INTERNATIONAL COURT OF JUSTICE

OBLIGATIONS OF STATES IN RESPECT OF CLIMATE CHANGE

WRITTEN STATEMENT OF ANTIGUA AND BARBUDA

22 March 2024

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LIST OF ABBREVIATIONS

Abbreviation	Description
ACHPR	African Commission on Human and Peoples' Rights
ACHR	American Convention on Human Rights
AFOLU	Agriculture, Forestry and Other Land Uses
CBD	Convention on Biological Diversity
CBDR-RC	Common but Differentiated Responsibility and Respective Capabilities
CEDAW	Convention on the Elimination of All Forms of Discrimination against Women
CESCR	United Nations Committee on Economic, Social and Cultural Rights
CO2	Carbon Dioxide
COP	Conference of the Parties
COSIS	Commission of Small Island States on Climate Change and International Law
CRC	Convention on the Rights of the Child
CRPD	Convention on the Rights of Persons with Disabilities
DSU	Understanding on Rules and Procedures Governing the Settlement of Disputes
ECHR	European Convention for the Protection of Human Rights and Fundamental Freedoms
EIA	Environmental Impact Assessment
GATT 1994	General Agreement on Tariffs and Trade 1994
GDP	Gross Domestic Product
GHG	Greenhouse Gases
GNI	Gross National Income
GtCO2	Giga Tonne of CO2 (1 billion tonnes)
IACHR	Inter-American Court of Human Rights

Abbreviation	Description
ICCPR	International Covenant on Civil and Political Rights
ICERD	International Convention on the Elimination of All Forms of Racial Discrimination
ICESCR	International Covenant on Economic Social and Cultural Rights
ICJ	International Court of Justice
ICRMW	International Convention on the Protection of the Rights of All Migrant Workers
ILC	International Law Commission
IMF	International Monetary Fund
IPBES	Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services
IPCC	Intergovernmental Panel on Climate Change
ITLOS	International Tribunal for the Law of the Sea
IUCN	International Union for Conservation of Nature
LDC	Least Developed Country
MVI	Multidimensional Vulnerability Index
NCQG	New Collective Quantified Goal
NDC	Nationally Determined Contribution
OAS	Organization of American States
OHCHR	The United Nations Office of the High Commissioner for Human Rights
RCB	Remaining Carbon Budget
SIDS	Small Island Developing States
TESS	Forum on Trade, Environment, and the Sustainable Development Goals
TRIPS	Agreement on Trade-Related Intellectual Property Rights
UDHR	Universal Declaration of Human Rights

Abbreviation	Description
UN	United Nations
UNCLOS	The United Nations Convention on the Law of the Sea
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNFCCC	United Nations Framework Convention on Climate Change
UNGA	United Nations General Assembly
USD	United States Dollars
VCLT	Vienna Convention on the Law of Treaties
WMO	World Meteorological Organization
WTO	World Trade Organization

I. INTRODUCTION TO THE WRITTEN STATEMENT

A. Introduction and importance of the request

1. Climate change is, unequivocally, the greatest challenge of our time. The severity of the harms that climate change has caused, and will continue to cause, to the world's ecosystems, biodiversity, and human populations, cannot be overstated. These harms will "escalate with every increment of global warming".[1] For small island developing States ("**SIDS**") – like Antigua and Barbuda – the threat is, literally, existential. Although SIDS have made a negligible contribution to the causes of climate change, they are already suffering loss and damage, and will continue to suffer the greatest consequences. The international community is now facing a "rapidly closing window of opportunity to secure a liveable and sustainable future for all".[2]

2. Given the severity of the existential threat posed by climate change, Antigua and Barbuda underscores the significance of these advisory proceedings, and of similar initiatives championed by SIDS in an attempt to address this common concern of humankind. Antigua and Barbuda commends the international community in agreeing unanimously to submit this request for an advisory opinion.[3] The request is, in Antigua and Barbuda's view, well-formulated to allow the Court to address these issues of unprecedented importance.

3. Antigua and Barbuda commends United Nations ("**UN**") General Assembly Resolution 77/276 as a call to secure clarity on the obligations of States in relation to climate change, and the legal consequences of the breach of those obligations. Such clarity has very important real-world significance. Quite literally, without greater clarity on the issues addressed in these advisory proceedings, Antigua and Barbuda's very existence would be at risk.

4. Similar initiatives have been championed in other international fora, specifically, through requests for Advisory Opinions from the Inter-American Court of Human

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[1] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Summary for Policymakers (available here), para. B.2.

[2] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Summary for Policymakers (available here), para. C.1.

[3] UN General Assembly, *Resolution 77/276: Request for an advisory opinion of the International Court of Justice on the obligations of States in respect of climate change*, UN Doc. A/RES/77/276, 29 March 2023.

Rights ("**IACHR**") and the International Tribunal for the Law of the Sea ("**ITLOS**"). Antigua and Barbuda is a founding Member of the Commission of Small Island States on Climate Change and International Law ("**COSIS**"). The mandate of COSIS is to "promote and contribute to the definition, implementation, and progressive development of rules and principles of international law concerning climate change", including the "responsibility [of States] for injuries arising from internationally wrongful acts in respect of the breach of such obligations".[4] COSIS has championed the request for an Advisory Opinion from ITLOS. The present advisory proceedings supplement other initiatives championed by the SIDS at other fora.

