goods and services provided by forests, mitigation and adaptation options in the forest sector need to be fully understood and used in the context of promoting sustainable development. Moreover, if forests are to effectively contribute to climate change solutions, countries, and the international community as a whole, will need to address several critical governance issues affecting forests, including those relating to rights, tenure, access, land-use planning, benefit-sharing, institutional and cross-sectoral coordination and law enforcement.

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[15] Ibid., pp. 80 and 81.

[16] Ibid., table IV-35, p. 81.

[17] Communication to the Office of the Secretary-General from the Permanent Mission of Norway to the United Nations, 21 July 2008.

34. CPF provides a unique opportunity for a more comprehensive strategic approach to addressing every aspect of sustainable forest management, including those aspects related to climate change. The strategic framework for forests and climate change proposed by CPF provides a strong argument in support of the strategic role that sustainable forest management can play in achieving long-term climate change mitigation and a robust and flexible framework for effective adaptation to climate change.

Key messages of the strategic framework for forests and climate change of the Collaborative Partnership on Forests

The strategic framework for forests and climate change, prepared by the Collaborative Partnership on Forests (CPF) for the eighth session of the Forum on Forests, provides a good foundation for discussing the issue of forests and climate change, including an analysis of mitigation and adaptation. It also addresses the key subject of the monitoring and verification of carbon stock in forests and emissions from deforestation and forest degradation. The framework presents six messages to the international community:

Message 1: Sustainable forest management provides an effective framework for forest-based climate change mitigation and adaptation.

Message 2: Forest-based climate change mitigation and adaptation measures should proceed concurrently.

Message 3: Intersectoral collaboration, economic incentives and the provision of alternative livelihoods are essential for reducing deforestation and forest degradation.

Message 4: Capacity-building and governance reforms are urgently required.

Message 5: Accurate forest monitoring and assessment helps informed decision-making but requires greater coordination at all levels.

Message 6: CPF members are committed to a collaborative and comprehensive approach to forest-based climate change mitigation and adaptation.

35. Several CPF member organizations, including the World Bank, the International Tropical Timber Organization, FAO, UNEP and UNDP, are already mobilizing substantial funds in preparing for and implementing initiatives to reduce emissions from deforestation and forest degradation. At the same time, however, the forest community needs to intensify its efforts to coordinate activities to address gaps and identify solutions. In this context, closer collaboration and cooperation between the Forum on Forests and CPF members would be desirable.

B. Constraints and challenges

36. The issue of forests and climate change is complicated and requires closer collaboration among leading players. For example, at its twenty-ninth session, the Subsidiary Body for Scientific and Technological Advice emphasized the need for further coordination of activities among parties, organizations and civil society. As the CPF strategic framework makes clear, intersectoral collaboration, economic incentives and the provision of alternative livelihoods are essential for reducing deforestation and forest degradation.

37. Opportunities for synergies in the context of reduction of emissions from deforestation and forest degradation should be explored with a view to reinforcing the implementation of mitigation measures aimed at achieving such reductions and the promotion of sustainable forest management in developing countries (see E/CN.18/2008/2, sect. V).

38. One principal concern is the fact that, when one single good or service, among the many covered by sustainable forest management, attracts significant finance, there is a risk that it can distort or skew the goals of sustainable forest management to the detriment of other goods and services.

39. The development of a mechanism for reduction of emissions from deforestation and forest degradation must be based on sound methodologies for estimating and monitoring changes in forest cover and associated carbon stocks and greenhouse gas emissions, incremental changes owing to the sustainable management of forests, and reductions in emissions resulting from deforestation and forest degradation. The methodological challenges involved have proved to be much more complicated for forest degradation than for deforestation. A workshop organized by the secretariat of the Framework Convention on Climate Change on methodological issues related to reduction of emissions from deforestation and forest degradation in developing countries, held in Tokyo in 2008, concluded that addressing the issue of emissions from forest degradation was more difficult than addressing the issue of emissions from deforestation. It was also noted that there are different types of forest degradation, and some may be easier to measure than others (FCCC/SBSTA/2008/11, para. 46).

40. Many developing countries would need extensive capacity-building and training activities on monitoring, reporting and verification in order to be able to effectively apply the methodologies for estimating and monitoring carbon emissions from deforestation and forest degradation. Such an undertaking would require adequate financial resources. In addition, capacity-building, institutional development and training are needed for those countries not able to meet even the minimum requirements for sustainable forest management in the context of the objectives of the initiative, and even for those that are closer to achieving the capacity to incorporate monitoring, reporting and verification into their national processes.

41. The issue of forests and climate change affects a wide range of stakeholders, who need to be taken into account. The Forest Dialogue has brought many of those stakeholders together, and, in 2008, in a joint statement entitled “Beyond REDD: the role of forests in climate change”, they expressed their concern that the implementation of measures for forest-related climate change mitigation and adaptation provides not only opportunities, but also risks for indigenous peoples and

other marginalized groups. Five principles were listed that should be considered in guiding post-2012 arrangements on climate change:

(a) Ensuring that forest-related climate change options support sustainable development in both forest-rich and forest-poor countries;

(b) Tackling the drivers of deforestation that lie outside the forest sector;

(c) Supporting transparent, inclusive and accountable forest governance;

(d) Encouraging local processes to clarify and strengthen tenure, property and carbon rights, giving full recognition to indigenous peoples, small-forest owners, the forest workplace and local communities;

(e) Providing substantial additional funding to build the capacity to put the above principles in practice.

C. Promoting climate change mitigation and adaptation strategies in national forest programmes

42. If mitigation and adaptation options in the forest sector are to be successful, they need to be fully understood and used in the context of promoting sustainable development.[18] Mitigation and adaptation strategies in response to climate change will need to be developed and integrated into national forest programmes and, in turn, into national development strategies. Innovative and emerging solutions are required, supported by economic policy instruments and public and private sector investment in sustainable forest management technologies and carbon sequestration approaches — many of which are already being used. The Forum on Forests, with the support of the Collaborative Partnership on Forests, could contribute to such a process.

43. The Intergovernmental Panel on Climate Change defines mitigation as "An anthropogenic intervention to reduce the anthropogenic forcing of the climate system; it includes strategies to reduce greenhouse gas sources and emissions and enhancing greenhouse gas sinks".[19] Mitigation measures for reducing emissions from deforestation and forest degradation in the forest sector are promising. The Panel has identified a number of available technologies and practices: afforestation; reforestation; forest management; reduced deforestation; harvested wood production management; use of forest products for bioenergy and to replace fossil fuels; tree species improvement to increase biomass production and carbon sequestration; improved remote-sensing technologies for analysis of vegetation/soil carbon sequestration potential; and the mapping of land-use change.

44. The policy measures required are financial incentives to increase forest area, reduce deforestation, rehabilitate degraded forests, maintain and sustainably manage forests; and land-use regulation and enforcement. Such policies and corresponding mitigation measures would contribute to poverty alleviation.[4]

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[18] J. Blaser and C. Robledo, "Not for timber alone — the role of forests in climate change", presentation made at Washington, D.C., 2008.

[19] Intergovernmental Panel on Climate Change, *Climate Change 2007: Impacts, Adaptation and Vulnerability*, contribution of Working Group II to the fourth assessment report, 2007, appendix I.

45. Adaptation is defined by the Intergovernmental Panel as "Initiatives and measures to reduce the vulnerability of natural and human systems against actual or expected climate change effects".[20] Adaptation is divided into three principal types: anticipatory adaptation, which refers to actions taken before the impacts of climate change are observed; autonomous adaptation, also known as spontaneous adaptation, which is not a conscious response but one that is prompted by ecological changes in natural systems or in human systems; and planned adaptation, which is the product of deliberate policy decisions, based on an awareness of changing conditions and that actions are required to return to, maintain or reach a desired state.[19] While mitigation measures aim to fix and maintain carbon, adaptation seeks to increase the resilience of people and ecosystems.[18]

46. According to the Intergovernmental Panel, key vulnerabilities exist in the short term in the form of drought, insects and fire. Models used by the Panel indicate that there will be significant forest dieback towards the end of this century and beyond in tropical, boreal and mountain areas, accompanied by the loss of key services. Losses of biodiversity are projected, particularly in tropical forest diversity hot spots such as north-eastern Amazonia and tropical Africa. Mountain forests are being affected, with a loss of high-altitude habitats.