5. Given the Court's role as the principal judicial organ of the UN and the breadth of areas of international law encompassed by the advisory opinion request, the present proceedings are a unique opportunity to ensure coherence and clarity in international law as it applies to climate change. It is in view of the unique importance of the present proceedings, and in solidarity with the SIDS and the international community, that Antigua and Barbuda submits this Written Statement.

6. This Section proceeds as follows. **Sub-section I.B** provides an overview of the process leading to the request for an advisory opinion from the International Court of Justice ("**ICJ**" or the "**Court**"); and **sub-section I.C** provides an overview of this Written Statement.

B. The process leading to the request for an advisory opinion

7. On 29 March 2023, the UN General Assembly adopted Resolution 77/276 entitled "Request for an advisory opinion of the International Court of Justice on the obligations of States in respect of climate change".[5] In that resolution, the General Assembly decided, pursuant to Article 96 of the Charter of the UN, to request the ICJ to render an advisory opinion on the following questions:

> Having particular regard to the Charter of the United Nations, the International Covenant on Civil and Political Rights, the International Covenant on Economic, Social and Cultural Rights, the United Nations Framework Convention on Climate

[4] Agreement for the establishment of the Commission of Small Island States on Climate Change and International Law, 31 October 2021, 3447 U.N.T.S. 1, Article 1(3).

[5] UN General Assembly, *Resolution 77/276: Request for an advisory opinion of the International Court of Justice on the obligations of States in respect of climate change*, UN Doc. A/RES/77/276, 29 March 2023.

> Change, the Paris Agreement, the United Nations Convention on the Law of the Sea, the duty of due diligence, the rights recognized in the Universal Declaration of Human Rights, the principle of prevention of significant harm to the environment and the duty to protect and preserve the marine environment,
>
> > (a) What are the obligations of States under international law to ensure the protection of the climate system and other parts of the environment from anthropogenic emissions of greenhouse gases for States and for present and future generations;
> >
> > (b) What are the legal consequences under these obligations for States where they, by their acts and omissions, have caused significant harm to the climate system and other parts of the environment, with respect to:
> >
> > > (i) States, including, in particular, small island developing States, which due to their geographical circumstances and level of development, are injured or specially affected by or are particularly vulnerable to the adverse effects of climate change?
> > >
> > > (ii) Peoples and individuals of present and future generations affected by the adverse effects of climate change?

8. On 12 April 2023, the UN Secretary-General transmitted the Request to the Court.[6] On 20 April 2023, the Court fixed time-limits within which written statements on the questions may be submitted to the Court.[7] On 21 April 2023, in accordance with Article 66(2) of the Statute of the Court, the Registrar of the Court informed Antigua and Barbuda that it may submit a written statement in the proceedings.[8] On 4 August 2023 and 15 December 2023, the Court extended the time-limits for the filing of written statements.[9] Antigua and Barbuda submits this Written Statement pursuant to the Court's invitation and within the time-limit set by the Court.

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[6] Letter from the UN Secretary-General to the President of the International Court of Justice, 12 April 2023.

[7] *Obligations of States in Respect of Climate Change (Request for an Advisory Opinion)*, I.C.J. General List No. 187, Order of the Court, 20 April 2023.

[8] Letter from the Registrar of the Court to the Permanent Representative of Antigua and Barbuda to the UN, Permanent Mission of Antigua and Barbuda, 21 April 2023.

[9] *Obligations of States in Respect of Climate Change (Request for an Advisory Opinion)*, I.C.J. General List No. 187, Order of the Court, 4 August 2023 and Order of 15 December 2023.

C. Overview and executive summary of this Written Statement

9. This Written Statement proceeds in three further Sections.

10. **Section 0** sets out the factual and scientific background to the climate crisis, drawing predominantly on the extensive work of the Intergovernmental Panel on Climate Change ("**IPCC**"). This Section establishes the unequivocal link between human activity – specifically, anthropogenic Greenhouse Gas ("**GHG**") emissions – and climate change, including the historical contributions made to the crisis, as well as the myriad resulting harms to the environment and human populations.

11. **Section III** of the Written Statement addresses the *first* question posed to the Court, Question (A), proceeding in two sub-sections. **Sub-section III.A** identifies and describes the key international rules and principles relevant to climate change, focusing in particular on: (1) the customary obligation of prevention; (2) the principle of common but differentiated responsibilities and respective capabilities, in light of different national circumstances ("**CBDR-RC**"); (3) the international climate change regime, including the United Nations Framework Convention on Climate Change ("**UNFCCC**") and the Paris Agreement; (4) international human rights law; (5) the United Nations Convention on the Law of the Sea ("**UNCLOS**"); (6) the Convention on Biological Diversity ("**CBD**"); and (7) international trade law.

12. **Sub-section III.B** synthesises these various rules and principles to identify what States are obliged to do under international law to ensure the protection of the climate system and other parts of the environment from anthropogenic GHG emissions. Sub-section III.B proceeds in three further sub-sections.