47. Adaptation practices fall into three different temporal categories: responses to current variability, which can take advantage of lessons learned from past adaptations; responses to observed medium- and long-term climate trends; and anticipatory planning in response to model-based scenarios of long-term climate change.[21] Most practices in the forest sector fall under the first category and include:

(a) Season climate forecasting, as in the case of El Niño-Southern Oscillation;

(b) Disease surveillance systems;

(c) Regulation and rationing of the usage of water provided by forests;

(d) Strategies for drought and coastal management;

(e) Strategies for preventing and combating forest fires, including the construction of fire lines and controlled burning;

(f) Reforestation of mangroves;

(g) Utilization of drought and fire-resistant tree species, such as teak, in tropical forest plantations;

(h) Establishment of biological reserves and ecological corridors for protecting ecosystems from the impact of climate change;

(i) Compensation paid to forest owners for environmental services provided by those forests to society.

48. Adaptive capacity — the ability or potential of a system to respond successfully to climate change — is a prerequisite for the design and

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[20] Intergovernmental Panel on Climate Change, *Climate Change 2007: Synthesis Report*, annex II, available at http://www.ipcc.ch/ipccreports/ar4-syr.htm.

[21] Intergovernmental Panel on Climate Change, *Climate Change 2007: Impacts, Adaptation and Vulnerability*, chap. 17.2.

implementation of effective adaptation strategies. For most developing countries, capacity-building and technology transfer will be required. Successful adaptation to climate change is complex and can be difficult. Policy and planning processes need to take into account the fact that capacities for adaptation and the processes by which it occurs differ greatly within and across regions, countries, sectors and communities. Adaptation can be limited by the extent and rate of climate change, as well as by technological limitations, financial barriers, informational and cognitive barriers and social and cultural barriers. In most cases, adaptation is undertaken as part of broader social and development initiatives.[22]

49. Much of the focus on adaptation to climate change has been in the areas of energy demand, sea-level rise and coastal protection, water management, agriculture and infrastructure. Less attention has been paid to the forest sector. However, at its eighth session, the Forum on Forests will be afforded the opportunity to address this important issue in depth for the first time. Through the CPF global forest expert panel (formerly the joint initiative on science and technology), led by the International Union of Forest Research Organizations, with the participation of FAO, UNEP, the secretariat of the Convention on Biological Diversity, the Centre for International Forestry Research, the World Agroforestry Centre and the Forum secretariat, and following consultations during the seventh session of the Forum in 2007 and the twelfth session of the Subsidiary Body for Scientific, Technical and Technological Advice of the Convention on Biological Diversity, also in 2007, an expert panel on adaptation of forests to climate change has been established. The task of the expert panel is to assess the state of knowledge on the adaptation of forests and forest-dependent people to climate change. The assessment report, which includes current information about environmental and socio-economic impacts and vulnerabilities, as well as policy and management options for adaptation, has been prepared as a contribution to the discussion at the eighth session of the Forum under the agenda item “Forests in a changing environment”, specifically under the sub-item “Forests and climate change”.[23]

VII. Conclusions

50. **There is increasing evidence that climate change is seriously affecting forests throughout the world. Boreal, temperate, subtropical and tropical forests, including mangroves, are at risk throughout the world.**

51. **Forests are important for sustainable development, societal well-being and the provision of key environmental services. Climate change imposes additional stresses on millions of people on the Earth who depend on forests to different degrees for their livelihoods, shelter, food and water and, in particular, on the forest-dependent poor, who are already highly vulnerable.**

52. **Carbon, thought to be a leading element contributing to global warming, is stored in large amounts in forest ecosystems, which in 2005 were estimated to contain 638 billion tons of carbon. The amount of carbon in forests is greater than the amount of carbon currently in the atmosphere.**

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[22] Ibid., chap 17.4.

[23] See www.iufro.org/publications/view/article/2008/policies-and-instruments-for-the-adaptation-of-forests-and-the-forest-sector-to-impacts-of-climate-c/.

53. **Deforestation and forest degradation are the primary drivers of carbon emissions from forests, accounting in 2004 for 17.4 per cent of total human-generated carbon dioxide emissions.**

54. **By contributing to forest degradation and deforestation, climate change is also exacerbating the release of carbon dioxide and further compounding global warming.**

55. **Although forests can play an important role in addressing climate change, agreement on that role has been a continuing process in the negotiations and implementation of the United Nations Framework Convention on Climate Change and the Kyoto Protocol. Forests have great potential to contribute to the overall climate change strategy.**

56. **More recently, the issue of forests has been receiving attention in climate change negotiations, in particular with respect to the need for reductions in developing countries' emissions resulting from deforestation and forest degradation, which account for 35 per cent of emissions in developing countries and 65 per cent in the least developed countries.**

57. **The Bali Action Plan noted the importance of forests in mitigating and adapting to climate change. The fifteenth session of the Conference of the Parties to the Framework Convention on Climate Change, to be held in 2009, is expected to reach agreement on issues relating to reducing emissions from deforestation and forest degradation in developing countries, which will have a long-term impact on forest management and financial flows to forests in the future.**

58. **In addressing the issue of forests and climate change, care must be taken to consider the full scope of forests in sustainable development. Forests provide much more than the carbon sequestration valued in the context of climate change, and care should be taken so that that one issue does not dominate the global forest agenda.**

59. **The best opportunity for the Forum on Forests and its member States to contribute to the global climate change agenda appears to be through the promotion of sustainable forest management, including mitigation and adaptation measures related to climate change. Sustainable forest management can also contribute to addressing other environmental, social and economic challenges. In this context, the outcome of the negotiations under the Forum on financing sustainable forest management could contribute substantively to the ongoing climate change negotiations.**

60. **The Collaborative Partnership on Forests provides a unique opportunity for a more comprehensive strategic approach to addressing every aspect of sustainable forest management, including those aspects related to climate change.**

Economic and Social Council

Distr.: General
7 July 2017

2017 session
Agenda item 18 (*k*)

Resolution adopted by the Economic and Social Council on 20 April 2017

[*on the recommendation of the United Nations Forum on Forests (E/2017/10)*]

2017/4. United Nations strategic plan for forests 2017–2030 and quadrennial programme of work of the United Nations Forum on Forests for the period 2017–2020

The Economic and Social Council,

Recalling its resolution 2015/33 of 22 July 2015, in which it decided that the United Nations Forum on Forests should develop a concise strategic plan for the period 2017–2030 to serve as a strategic framework to enhance the coherence of and guide and focus the work of the international arrangement on forests and its components, and that it should consider proposals on the replacement of the reference to the Millennium Development Goals in paragraph 1 (*b*) of the non-legally binding instrument on all types of forests[1] with an appropriate reference to the Sustainable Development Goals and targets, and on the strategic plan for the period 2017–2030,

Recalling also General Assembly resolution 70/199 of 22 December 2015, in which the Assembly renamed the non-legally binding instrument on all types of forests as the United Nations forest instrument,

1. *Approves* the United Nations strategic plan for forests 2017–2030 contained in annex I to the present resolution, and recommends to the General Assembly its adoption prior to the twelfth session of the United Nations Forum on Forests;

2. *Also approves* the quadrennial programme of work of the Forum for the period 2017–2020 contained in annex II to the present resolution;

3. *Recommends* that the General Assembly amend the reference to the Millennium Development Goals in paragraph 1 (*b*) of the United Nations forest instrument[2] to read: "To enhance the contribution of forests to the achievement of the internationally agreed development goals, including the 2030 Agenda for Sustainable Development[3] and the Sustainable Development Goals".

21st plenary meeting
20 April 2017

[1] General Assembly resolution 62/98, annex.

[2] See General Assembly resolutions 62/98 and 70/199.

[3] General Assembly resolution 70/1.

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Annex I

United Nations strategic plan for forests 2017–2030

I. Introduction

A. Vision and mission

1. Forests are among the world's most productive land-based ecosystems and are essential to life on Earth. The United Nations strategic plan for forests 2017–2030 provides a global framework for action at all levels to sustainably manage all types of forests and trees outside forests, and to halt deforestation and forest degradation. The strategic plan also provides a framework for forest-related contributions to the implementation of the 2030 Agenda for Sustainable Development,[4] the Paris Agreement adopted under the United Nations Framework Convention on Climate Change,[5] the Convention on Biological Diversity,[6] the United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa,[7] the United Nations forest instrument[8] and other international forest-related instruments, processes, commitments and goals.

2. The strategic plan serves as a reference framework for the forest-related work of the United Nations system and for the fostering of enhanced coherence, collaboration and synergies among United Nations bodies and partners towards the vision and mission set out below. It also serves as a framework to enhance the coherence of and guide and focus the work of the international arrangement on forests and its components.

Shared United Nations vision

3. The shared United Nations vision is of a world in which all types of forests and trees outside forests are sustainably managed, contribute to sustainable development and provide economic, social, environmental and cultural benefits for present and future generations.

Shared United Nations mission

4. The shared United Nations mission is to promote sustainable forest management and the contribution of forests and trees outside forests to the 2030 Agenda for Sustainable Development, including by strengthening cooperation, coordination, coherence, synergies and political commitment and action at all levels.

B. Importance of forests to people and the 2030 Agenda for Sustainable Development

5. Forests cover 30 per cent of the Earth's land area, or nearly 4 billion hectares, and are essential to human well-being, sustainable development and the

[4] General Assembly resolution 70/1.

[5] See FCCC/CP/2015/10/Add.1, decision 1/CP.21, annex.

[6] United Nations, *Treaty Series*, vol. 1760, No. 30619.

[7] Ibid., vol. 1954, No. 33480.

[8] The United Nations forest instrument was adopted by the United Nations Forum on Forests and the General Assembly in 2007. It sets out four shared global objectives on forests and 44 national and international policies, measures and actions to implement sustainable forest management and enhance the contribution of forests to the 2030 Agenda for Sustainable Development (see General Assembly resolutions 62/98 and 70/199).

health of the planet.[9] An estimated 1.6 billion people, or 25 per cent of the global population, depend on forests for subsistence, livelihood, employment and income generation.

6. Forests provide essential ecosystem services, such as timber, food, fuel, fodder, non-wood products and shelter, as well as contribute to soil and water conservation and clean air. Forests prevent land degradation and desertification and reduce the risk of floods, landslides, avalanches, droughts, dust storms, sandstorms and other natural disasters. Forests are home to an estimated 80 per cent of all terrestrial species. Forests contribute substantially to climate change mitigation and adaptation and to the conservation of biodiversity.

7. When sustainably managed, all types of forests are healthy, productive, resilient and renewable ecosystems, providing essential goods and services to people worldwide. In many regions, forests also have important cultural and spiritual value. As set out in the United Nations forest instrument, "sustainable forest management, as a dynamic and evolving concept, is intended to maintain and enhance the economic, social and environmental value of all types of forests, for the benefit of present and future generations".

8. The sustainable management of forests and trees outside forests is vital to the integrated implementation of the 2030 Agenda for Sustainable Development, including the achievement of the Sustainable Development Goals, especially Goal 15, sustainably manage forests, combat desertification, halt and reverse land degradation and halt biodiversity loss.

9. In recognition of the extraordinary importance of forests to people, the General Assembly, in its resolution 67/200 of 21 December 2012, proclaimed 21 March as the International Day of Forests, which is celebrated around the world each year to raise awareness of and promote action on forest issues.

C. Trends and challenges

10. Despite the crucial contribution of forests to life on Earth and human well-being, deforestation and forest degradation continue in many regions, often in response to the demand for wood, food, fuel and fibre. Many drivers of deforestation lie outside the forest sector and are rooted in wider social and economic issues, including challenges related to reducing poverty, urban development and policies that favour land uses that produce higher and more rapid financial returns, such as agriculture, energy, mining and transportation.

11. Forests are also at risk from illegal or unsustainable logging, unmanaged fires, pollution, dust storms, sandstorms and wind storms, disease, pests, invasive alien species, fragmentation and the impact of climate change, including severe weather events, all of which threaten the health of forests and their ability to function as productive and resilient ecosystems.

12. Continued rapid population growth, as well as rising per capita income, is accelerating the global demand for and consumption of forest products and services and putting pressure on forests. With the world population projected to reach 9.6 billion by 2050, meeting future demand for forest products and services depends

[9] For a glossary of forest-related definitions, see the terms and definitions for the most recent Global Forest Resources Assessment of the Food and Agriculture Organization of the United Nations (available from www.fao.org/docrep/017/ap862e/ap862e00.pdf).

on urgent action and cross-sectoral policy coordination at all levels to secure sustainable forest management, including forest conservation, restoration and expansion.

13. At the global level, there is a need to reduce fragmentation and enhance coordination among the many international organizations, institutions and instruments addressing forest issues.

14. At the national, local and regional levels, cross-sectoral coordination on forests can be weak, and forest authorities and stakeholders may not be full partners in land use planning and development decisions.

15. The effective implementation of sustainable forest management is critically dependent upon adequate resources, including financing, capacity development and the transfer of environmentally sound technologies and, in particular, the need to mobilize increased financial resources, including from innovative sources, for developing countries, including least developed countries, landlocked developing countries and small island developing States, as well as countries with economies in transition. Implementation of sustainable forest management is also critically dependent upon good governance at all levels.

D. Opportunities for enhanced and value-added action on sustainable forest management

16. The launch of the United Nations strategic plan for forests 2017–2030 comes at a time of unprecedented opportunity for strengthened and decisive action by all actors at all levels, within and beyond the United Nations system, to safeguard the world's forests and their multiple values, functions and benefits, now and in the future.

17. The strategic plan is aimed at building on the momentum provided by the 2015 global milestones represented by the adoption of the 2030 Agenda for Sustainable Development, the Addis Ababa Action Agenda of the Third International Conference on Financing for Development[10] and the Paris Agreement adopted under the United Nations Framework Convention on Climate Change.

18. The United Nations system can contribute to these initiatives and achieve the vision and mission for forests by advancing a set of global goals and targets in support of the sustainable management of all types of forests and trees outside forests.

E. International arrangement on forests

19. The international arrangement on forests is composed of the United Nations Forum on Forests, a functional commission of the Economic and Social Council, and the 197 States members thereof, the secretariat of the Forum, the Collaborative Partnership on Forests, the Global Forest Financing Facilitation Network and the Trust Fund for the United Nations Forum on Forests. The Forum is the United Nations body mandated to address forest-related issues in an integrated and holistic manner and oversees the implementation of the strategic plan and the United Nations forest instrument, as well as the operation of the Global Forest Financing Facilitation Network.

[10] General Assembly resolution 69/313, annex.

20. The work of the Forum is supported by its secretariat, the Trust Fund for the United Nations Forum on Forests and the Collaborative Partnership on Forests. The Collaborative Partnership is a voluntary partnership chaired by the Food and Agriculture Organization of the United Nations and comprising 14 international organizations with significant programmes on forests.[11] The functions of the Forum, its secretariat and the Partnership are contained in Economic and Social Council resolution 2015/33 of 22 July 2015.

21. The international arrangement on forests involves as partners a variety of international, regional, subregional and non-governmental organizations and processes with forest-related programmes, and recognizes the important role of major groups and other relevant stakeholders at all levels in promoting and achieving sustainable forest management worldwide.