    (a) **Sub-section III.B.1** addresses obligations related to **mitigation**, identifying that States are under an obligation to do their utmost, using all the means at their disposal, to achieve rapid, deep and sustained emissions reductions sufficient to prevent significant environmental harm, in a manner consistent with fairness, equity, and the principle of CBDR-RC. This obligation arises independently under several sources of law, in particular under the international climate change regime; the customary obligation of prevention; human rights law; and UNCLOS. In each instance, the obligations arising under one source of law support those arising under the other sources. Further, where States unilaterally

adopt trade-related climate measures (*e.g.*, border charges and restrictions), international trade law requires them to first engage in good-faith cooperative efforts with affected countries, and to respect the principle of fairness, equity and CBDR-RC in the design of those measures.

(b) **Sub-section III.B.2** addresses obligations related to **adaptation**, identifying that States are under an obligation to engage in adaptation planning processes and to implement adaptation actions; however, this obligation is qualified by what is "appropriate" for the State in question, including (for developing countries) the adequacy of adaptation support.

(c) **Sub-section III.B.3** addresses obligations related to **support**, identifying an obligation on developed States to provide both financial support and technology support for developing States' mitigation and adaptation efforts. On the former, the level of financial support must be at a level adequate to meet this purpose, with SIDS and other uniquely vulnerable countries enjoying priority in the allocation of these resources.

13. **Section 0** of the Written Statement addresses the *second* question posed to the Court, Question (B). The second question asks the Court to identify "the legal consequences" for States where they have breached the obligations that are the subject of the first question, proceeding in two sub-sections. **Sub-section IV.A** explains how customary international law on State responsibility applies in the context of climate change. **Sub-section IV.B** then applies these rules to identify the legal consequences that flow from the violation of the primary obligations identified in response to the first question. These rules are of particular significance for those States – such as Antigua and Barbuda – that have made a negligible contribution to the climate crisis, but have suffered, and will continue to suffer, disproportionate loss and damage as a result thereof.

II. FACTUAL AND SCIENTIFIC BACKGROUND

A. Introduction and roadmap

14. In this Section, Antigua and Barbuda sets out the factual and scientific background relevant to the questions before the Court.

15. This Written Statement draws on the work of recognised international scientific bodies, in particular that of the IPCC and the Intergovernmental Science-Policy Platform on Biodiversity and Ecosystem Services ("**IPBES**").[10] Both are independent, intergovernmental bodies established by States to strengthen the science-policy interface on, among others, climate and biodiversity issues.

16. **Sub-section B** sets out how anthropogenic GHG emissions cause climate change. It explains the scientific basis for the IPCC's "unequivocal" conclusion that anthropogenic GHG emissions are causing warming to the earth's atmosphere and oceans, leading to the climate crisis (**B.1**). It sets out the present and expected impact of human activity on climate change (**B.2**); explains the disparities in how States' historical activities have already contributed to climate change (**B.3**); and sets out the IPCC's findings on the Remaining Carbon Budget ("**RCB**") available to States, *i.e.*, how much carbon can be emitted while still limiting warming to certain temperature levels (**B.4**).

17. **Section C** addresses how anthropogenic emissions, through their impact on the climate system, cause harm to the environment. It identifies the key drivers of harm resulting from anthropogenic emissions: increased temperatures (land and ocean); rising sea levels; and ocean acidification (**C.1**). It next unpacks the harms that flow, as a consequence, to the environment: extreme weather events, coastal erosion, inundation and salination, and severe habitat and biodiversity loss (**C.2**). The sub-section then