22. The objectives of the international arrangement on forests are:

(*a*) To promote the implementation of sustainable management of all types of forests, in particular the implementation of the United Nations forest instrument;

(*b*) To enhance the contribution of all types of forests and trees outside forests to the 2030 Agenda for Sustainable Development;

(*c*) To enhance cooperation, coordination, coherence and synergies on forest-related issues at all levels;

(*d*) To foster international cooperation, including North-South, South-South, North-North and triangular cooperation, as well as public-private partnerships and cross-sectoral cooperation, at all levels;

(*e*) To support efforts to strengthen forest governance frameworks and means of implementation, in accordance with the United Nations forest instrument, in order to achieve sustainable forest management.

II. Global forest goals and targets

23. At the heart of the strategic plan are six global forest goals and 26 associated targets to be achieved by 2030. These goals and targets, set out below, fully encompass and build on the solid foundation provided by the four global objectives on forests included in the United Nations forest instrument.

24. The global forest goals and targets are voluntary and universal. They support the objectives of the international arrangement on forests and are aimed at contributing to progress on the Sustainable Development Goals, the Aichi Biodiversity Targets,[12] the Paris Agreement adopted under the United Nations Framework Convention on Climate Change and other international forest-related instruments, processes, commitments and goals.

25. The vision, principles and commitments set out in the 2030 Agenda for Sustainable Development provide the context for the global forest goals and targets, which are interconnected and integrate the economic, social and environmental dimensions of sustainable forest management and sustainable development.

[11] For a list of member organizations of the Collaborative Partnership on Forests, see the website of the Partnership (www.cpfweb.org).

[12] See United Nations Environment Programme, document UNEP/CBD/COP/10/27, annex, decision X/2, annex.

26. The global forest goals and targets are intended to stimulate and provide a framework for voluntary actions, contributions and enhanced cooperation by countries and international, regional, subregional and non-governmental partners and stakeholders. They also provide a reference for enhanced coherence and collaboration on forests within the United Nations system and among member organizations of the Collaborative Partnership on Forests, as well as among other forest-related organizations and processes.

27. The global forest goals and targets encompass a wide variety of thematic areas in regard to which voluntary actions, contributions and cooperation are needed to advance their achievement. These thematic areas reflect and encompass the 44 policies, measures and actions set out in the United Nations forest instrument. A non-exhaustive list of indicative thematic areas for action is contained in the appendix to the present document. Indicative thematic areas may correspond to more than one goal.

Global forest goal 1

Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation and contribute to the global effort of addressing climate change

1.1 Forest area is increased by 3 per cent worldwide[13]

1.2 The world's forest carbon stocks are maintained or enhanced

1.3 By 2020, promote the implementation of sustainable management of all types of forests, halt deforestation, restore degraded forests and substantially increase afforestation and reforestation globally

1.4 The resilience and adaptive capacity of all types of forests to natural disasters and the impact of climate change is significantly strengthened worldwide

Goal 1 and its targets support and contribute to the achievement of, among other things, Sustainable Development Goal targets 6.6, 12.2, 13.1, 13.3, 14.2, 15.1–15.4 and 15.8, as well as Aichi Biodiversity Targets 5, 7, 9, 11, 14 and 15

Global forest goal 2

Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest-dependent people

2.1 Extreme poverty for all forest-dependent people is eradicated

2.2 Increase the access of small-scale forest enterprises, in particular in developing countries, to financial services, including affordable credit, and their integration into value chains and markets

2.3 The contribution of forests and trees to food security is significantly increased

[13] Based on the Global Forest Resources Assessment 2015.

2.4 The contribution of forest industry, other forest-based enterprises and forest ecosystem services to social, economic and environmental development, among other things, is significantly increased

2.5 The contribution of all types of forests to biodiversity conservation and climate change mitigation and adaptation is enhanced, taking into account the mandates and ongoing work of relevant conventions and instruments

Goal 2 and its targets support and contribute to the achievement of, among other things, Sustainable Development Goal targets 1.1, 1.4, 2.4, 4.4, 5.a, 6.6, 8.3, 9.3, 12.2, 12.5, 15.6 and 15.c, as well as Aichi Biodiversity Targets 4, 14 and 18

Global forest goal 3

Increase significantly the area of protected forests worldwide and other areas of sustainably managed forests, as well as the proportion of forest products from sustainably managed forests

3.1 The area of forests worldwide designated as protected areas or conserved through other effective area-based conservation measures is significantly increased

3.2 The area of forests under long-term forest management plans is significantly increased

3.3 The proportion of forest products from sustainably managed forests is significantly increased

Goal 3 and its targets support and contribute to the achievement of, among other things, Sustainable Development Goal targets 7.2, 12.2, 12.6, 12.7, 14.2, 14.5, 15.2 and 15.4, as well as Aichi Biodiversity Targets 7, 11, 12 and 16

Global forest goal 4

Mobilize significantly increased, new and additional financial resources from all sources for the implementation of sustainable forest management and strengthen scientific and technical cooperation and partnerships

4.1 Mobilize significant resources from all sources and at all levels to finance sustainable forest management and provide adequate incentives to developing countries to advance such management, including for conservation and reforestation

4.2 Forest-related financing from all sources at all levels, including public (national, bilateral, multilateral and triangular), private and philanthropic financing, is significantly increased

4.3 North-South, South-South, North-North and triangular cooperation and public-private partnerships on science, technology and innovation in the forest sector are significantly enhanced and increased

4.4 The number of countries that have developed and implemented forest financing strategies and have access to financing from all sources is significantly increased

4.5 The collection, availability and accessibility of forest-related information is improved through, for example, multidisciplinary scientific assessments

Goal 4 and its targets support and contribute to the achievement of, among other things, Sustainable Development Goal targets 12.a, 15.7, 15.a, 15.b, 17.1–17.3, 17.6, 17.7 and 17.16–17.19, as well as Aichi Biodiversity Target 19

Global forest goal 5

Promote governance frameworks to implement sustainable forest management, including through the United Nations forest instrument, and enhance the contribution of forests to the 2030 Agenda for Sustainable Development

5.1 The number of countries that have integrated forests into their national sustainable development plans and/or poverty reduction strategies is significantly increased

5.2 Forest law enforcement and governance are enhanced, including through significantly strengthening national and subnational forest authorities, and illegal logging and associated trade are significantly reduced worldwide

5.3 National and subnational forest-related policies and programmes are coherent, coordinated and complementary across ministries, departments and authorities, consistent with national laws, and engage relevant stakeholders, local communities and indigenous peoples, fully recognizing the United Nations Declaration on the Rights of Indigenous Peoples[14]

5.4 Forest-related issues and the forest sector are fully integrated into decision-making processes concerning land use planning and development

Goal 5 and its targets support and contribute to the achievement of, among other things, Sustainable Development Goal targets 1.4, 2.4, 5.a, 15.9, 15.c, 16.3, 16.5–16.7, 16.10 and 17.14, as well as Aichi Biodiversity Targets 2 and 3

Global forest goal 6

Enhance cooperation, coordination, coherence and synergies on forest-related issues at all levels, including within the United Nations system and across member organizations of the Collaborative Partnership on Forests, as well as across sectors and relevant stakeholders

6.1 Forest-related programmes within the United Nations system are coherent and complementary and integrate the global forest goals and targets, where appropriate

6.2 Forest-related programmes across member organizations of the Collaborative Partnership on Forests are coherent and complementary and together encompass the multiple contributions of forests and the forest sector to the 2030 Agenda for Sustainable Development

6.3 Cross-sectoral coordination and cooperation to promote sustainable forest management and halt deforestation and forest degradation are significantly enhanced at all levels

6.4 A greater common understanding of the concept of sustainable forest management is achieved and an associated set of indicators is identified

[14] General Assembly resolution 61/295, annex.

6.5 The input and involvement of major groups and other relevant stakeholders in the implementation of the strategic plan and in the work of the Forum, including intersessional work, is strengthened

Goal 6 and its targets support and contribute to the achievement of, among other things, Sustainable Development Goal target 17.14

III. Implementation framework

28. The United Nations strategic plan for forests 2017–2030 provides a reference for ambitious and transformational actions by all actors, at all levels, to achieve its global forest goals and targets. An overview of roles and responsibilities and means of implementation is outlined below.