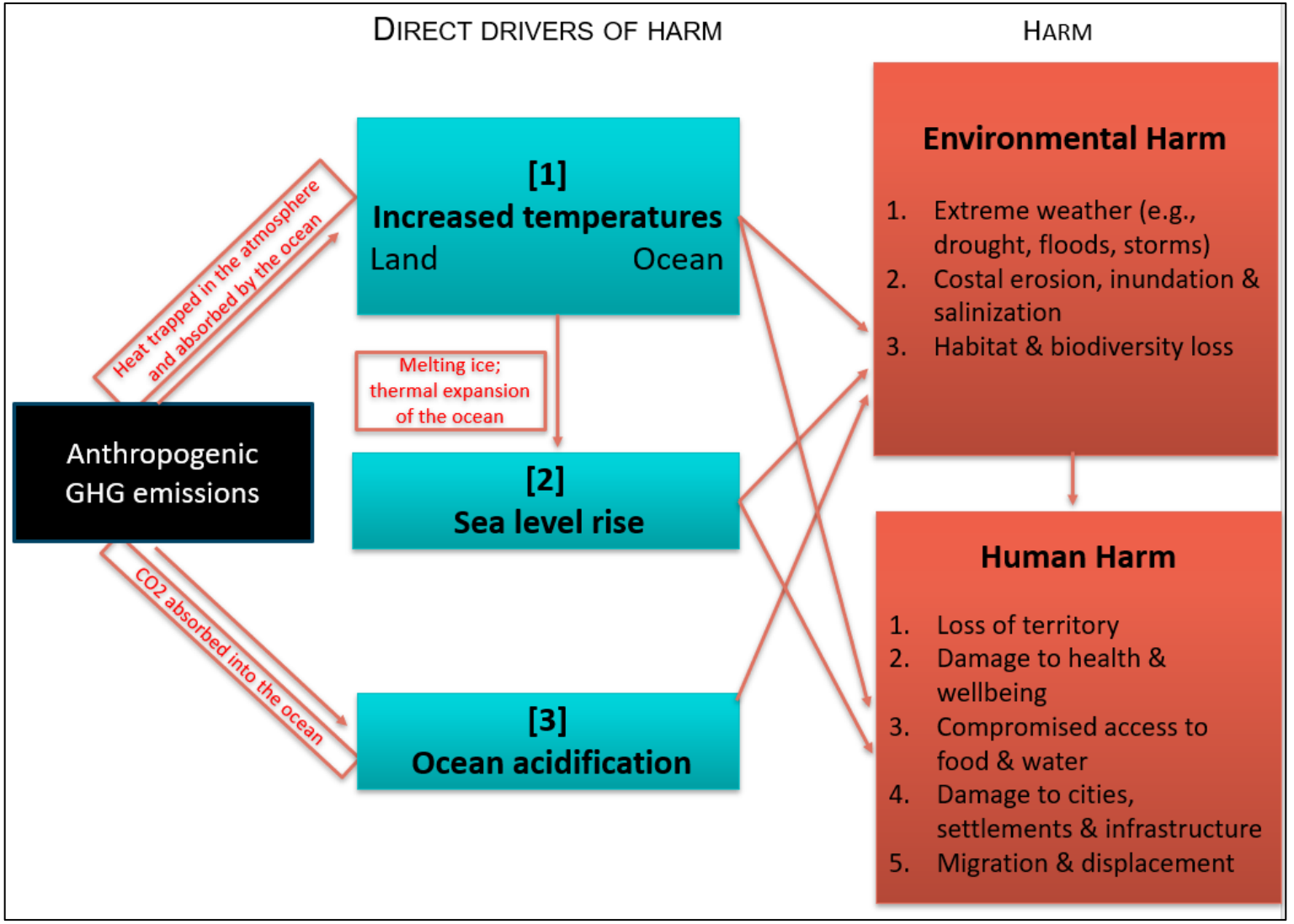
[10] The **IPCC** was established in 1988 by the World Meteorological Organization ("**WMO**") and the United Nations' Environment Program ("**UNEP**") (*see*, here). This Written Statement also refers to the report "Science of Climate Change and the Caribbean: Findings from the Intergovernmental Panel on Climate Change IPCC) Sixth Assessment Cycle (AR6)", 5 March 2024, authored by Dr. Adelle Thomas, Professor Michelle Mycoo, and Professor Michael Taylor (available as Annex 1 attached to this Written Statement) (hereinafter, "**Caribbean Climate Science Report, March 2024 (Annex 1)**"). The Caribbean Climate Science Report provides an overview of the scientific consensus on the causes, impacts and risks of climate change for the Caribbean region, based on the most recent reports of the IPCC. **IPBES** was established in 2012 in recognition of the need for an intergovernmental science-policy platform on biodiversity and ecosystem services (*see*, here).

describes the consequential harms to human populations: full or partial loss of territory; harm to human physical and mental health; compromised access to food and water; damage to cities, settlement and infrastructure; and forced migration and displacement (**C.3**).

18. **Section D** explains that – according to the Conference of the Parties ("**COP**") Global Stocktake Decision of December 2023 – States current efforts to address climate change are insufficient (**D.1**), notwithstanding the availability of concrete and cost-effective policy options for reducing emissions (**D.2**).

19. The causal pathways linking anthropogenic GHG emissions to environmental and human harms are summarised in Figure 1 below.

Figure 1: Summary of causal pathways from anthropogenic GHG emission to environmental and human harm (Source: IPCC)



B. How anthropogenic GHG emissions cause climate change

1. How human activity leads to GHG emissions and how these emissions impact the climate system

20. Climate change is caused by the release of the following GHGs into the Earth's atmosphere: (1) carbon dioxide ("**CO2**"); (2) methane; (3) nitrous oxide; and (4) other GHGs such as "fluorinated gases".[11] The first three are naturally occurring, but have also been released in large volumes through a variety of human activities ("**anthropogenic**" GHGs), while fluorinated gases are generated exclusively by human activities. Once accumulated in the atmosphere, GHGs trap the sun's radiation around the Earth, leading to a "greenhouse" warming effect.

21. The contribution that each GHG makes to climate change is a function of several factors: the volume of emissions over time; the effectiveness of the molecular structure in trapping heat in the atmosphere (its "potency"); and the length of time the gas remains in the atmosphere (its "atmospheric lifetime"). The following points should be noted for the four categories of GHGs.