A. Roles and responsibilities

1. Members of the United Nations Forum on Forests

29. The individual and collective actions and commitments of members of the United Nations Forum on Forests are decisive for the successful implementation of the strategic plan and achievement of its global forest goals and targets.

30. Members may, on a voluntary basis, determine their contributions towards achieving the global forest goals and targets, taking into account their national circumstances, policies, priorities, capacities, levels of development and forest conditions.

31. Members may include in their voluntary national contributions, as appropriate, the forest-related contributions they intend to make with regard to other international forest-related commitments and goals, such as the implementation of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals, the Aichi Biodiversity Targets and actions to address climate change under the Paris Agreement adopted under the United Nations Framework Convention on Climate Change.

32. Members may, on a voluntary basis, communicate their progress on the voluntary national contributions to the United Nations Forum on Forests at regular intervals determined by the Forum, in accordance with paragraph 67 of the strategic plan. In order to avoid any additional reporting burden, such voluntary communications on their voluntary national contributions may be part of their voluntary reporting on the strategic plan and the United Nations forest instrument.

33. Members of the Forum, as members of the governing bodies of forest-related international, regional and subregional organizations and processes, as appropriate, are encouraged to promote the integration of the global forest goals and targets into the strategies and programmes of these organizations, processes and instruments, consistent with their mandates and priorities.

2. United Nations Forum on Forests and its secretariat

34. As part of the United Nations system and the international arrangement on forests, the United Nations Forum on Forests, in carrying out its core functions as defined in Economic and Social Council resolution 2015/33, should be guided by the strategic plan. The Forum’s quadrennial programmes of work are to reflect its contribution to the global forest goals and targets for each quadrennium.

35. The Forum is the responsible intergovernmental body for follow-up and review of the implementation of the strategic plan, including through providing guidance to the Collaborative Partnership on Forests and ensuring the smooth interplay between its odd- and even-year sessions.

36. The Forum secretariat services and supports the Forum in all matters related to the Forum's quadrennial programmes of work and the strategic plan.

37. The Forum should structure its annual sessions and enhance its intersessional activities to maximize the impact and relevance of its work under the quadrennial programmes of work, including by fostering cross-sectoral exchanges to enhance synergies inside and outside the United Nations.

3. Collaborative Partnership on Forests and its member organizations

38. Member organizations of the Collaborative Partnership on Forests play an important role in implementing the strategic plan and are encouraged to integrate relevant global forest goals and targets into their forest-related plans and programmes, where appropriate and consistent with their respective mandates.

39. The Partnership is invited to support the Forum and its members in advancing the global forest goals and targets, including through cooperation and partnership among its members, implementing a joint workplan with the Partnership which is aligned with the Forum's quadrennial programmes of work and identifying collective actions by all or subsets of the Partnership's members, as well as associated resource needs.

40. Members of the Forum are encouraged to support the Partnership workplan as an essential strategy for improving cooperation, synergies and coherence among member organizations of the Partnership. Members of the Forum are also encouraged to provide voluntary financial contributions to support the activities of the Partnership and its member organizations.

4. United Nations system

41. Several United Nations bodies, organizations and specialized agencies not participating in the Collaborative Partnership on Forests address issues that are relevant to forests, such as eradication of poverty in its all forms, gender equality and the empowerment of women, labour standards, small and medium-sized enterprises, scientific and technical cooperation, disaster risk reduction, ecotourism and issues related to the United Nations Declaration on the Rights of Indigenous Peoples. These bodies, organizations and specialized agencies, within the scope of their mandates, are invited to use the strategic plan as a reference, with a view to building synergies between the global forest goals and targets of the strategic plan and their respective policies and programmes, including their contributions to the achievement of the Sustainable Development Goals.

42. Close cooperation with the secretariats of, and the parties to, the Rio conventions, [15] and mutually supportive implementation of their forest-related objectives, is important to achieve the global forest goals and targets.

[15] Convention on Biological Diversity, United Nations Convention to Combat Desertification in Those Countries Experiencing Serious Drought and/or Desertification, Particularly in Africa, and United Nations Framework Convention on Climate Change.

43. The United Nations System Chief Executives Board for Coordination is also invited to promote the use of the strategic plan as a reference for forest-related work within the United Nations system, where appropriate.

5. Other intergovernmental partners and stakeholders at the international level

44. In addition to under the multilateral environmental agreements that are represented in the Collaborative Partnership on Forests, forest-related activities are undertaken under a number of other multilateral environmental agreements, such as the Convention on Wetlands of International Importance especially as Waterfowl Habitat,[16] the Convention on International Trade in Endangered Species of Wild Fauna and Flora[17] and the Convention concerning the Protection of the World Cultural and Natural Heritage,[18] and can make important contributions to the global forest goals and targets. The secretariats of and parties to these agreements are invited to seek opportunities to contribute to the implementation of the strategic plan, where appropriate and consistent with their mandates.

6. Regional and subregional organizations and processes

45. Regional bodies, notably the United Nations regional economic commissions and the regional forestry commissions of the Food and Agriculture Organization of the United Nations, and other regional and subregional bodies and processes provide a crucial bridge between international policies and national actions and are important partners in efforts to implement the strategic plan and achieve its global forest goals and targets.

46. The Forum works with regional and subregional bodies and processes to identify ways to contribute to the global forest goals and targets, including by encouraging them to exchange information, enhance cooperation, raise awareness, strengthen stakeholder engagement and build capacity to scale up best practices within and across regions.

47. Regional and subregional bodies and processes, including those within the United Nations system, as well as the criteria and indicator processes, are encouraged to build and strengthen synergies between the strategic plan and their policies and programmes, including in the context of their contributions to the implementation of the Sustainable Development Goals.

48. Members are invited to consider strengthening regional and subregional forest policy development, dialogue and coordination to advance the strategic plan.

7. Major groups and other stakeholders

49. The effective implementation of sustainable forest management depends on the contributions of all relevant stakeholders, including forest owners, indigenous peoples, local communities, local authorities, the private sector (including small, medium and large forest-based enterprises), non-governmental organizations, women, children, youth, and scientific, academic and philanthropic organizations at all levels.

[16] United Nations, *Treaty Series*, vol. 996, No. 14583.

[17] Ibid., vol. 993, No. 14537.

[18] Ibid., vol. 1037, No. 15511.

50. The Forum endeavours to work with major groups and other relevant stakeholders to identify ways to enhance their contributions to the achievement of the global forest goals and targets at all levels and their interactions with the Forum and the Collaborative Partnership on Forests, including through networks, advisory groups and other mechanisms, to raise awareness, foster information exchange and dissemination and facilitate coordinated inputs.

51. Major groups and other relevant stakeholders such as private philanthropic organizations, educational and academic entities, volunteer groups and others are encouraged to autonomously establish and maintain effective coordination mechanisms at all levels for interaction and participation in the Forum and other forest-related United Nations bodies.

B. Means of implementation

52. Building on the Addis Ababa Action Agenda, which is an integral part of the 2030 Agenda for Sustainable Development, the strategic plan provides a reference for international cooperation and means of implementation, including finance and capacity-building related to forests, supported by effective institutions, sound policies, legal frameworks, good governance and partnerships at all levels. Recognizing that there is no single solution to address all of the needs in terms of financing for actions to achieve the global forest goals and targets, a combination of actions is required at all levels to mobilize resources, by all stakeholders and from all sources, public and private, domestic and international, bilateral and multilateral.

53. The means of implementation targets under Goal 17 and under each Sustainable Development Goal are key to realizing the 2030 Agenda for Sustainable Development and are of equal importance with the other Goals and targets. The Agenda, including the Sustainable Development Goals, can be met within the framework of a revitalized Global Partnership for Sustainable Development, supported by the concrete policies and actions as outlined in the Addis Ababa Action Agenda. Welcoming the endorsement by the General Assembly of the Addis Ababa Action Agenda, which is an integral part of the 2030 Agenda for Sustainable Development, it is recognized that full implementation of the Addis Ababa Action Agenda is critical for the realization of the Sustainable Development Goals and targets.