22. *First*, the most significant GHG is CO2, making up approximately 64 percent of annual GHG emissions.[12] In 2019, atmospheric concentrations of CO2 were higher than at any time in the last 2 million years.[13] Most CO2 is emitted through the combustion of fossil fuels (*e.g.*, coal, oil, gas, and peat) in energy conversion systems like boilers in electric power plants, engines in aircraft and automobiles, and in cooking and heating.[14] Deforestation and related land-use changes also result in the release of CO2 stored in biomass (*e.g.*, burning felled trees), and the destruction of carbon sinks which remove CO2 from the atmosphere. CO2 can remain in the atmosphere for up to approximately 1,000 years.[15] Practically, this means that much of the CO2 emitted since the pre-

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[11] IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Full Report (available here), p. 194.

[12] IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Full Report (available here), p. 194.

[13] IPCC, Sixth Assessment Report, 2021, *The Physical Science Basis* (Working Group I), Summary for Policymakers (available here), para. A.2.1.

[14] IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Full Report (available here), p. 194.

[15] The precise atmospheric lifetime of CO2 released into the atmosphere can vary; *see*, IPCC, Fourth Assessment Report, 2007, *The Physical Science Basis* (Working Group I), Technical Summary (available here), p. 77; "The Atmosphere: Getting a Handle on Carbon Dioxide", NASA News, 9 October 2019 (available here).

industrial period (*i.e.*, 1850-1900) is still present in the atmosphere today; and that CO2 emitted today will remain in the atmosphere – and have a warming effect – for potentially up to 1,000 years.

23. *Second*, the second biggest GHG contributor to climate change is methane. Although methane makes up only 18 percent of annual emissions,[16] its greenhouse effect is highly potent, absorbing significantly more energy as long as it remains in the atmosphere.[17] Methane is released through fossil fuel combustion, as well as large-scale agricultural processes, and the breakdown of rubbish in landfills.[18] Methane has an atmospheric lifetime of approximately 12 years.[19]

24. *Third*, nitrous oxide, while only a small percentage of total annual emissions, is extremely potent: 300 and 15 times more potent than CO2 and methane, respectively.[20] It is released through fossil fuel combustion and certain agricultural and industrial processes, and has an atmospheric lifetime of approximately 114 years.[21]

25. *Fourth*, and finally, other GHGs include "fluorinated gases" – artificial compounds generated exclusively from human industrial activities (*e.g.*, manufacture and use of refrigerators, air-conditioners, and industrial solvents). Fluorinated gas emissions are small in volume but extremely potent, with some having a greenhouse effect several thousand times greater than CO2.[22]

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[16] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here), p. 229.

[17] International Energy Agency, "The Imperative of Cutting Methane from Fossil Fuels: an assessment of the benefits from the climate and health", October 2023 (available here), p. 4.

[18] International Energy Agency, "Global Methane Tracker 2023: Understanding methane emissions" (available here); UNEP/Climate and Clean Air Coalition, "Global Methane Assessment: 2030 Baseline Report" (available here), p. 9.

[19] International Energy Agency, "Global Methane Tracker 2023: Understanding methane emissions" (available here); *see also*, IPCC, Fourth Assessment Report, 2007, *The Physical Science Basis* (Working Group I), Full Report (available here), p. 212.

[20] *See*, IPCC, Fourth Assessment Report, 2007, *The Physical Science Basis* (Working Group I), Full Report (available here), p. 212. *See also*, University Corporation for Atmospheric Research, "Some Greenhouse Gases Are Stronger than Others" (available here); *Inside Climate News*, "What is Nitrous Oxide and Why is it a Climate Threat?", 11 September 2019 (available here).

[21] IPCC, Fourth Assessment Report, 2007, *The Physical Science Basis* (Working Group I), Full Report (available here), p. 212; *see also*, The World Bank, "Metadata Glossary: Nitrous oxide emissions" (available here).

[22] IPCC, Sixth Assessment Report, 2021, *The Physical Science Basis* (Working Group I), Full Report (available here), p. 180. *See also*, IPCC, Fourth Assessment Report, 2007, *The Physical Science Basis* (Working Group I), Full Report (available here), p. 212.

2. The present and expected impact of human activity on climate change

26. The international scientific community has reached an "unequivocal" conclusion that anthropogenic GHGs have caused, and are causing, drastic and accelerated changes to the Earth's climate system.[23] In the IPCC's words, "human influence on the climate system is now an established fact".[24]

27. Temperatures in the context of climate change are typically identified as the rise since "pre-industrial levels", *i.e.*, 1850-1900, the point at which climate change due to large-scale anthropogenic emissions is understood to have begun.

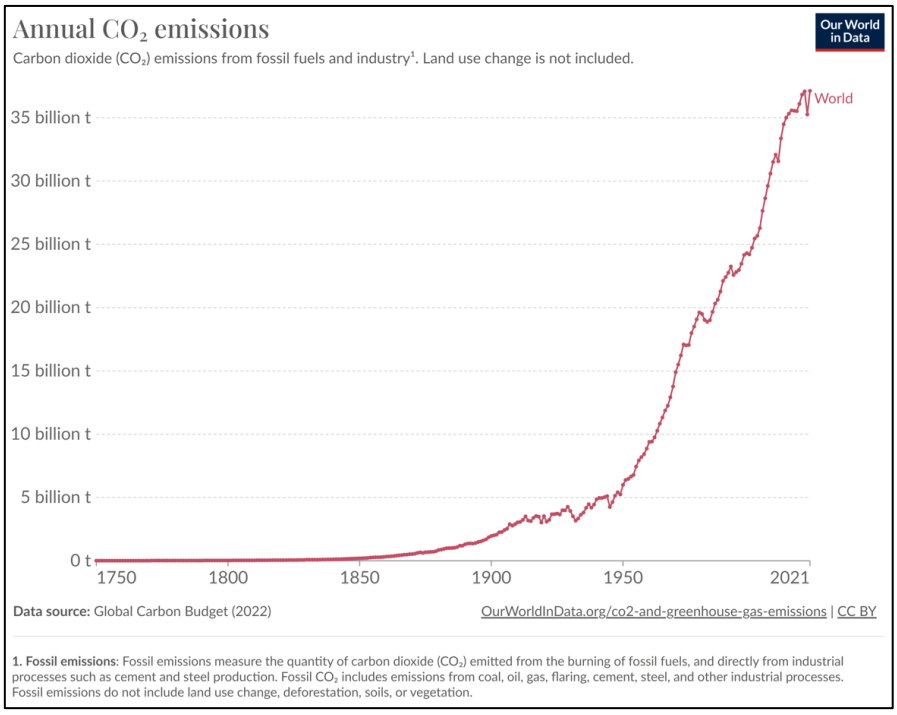
28. As shown in Figure 2 below, annual global CO2 emissions were very low in the pre-industrial period, and increased thereafter. Growth in CO2 emissions was relatively low until 1950 (at around 6 billion tonnes per year), and grew exponentially thereafter – reaching more than 22 billion tonnes in 1990 and more than 34 billion tonnes per year today.[25] Annual global CO2 emissions continue to grow, albeit at a slower pace.

[23] IPCC, Sixth Assessment Report, 2021, *The Physical Science Basis* (Working Group I), Summary for Policymakers (available here), para. A1; *see also*, Caribbean Climate Science Report, March 2024 (**Annex 1**), pp. 8 and 12.

[24] IPCC, Sixth Assessment Report, 2021, *The Physical Science Basis* (Working Group I), Technical Summary (available here), p. 41.

[25] *See*, University of Oxford and Global Change Data Lab, Our World in Data, "CO_2 and Greenhouse Gas Emissions" (available here).

Figure 2: Annual CO2 emissions over time (Source: Our World in Data)



29. As a result of the cumulative global emissions, atmospheric temperatures have already warmed by, on average, approximately 1.1°C to 1.35°C since pre-industrial levels.[26] Today's level of global warming has already caused, and continues to cause, severe, and in some cases, irreversible, environmental and human harm. These effects are discussed in detail below.[27]

30. The IPCC develops estimates for **future temperature** increases. That is, the IPCC assesses the *rate* and *degree* of warming using a set of tools, including integrated assessment models, climate models and paleoclimatic insights.[28] On this basis, the IPCC

[26] The precise degree of *average* post-industrial warming is subject to some uncertainty, depending on methodological factors such as the reference period over which average warming is measured. The IPCC's Sixth Assessment Report, released in 2021, confirms that human activities are responsible for approximately 1.1°C of post-industrial warming. *See*, IPCC, Sixth Assessment Report, 2021, *The Physical Science Basis* (Working Group I), Summary for Policymakers (available here), A.1.2.

However, factoring in more recent data from 2022/2023, newer estimates calculate still higher levels of warming of up to, on average, 1.35°C. Further, 2023 is now the first year to have reached, on average across the year, 1.5°C. *See*, *Financial Times*, "Climate Graphic of the Week: Critical 1.5°C threshold breached over 12-month period for first time", 8 February 2024 (available here); *see also*, Copernicus, "Global Climate Highlights 2023: 2023 is the hottest year on record with global temperatures close to the 1.5°C limit" (available here); *Berkeley Earth*, "Global Temperature Report for 2023", 12 January 2024 (available here).

[27] *See*, Section II.C.2 and Section II.C.3, below.

[28] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Full Report (available here), p. 63, footnote 109.

is able to provide an estimated range of what warming will likely occur in a given scenario (*e.g.*, high, medium and low mitigation efforts, plus additional variables).

31. The IPCC modelling process naturally involves uncertainty. While the fact of warming driven by anthropogenic emissions is "unequivocal", the *ceiling* and *rate* of future warming is not certain. The IPCC has warned that, for each given scenario, "warming substantially *above* the assessed very likely range… cannot be ruled out".[29] In other words, future warming could be higher than the currently estimated top end of estimated warming (approximately 4.4°C).[30]

32. In this modelling exercise, the IPCC calculates *an estimated temperature increase* for each of a set of different scenarios that vary depending on, for instance, the depth and speed of States' mitigation efforts.

33. In addition, the IPCC also conducts modelling exercises which calculate the quantity of GHG emissions that can be released for warming to stay below a certain temperature level (for instance 1.5°C). This quantity is called the "total carbon budget": the maximum amount of cumulative net global anthropogenic CO2 emissions that would result in limiting global warming to a given level (within a certain probability).