54. Mobilization of and effective use of financial resources, including new and additional resources from all sources and at all levels, is crucial. Public policies and the mobilization and effective use of domestic resources, underscored by the principle of national ownership and leadership, are central to our common pursuit of sustainable development.

55. Private business activity, investment and innovation are major drivers of productivity, inclusive economic growth and job creation, and private international capital flows, particularly foreign direct investment, along with a stable international system, are vital complements to national development efforts.

56. International public finance plays an important role in complementing the efforts of countries to mobilize public resources domestically, especially those with the greatest needs and the least ability to mobilize other resources. An important use of international public finance, including official development assistance, is to catalyse additional resource mobilization from other sources, public and private.

57. Philanthropic organizations and foundations, as well as public-private and multi-stakeholder partnerships, also play important roles in the scaling-up of resources for sustainable forest management and the implementation of the strategic plan.

58. In advancing the global forest goals and targets, members are encouraged:

(*a*) To enhance North-South, South-South and triangular regional and international cooperation on and access to science, technology and innovation and enhance knowledge-sharing on mutually agreed terms, including through improved coordination among existing mechanisms, in particular at the United Nations level, and through a global technology facilitation mechanism;

(*b*) To promote the development, transfer, dissemination and diffusion of environmentally sound technologies to developing countries on favourable terms, including on concessional and preferential terms, as mutually agreed;

(*c*) To make full use of the grant and concessional and innovative resources available to them through United Nations system programmes, funds and specialized agencies; national funds and domestic resources; private funding; multilateral, regional and subregional development banks and funding institutions; bilateral development assistance agencies; and funding opportunities provided through foundations and philanthropic organizations.

59. Eligible countries are encouraged to make full use of the international resources available, including through:

(*a*) The Global Environment Facility strategy for sustainable forest management and the focal areas of the Facility on biodiversity, climate change and land degradation, which serve as funding mechanisms for the Rio conventions;

(*b*) The Global Environment Facility strategy and financing for sustainable forest management under the replenishment processes of the Facility, including through harnessing synergies across the focal areas of the Facility in order to reinforce the importance of sustainable forest management for integrating environmental and development aspirations;

(*c*) The United Nations Collaborative Programme on Reducing Emissions from Deforestation and Forest Degradation in Developing Countries, activities under the Forest Carbon Partnership Facility and the Forest Investment Programme, and the Green Climate Fund.

60. Members are invited to make full use of the potential of innovative funding mechanisms, including payment for ecosystem services schemes and existing mechanisms under the United Nations Framework Convention on Climate Change.[19]

61. Effective attainment of the global forest goals and targets also requires the mobilization of the best available scientific and traditional forest-related knowledge. The scientific community, in cooperation with the Forum and its members, is encouraged to support the implementation of the strategic plan, through scientific inputs presented to the Forum. In doing so, the Forum is invited to build upon existing joint initiatives of the Collaborative Partnership on Forests and further strengthen these initiatives.

[19] Ibid., *Treaty Series*, vol. 1771, No. 30822.

1. Global Forest Financing Facilitation Network

62. The Global Forest Financing Facilitation Network of the United Nations Forum on Forests, in close cooperation with members of the Collaborative Partnership on Forests, contributes to the scaling-up of sustainable forest management by facilitating access by countries to resources to implement the strategic plan and to achieve its global forest goals and targets. To this end, the priorities for the Network are:

(*a*) To promote and assist members in designing national forest financing strategies to mobilize resources for sustainable forest management, including existing national initiatives, within the framework of national forest programmes or other appropriate national frameworks;

(*b*) To assist countries in mobilizing, accessing and enhancing the effective use of existing financial resources from all sources for sustainable forest management, taking into account national policies and strategies;

(*c*) To serve as a clearing house and database on existing, new and emerging financing opportunities and as a tool for sharing lessons learned and best practices from successful projects, building on the Collaborative Partnership on Forests online sourcebook for forest financing;

(*d*) To contribute to the achievement of the global forest goals and targets, as well as priorities contained in the quadrennial programmes of work.

63. Special consideration should be given to the special needs and circumstances of Africa, the least developed countries, countries with low forest cover, countries with high forest cover, countries with medium forest cover and low deforestation, and small island developing States, as well as countries with economies in transition, in gaining access to funds.

2. Trust Fund for the United Nations Forum on Forests

64. The Trust Fund for the United Nations Forum on Forests was established in 2001 to finance activities in support of the Forum from voluntary extrabudgetary resources to support its activities. The Trust Fund can be used to support the activities of the Global Forest Financing Facilitation Network. Members of the Forum are encouraged to provide voluntary contributions to the Trust Fund.

65. The Forum is to monitor and assess the work and performance of the Global Forest Financing Facilitation Network on a regular basis, including the availability of Trust Fund resources.

IV. Review framework

A. Review of the international arrangement on forests

66. In accordance with section XII of Economic and Social Council resolution 2015/33, the Forum is to conduct in 2024 a midterm review of the effectiveness of the international arrangement on forests in achieving its objectives, and a final review in 2030. In the context of the midterm review, the Forum could consider:

(*a*) A full range of options, including the adoption of a legally binding instrument on all types of forests, the strengthening of the current arrangement and the continuation of the current arrangement;

(*b*) A full range of financing options, inter alia, the establishment of a voluntary global forest fund, in order to mobilize resources from all sources in support of the sustainable management of all types of forests. This can be further considered, if there is a consensus to do so, at a session of the Forum prior to 2024.

B. Progress in implementing the United Nations strategic plan for forests 2017–2030

67. The Forum should assess progress in implementing the United Nations strategic plan for forests 2017–2030 in the context of its midterm and final reviews of the effectiveness of the international arrangement on forests, in 2024 and 2030. The assessment should be based on internationally agreed indicators, including relevant Sustainable Development Goal indicators, that are relevant to the global forest goals and targets.

68. The assessment should take into account voluntary national reporting on the implementation of the strategic plan, the United Nations forest instrument, voluntary national contributions and the results of the most recent Global Forest Resources Assessment of the Food and Agriculture Organization of the United Nations, as well as inputs from the Collaborative Partnership on Forests and its member organizations and other partners within and outside the United Nations system, including regional and subregional organizations and relevant stakeholders.

69. To reduce the reporting burden, the Forum is to establish a cycle and format for voluntary national reporting by its members, taking into account the cycle of the Global Forest Resources Assessments and the Sustainable Development Goal review cycle at the global level.

C. Contributing to the follow-up to and review of the 2030 Agenda for Sustainable Development

70. The United Nations Forum on Forests, as a functional commission of the Economic and Social Council, should contribute to the follow-up to and review of the 2030 Agenda for Sustainable Development and the Sustainable Development Goals, including through the work of the Collaborative Partnership on Forests on global forest indicators, as well as highlight the contribution of forests to the Sustainable Development Goals, to be reviewed in depth at the annual sessions of the high-level political forum on sustainable development.

V. Communication and outreach strategy

71. Communication and outreach are essential components of the strategic plan, which is itself an important communication tool. A communication and outreach strategy should be developed to raise awareness, within and outside the forest sector, of the vital contribution of all types of forests and trees to life on Earth and human well-being. The communication and outreach strategy should draw on the strategic plan, synchronize with the quadrennial programmes of work and consider relevant themes, including those which are relevant to the high-level political forum on sustainable development. Actors at all levels are encouraged to contribute to these efforts.

72. The communication and outreach strategy should raise the awareness of the strategic plan, including through its graphic visualization.

73. The Forum should develop the communication and outreach strategy for the strategic plan. This strategy should identify, inter alia, target audiences, key messages, methods, activities and success criteria.