34. The total carbon budget is the sum of: (i) the *historical* carbon budget (that is *historical* cumulative net CO2 emissions); and, (ii) the *remaining* carbon budget (that is the *future* cumulative net CO2 emissions to keep global warming to a given level). Antigua and Barbuda discusses these two aspects of the total carbon budget in turn.

3. The historical carbon budget: How much States have already contributed to climate change

35. As a result of historical emissions, atmospheric temperature has increased already by up to 1.35°C since pre-industrial levels.[31]

36. Historical cumulative emissions (between 1890-2023) constitute the largest share of the total carbon budget that can be exploited while keeping the temperature increase below

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[29] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Full Report (available here), p. 77.

[30] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Full Report (available here), p. 68.

[31] *See*, para. 29, *above*.

1.5°C, accounting for about 90 percent of the total carbon budget.[32] This means that the remaining carbon budget – the carbon which States could still emit while staying below 1.5°C – is only about 10 percent of the total carbon budget (see Section II.B.4, below).

37. Historical emissions, therefore, carry a large responsibility for causing, and continuing to cause, climate change.[33] This responsibility is, however, not shared equally across States.[34]

38. Figure 3 below shows the significant regional disparity in historical CO2 emissions.[35] Until the mid-20th century, global emissions were dominated by Europe and the United States; thereafter, emissions picked up in other regions, in particular in Eastern Asia. Overall, the United States is responsible for approximately 24 percent of cumulative CO2 emissions, the 27 EU Member States for approximately 17 percent, and China for approximately 15 percent.[36]

[32] Pierre Friedlingstein *et al.*, "Global Carbon Budget 2023", *Earth System Science Data*, 15(12), 5 December 2023 (available here), p. 5327.

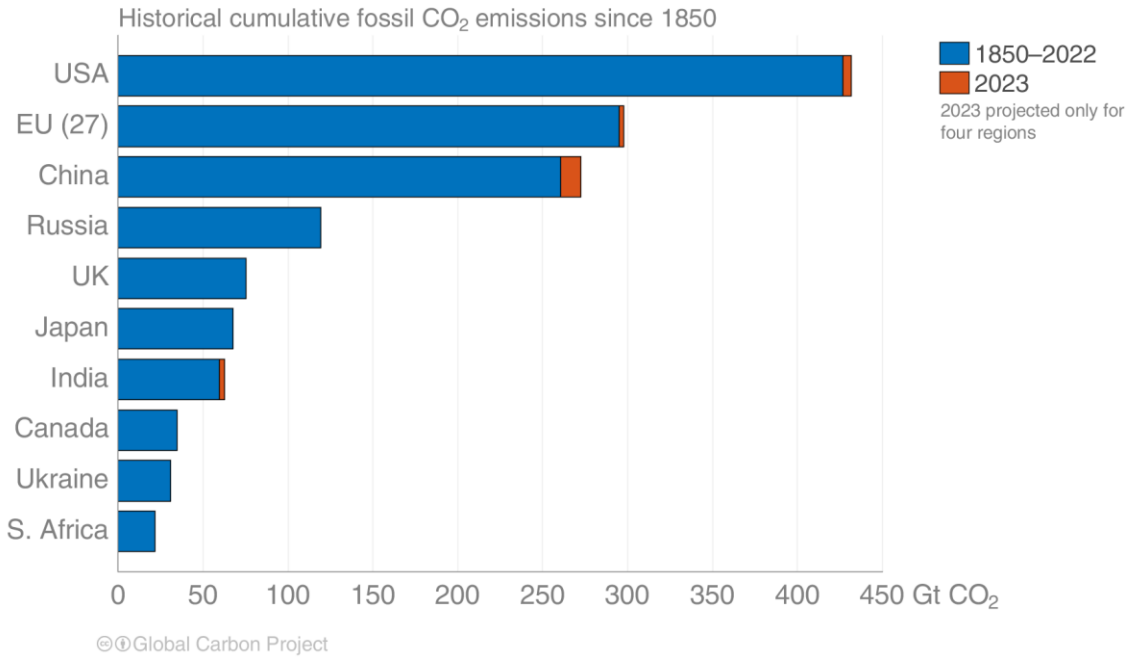
[33] *Carbon Brief*, "Revealed: How colonial rule radically shifts historical responsibility for climate change", 26 November 2023 (available here).

[34] IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Full Report (available here), p. 64; *see also*, Caribbean Climate Science Report, March 2024 (**Annex 1**), p. 8-9.

[35] *See*, University of Oxford and Global Change Data Lab, Our World in Data, "Cumulative CO_2 emissions by world region" (available here). This does not include CO2 emissions from land use change.

[36] Pierre Friedlingstein *et al.*, "Global Carbon Budget 2023", *Earth System Science Data*, 15(12), 5 December 2023 (available here), p. 5319.

Figure 3: Historical cumulative fossil CO2 emissions since 1850 (Source: Global Carbon Project)



39. By contrast, all SIDS together – the countries which are most vulnerable to the effects of climate change – have contributed only 0.5 percent to the total volume of CO2 emissions.[37]

40. Antigua and Barbuda, for its part, has emitted a mere **0.001 percent** of global CO2 emissions.[38] This number is even inflated because it includes emissions from before Antigua and Barbuda's independence from colonial rule (in November 1981).