74. The United Nations system, the Collaborative Partnership on Forests and its member organizations and other partners are encouraged to enhance cooperation and synergies on forest-related communication and outreach to increase the impact of their messaging, and to consider joint events and products with national, regional, subregional and non-governmental organizations and processes.

75. The International Day of Forests on 21 March provides a powerful annual event to promote implementation of the strategic plan, and is a platform for individual and collective public outreach activities by all actors on forests at all levels. Members are encouraged to observe this day in collaboration with other relevant stakeholders and to inform the Forum about their activities.

Appendix

Indicative thematic areas for action associated with the global forest goals and targets of the United Nations strategic plan for forests 2017–2030

The list of indicative thematic areas for action set out below is not exhaustive and is in no particular order.

Global forest goal 1

Reverse the loss of forest cover worldwide through sustainable forest management, including protection, restoration, afforestation and reforestation, and increase efforts to prevent forest degradation and contribute to the global effort of addressing climate change

The indicative thematic areas for action are:

(*a*) Reduction in/halting of deforestation

(*b*) Reduction in/halting of forest degradation

(*c*) Maintenance and improvement of forest health

(*d*) Reforestation and afforestation

(*e*) Forest landscape restoration and rehabilitation

(*f*) Natural forest regeneration

(*g*) Contribution of forests to climate change mitigation and adaptation

(*h*) Reduction in/halting of loss of forest biodiversity

(*i*) Mitigating the impact of invasive alien species

(*j*) Mitigating the impact of air pollution

(*k*) Fire control and management

(*l*) The role of forests in preventing land degradation and desertification

(*m*) Combating sandstorms and dust storms

(*n*) Wildlife protection and management

(*o*) Innovative approaches to the sustainable management of natural and planted forests

(*p*) Disaster risk reduction

(*q*) Control of mining activities within and adjacent to forests

(*r*) Mitigating the impact of air, water and soil pollution

Global forest goal 2

Enhance forest-based economic, social and environmental benefits, including by improving the livelihoods of forest-dependent people

The indicative thematic areas for action are:

(*a*) Contribution of forests to poverty eradication and livelihoods

(*b*) Community/collaborative forest management

(*c*) Value-added forest product production and processing

(*d*) Working conditions and wages of forest workers

(*e*) Competitiveness and diversification of forest products

(*f*) Valuation of forest goods and services

(*g*) Payments for ecosystem services

(*h*) Protective functions of forests (soil and water management)

(*i*) Conservation and sustainable use of genetic diversity of forests and trees outside forests

(*j*) Traditional forest-related knowledge

(*k*) Forest-related education, training and extension

(*l*) Forests and trees in the urban context

(*m*) Sustainable production and consumption of forest products

(*n*) Socioeconomic functions of forests

(*o*) Ecotourism development

(*p*) Importance and characteristics of different forest types (e.g. boreal, temperate, tropical)

(*q*) Agroforestry

(*r*) Research

(*s*) New and innovative forest products

(*t*) The role of women and girls in sustainable forest management

(*u*) Sustainable building materials

Global forest goal 3

Increase significantly the area of protected forests worldwide and other areas of sustainably managed forests, as well as the proportion of forest products from sustainably managed forests

The indicative thematic areas for action are:

(*a*) Management of protected forest areas and networks

(*b*) Enhancing conservation through other effective area-based conservation measures, including by establishing and expanding national parks where appropriate

(*c*) Conservation and sustainable use of forest biodiversity, including in production forests

(*d*) Sustainable management of forests used for production of wood and non-wood forest products

(*e*) Productive functions of forests

(*f*) Wood for energy and fuelwood, including sustainable use of woody biomass

(*g*) Competitiveness of sustainably managed forest products

(*h*) Market-based tools

(*i*) Incentives for sustainable forest management and other public policy tools

(*j*) Legality verification and traceability of forest products

(*k*) Approaches for reduced-impact logging

(*l*) Application of spatial and land use planning tools

(*m*) The role of indigenous peoples and local communities in sustainable forest management

(*n*) Building markets and infrastructure to promote production and consumption of sustainably managed forest products

(*o*) Conservation and sustainable use of forest biodiversity

Global forest goal 4

Mobilize significantly increased, new and additional financial resources from all sources for the implementation of sustainable forest management and strengthen scientific and technical cooperation and partnerships

The indicative thematic areas for action are:

(*a*) Means of implementation to achieve sustainable forest management

(*b*) Funding support for implementation of the United Nations forest instrument

(*c*) International public funding and national budgets

(*d*) Foreign and domestic private sector investment in sustainable forest management and forest-based enterprises

(*e*) Capacity-building to access and mobilize funds for sustainable forest management

(*f*) Expertise in expanding capacity-building in developing countries

(*g*) Public-private partnerships

(*h*) Environmentally sound and innovative forest-based technology and know-how

(*i*) North-South, South-South and triangular technical and scientific cooperation

(*j*) North-North technical and scientific cooperation

(*k*) Efficiency of forest-based industries

(*l*) Forest science-policy interface

(*m*) Best practices and innovative tools

(*n*) Regional and subregional financing sources and mechanisms

(*o*) Programmes and pilots for the implementation of the United Nations forest instrument and strategic plan

Global forest goal 5

Promote governance frameworks to implement sustainable forest management, including through the United Nations forest instrument, and enhance the contribution of forests to the 2030 Agenda for Sustainable Development

The indicative thematic areas for action are:

(*a*) Cross-sectoral coordination at all levels

(*b*) Integration of forest values into national planning and accounting

(*c*) Enabling environments for investment in sustainable forest management

(*d*) Forest law enforcement, governance and trade

(*e*) Illegal logging and associated trade

(*f*) Forest land tenure and land ownership

(*g*) Gender equality in the forest sector, including empowerment of women and girls

(*h*) Stakeholder engagement at all levels

(*i*) Public involvement in forest decision-making

(*j*) Civil society partnerships

(*k*) The role of research in sustainable forest management

(*l*) Criteria and indicators for sustainable forest management

(*m*) Forest inventories and availability of reliable forest data and statistics

(*n*) National forest inventories and other official forest-related data

(*o*) Legal policy and institutional framework for sustainable forest management

Global forest goal 6

Enhance cooperation, coordination, coherence and synergies on forest-related issues at all levels, including within the United Nations system and across member organizations of the Collaborative Partnership on Forests, as well as across sectors and relevant stakeholders

The indicative thematic areas for action are:

(*a*) Enhanced coherence and reduced fragmentation in global forest governance

(*b*) Coherence, collaboration and cooperation among forest-related programmes and initiatives

(*c*) Joint initiatives and joint programming of the Collaborative Partnership on Forests

(*d*) Collaboration and cooperation between members of the Forum, the Collaborative Partnership on Forests and regional and subregional organizations and processes, as well as major groups and other non-governmental stakeholders

(*e*) Harmonized programmes of work and programmes of action at all levels

(*f*) Strengthened and harmonized data collection and reporting cycles and formats

(*g*) Coordination initiatives among criteria and indicator processes

(*h*) Common understanding of sustainable forest management

(*i*) Regional and subregional coordination mechanisms

Annex II

Quadrennial programme of work of the United Nations Forum on Forests for the period 2017–2020

1. The United Nations Forum on Forests carries out its core functions on the basis of the United Nations strategic plan for forests 2017–2030. The Forum's quadrennial programme of work represents its contribution to implementing the strategic plan and sets the agenda for each session of the Forum within the quadrennium.

2. The quadrennial programme of work identifies thematic and operational priorities, priority actions and resource needs.

3. The quadrennial programme of work reflects the linkage between odd-year and even-year sessions of the Forum. As a general rule:

(*a*) Odd-year sessions focus on discussions on implementation and technical advice, including exchange of experiences among members of the Forum, member organizations of the Collaborative Partnership on Forests, regional and subregional organizations, major groups and other relevant stakeholders, and the science-policy interface. The output of odd-year sessions is a chair's summary report of those discussions, including possible proposals, which is reported to the Forum at its subsequent session in the even-numbered year for further consideration and recommendations;

(*b*) Even-year sessions focus on policy dialogue, development and decision-making, taking into account the discussions and proposals of the previous session. The substantive output of even-year sessions is a concise Forum resolution or decision on the next steps;

(*c*) Odd-year and even-year sessions for a given biennium are thematically linked. Thematic and operational priorities, priority actions and resource needs for each biennium are identified by the Forum on the basis of the global forest goals and targets contained in the strategic plan, taking into account the annual themes and Sustainable Development Goals[20] under review by the high-level political forum on sustainable development;

(*d*) The Forum sessions and their outcomes, as well as intersessional work, should maximize the impact and relevance of the work of the Forum.

[20] See General Assembly resolution 70/1.

4. Intersessional activities, including country-led initiatives and other similar initiatives, can contribute to the quadrennial programmes of work and the implementation of the strategic plan.

5. The twelfth and fourteenth sessions of the Forum will focus on technical advice, and the thirteenth and fifteenth sessions on policy dialogue, development and decision-making (see tables 1 to 4 below).

6. Given that the twelfth session of the Forum, to be held in 2017, is the first session following the adoption of Economic and Social Council resolution 2015/33 on 22 July 2015 and the strategic plan, it is transitional in nature and may take decisions on matters called for in the resolution as needed to facilitate the work of the Forum.

Table 1

Twelfth session of the United Nations Forum on Forests, 2017

Priority actions
1. Implementation of the United Nations strategic plan for forests 2017–2030
(*a*) Technical discussion and exchange of experiences on the thematic and operational priorities, priority actions and resource needs for the period 2017–2018, taking into account the review cycle of the high-level political forum on sustainable development during the biennium and the theme of the International Day of Forests
(*b*) Format for voluntary national contributions and voluntary announcement, where appropriate
(*c*) United Nations system-wide contributions to the implementation of the global forest goals and targets
2. Monitoring, assessment and reporting
(*a*) Cycle and format for voluntary national reporting on the implementation of the strategic plan, including the United Nations forest instrument (para. 16 (*c*))[21] and voluntary national contributions
(*b*) Progress on the development of global forest indicators
(*c*) Measures to better synchronize data collection and reduce the reporting burden (para. 16 (*b*))
3. Means of implementation
(*a*) Initial discussions on the guidelines for the operation of the Global Forest Financing Facilitation Network and the availability of resources (para. 6 (*f*) (iv))
(*b*) Progress on the activities and operation of the Global Forest Financing Facilitation Network
4. Enhanced cooperation, coordination and engagement on forest-related issues
(*a*) Information on the Collaborative Partnership on Forests workplan and actions to strengthen its operations in support of the strategic plan and the quadrennial programme of work for the period 2017–2020
(*b*) Regional and subregional partners
(*c*) Major groups and other relevant stakeholders

[21] Citations in parentheses refer to the relevant paragraphs of Economic and Social Council resolution 2015/33.

Priority actions
(*d*) Revision of the existing guidelines for country-led initiatives and similar initiatives to enhance their contribution to the work of the Forum (para. 6 (*e*))
(*e*) Communication and outreach activities
(*f*) Information on intersessional activities
5. Emerging issues and challenges
6. Trust Fund for the United Nations Forum on Forests

Table 2

Thirteenth session of the United Nations Forum on Forests, 2018 (policy session)

Priority actions
1. Implementation of the United Nations strategic plan for forests 2017–2030
(*a*) Policy dialogue on the thematic and operational priorities, priority actions and resource needs for the period 2017–2018, taking into account the review cycle of the high-level political forum on sustainable development during the biennium and the theme of the International Day of Forests
(*b*) Voluntary announcement of voluntary national contributions
(*c*) United Nations system-wide contributions to the implementation of the global forest goals and targets
(*d*) Development of the strategic plan communication and outreach strategy
2. Monitoring, assessment and reporting
(*a*) Progress on the implementation of the strategic plan, including the United Nations forest instrument and voluntary national contributions
(*b*) Progress on the development of global forest indicators
3. Means of implementation
(*a*) Progress on the activities and the operation of the Global Forest Financing Facilitation Network
(*b*) Guidelines for the operation of the Global Forest Financing Facilitation Network
(*c*) Measures to increase the effectiveness and efficiency of the Global Forest Financing Facilitation Network (para. 14 (*a*))[21]
4. Emerging issues and challenges
5. Trust Fund for the United Nations Forum on Forests
6. Information on intersessional activities
7. Progress in the implementation of Economic and Social Council resolution 2015/33 (para. 56)

Table 3

Fourteenth session of the United Nations Forum on Forests, 2019 (implementation and technical advice)

Priority actions

1. Implementation of the United Nations strategic plan for forests 2017–2030

   (*a*) Technical discussion and exchange of experiences on the thematic and operational priorities, priority actions and resource needs for the period 2019–2020, taking into account the review cycle of the high-level political forum on sustainable development during the biennium and the theme of the International Day of Forests

   (*b*) Voluntary announcement of voluntary national contributions

   (*c*) United Nations system-wide contributions to the implementation of the global forest goals and targets

2. Monitoring, assessment and reporting

   (*a*) Progress on the implementation of the strategic plan, including the United Nations forest instrument and voluntary national contributions

   (*b*) Progress on the development of global forest indicators

3. Means of implementation: progress on activities and the operation of the Global Forest Financing Facilitation Network, and availability of resources (paras. 6 (*f*) (iii) and (iv))[21]

4. Enhancing global forest policy coherence and a common international understanding of sustainable forest management (para. 6 (*f*) (ii))

5. Enhanced cooperation, coordination and engagement on forest-related issues

   (*a*) Activities of the Collaborative Partnership on Forests in support of the strategic plan and the quadrennial programme of work for the period 2017–2020

   (*b*) United Nations Framework Convention on Climate Change: implementation of the Paris Agreement

   (*c*) Convention on Biological Diversity: Aichi Biodiversity Targets

   (*d*) Regional and subregional partners

   (*e*) Major groups and other relevant stakeholders

   (*f*) Communication and outreach activities

   (*g*) Cross-sectoral engagement

   (*h*) Information on intersessional activities

6. Emerging issues and challenges

7. Trust Fund for the United Nations Forum on Forests

Table 4

Fifteenth session of the United Nations Forum on Forests, 2020 (policy session)

Priority actions
1. Implementation of the United Nations strategic plan for forests 2017–2030 (*a*) Policy dialogue on the thematic and operational priorities, priority actions and resource needs for the period 2019–2020, taking into account the review cycle of the high-level political forum on sustainable development during the biennium and the theme of the International Day of Forests (*b*) Voluntary announcement of voluntary national contributions (*c*) United Nations system-wide contributions to the implementation of the global forest goals and targets
2. Monitoring, assessment and reporting: progress on the implementation of the strategic plan, including the United Nations forest instrument and voluntary national contributions
3. Means of implementation: availability of resources for the Global Forest Financing Facilitation Network (para. 14 (*a*))[21] and its priority actions and resource needs for the quadrennial programme of work for the period 2021–2024
4. Emerging issues and challenges
5. Trust Fund for the United Nations Forum on Forests
6. High-level segment, including forest partnership forum with the Collaborative Partnership on Forests and non-governmental organizations and private sector chief executive officers (para. 6 (*d*))
7. Adoption of the quadrennial programme of work for the period 2021–2024, including consideration of its priority actions and the resources needed

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[*without reference to a Main Committee (A/71/L.63)*]

71/285. United Nations strategic plan for forests 2017–2030

The General Assembly,

Recalling Economic and Social Council resolution 2017/4 of 20 April 2017, in which the Council adopted the United Nations strategic plan for forests 2017–2030 on the recommendation of the United Nations Forum on Forests at its special session held on 20 January 2017,[1]

Decides to adopt the United Nations strategic plan for forests 2017–2030 as contained in annex I to Economic and Social Council resolution 2017/4.

79th plenary meeting
27 April 2017

[1] See E/2017/10.

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