4. The remaining carbon budget: How much States can still emit to limit climate change

41. Currently, as a result of historical emissions, the global atmospheric temperature has already increased by between 1.1°C – 1.35°C on average since pre-industrial levels. Every additional tonne of GHG emissions adds to global warming. In fact, there is a near-linear relationship between anthropogenic CO2 emissions and the global warming

[37] *See* University of Oxford and Global Change Data Lab, Our World in Data, "CO_2 emissions" (available here).

[38] *See* University of Oxford and Global Change Data Lab, Our World in Data, "CO_2 emissions" (available here).

they cause: each 1000 GtCO2 of cumulative CO2 emissions causes a 0.27°C to 0.63°C temperature increase.[39] This relationship has two important implications.

42. *First*, global temperature will stabilise at any level *only* when global anthropogenic emissions reach "net zero". That is, when the volume of GHG emissions going *into* the atmosphere is balanced by an equivalent *removal* of GHG emissions from the atmosphere. As long as the world does not reach "net zero", the global temperature will continue to increase, day by day.[40]

43. *Second*, the near-linear relationship between anthropogenic CO2 emissions and global warming necessarily means that the world, as a whole, has only a limited carbon budget left to stabilise the global temperature at any given level. The Remaining Carbon Budget ("**RCB**") is the net amount of CO2 that the world can still emit, collectively, while keeping global warming below a particular temperature limit.

44. The RCB can be calculated for any particular temperature increase, with a given probability. The IPCC has calculated RCBs for several temperature increases, including 1.5°C.[41] The Global Carbon Project, an international group of more than a 100 scientists, also regularly calculates and updates RCB figures, including for 1.5°C.[42]

45. The IPCC's most recent calculations were done in 2021, with the IPCC's Sixth Assessment Report. At that time, the IPCC calculated that, to have a 50 percent chance of limiting average warming to 1.5°C, the world had an RCB of approximately **500 GtCO2** from the beginning of 2020 (representing 17 percent of the total carbon budget) (*i.e.*, the "**1.5°C RCB**").[43] Using the RCB, the IPCC calculates emission reduction pathways for each temperature level. Specifically, using the RCB, the IPCC determines the percentage rate by which current emission levels must be reduced to hold the total

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[39] IPCC, Sixth Assessment Report, 2021, *The Physical Science Basis* (Working Group I), Summary for Policymakers (available here), D.1.1.

[40] IPCC, Sixth Assessment Report, 2021, *The Physical Science Basis* (Working Group I), Summary for Policymakers (available here), D.1.1 and D.1.8.

[41] IPCC, Sixth Assessment Report, 2021, *The Physical Science Basis* (Working Group I), Summary for Policymakers (available here), p. 29.

[42] Global Carbon project, "About GCP" (available here); *see also*, Pierre Friedlingstein *et al.*, "Global Carbon Budget 2023", *Earth System Science Data*, 15(12), 5 December 2023 (available here), pp. 5301-5369.

[43] IPCC, Sixth Assessment Report, 2021, *The Physical Science Basis* (Working Group I), Summary for Policymakers (available here), Table SPM.2.

carbon budget and, hence, the temperature increase, to a given level (*e.g.*, 1.5°C). Antigua and Barbuda refers to these emission reduction targets as the "collective targets aligned with the IPCC 1.5°C pathway". Specifically, the IPCC found that, limiting global warming to 1.5°C (with a 50 percent probability), requires global GHG emission reductions (below the 2019 level) by 43 percent by 2030; by 60 percent by 2035; and, by 84 percent by 2050.[44] Net zero CO2 emissions need to be achieved by early 2050, and net zero GHG emissions by early 2070.[45] In other words, to hold global warming to 1.5°C requires rapid, deep and sustained emission reductions.[46]

46. In 2023, subsequent to the IPCC's Sixth Assessment, the Global Carbon Project calculated the 1.5°C RCB, showing that it is now significantly lower; the RCB is now vanishingly small.[47] Indeed, the Global Carbon Project found that, from the beginning of 2024, the RCB to limit global warming to 1.5° (with a 50 percent probability) is only around **275 GtCO2**, which is equal to around seven years of current CO2 emissions.[48] In other words, the 1.5°C RCB from the beginning of 2024 is *almost half* of the 1.5°C RCB from the beginning of 2020, as previously estimated by the IPCC. This means that only 10 percent of the total carbon budget is left to limit global warming to 1.5°C. This means that, at *current* emission levels, the remaining carbon budget to limit global warming to 1.5°C would be entirely exhausted by January 2031.[49]

47. Figure 4, below, shows the most recent RCB calculated for 1.5°C by the IPCC and the Global Carbon Project. The 1.5°C RCB is the red slice in the pie chart, with the remainder of the pie reflecting historic emissions at the time of calculation.

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[44] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Summary for Policymakers (available here), Table SPM.1; UNFCCC, "Technical dialogue of the first global stocktake", UN Doc. FCCC/SB/2023/9, 8 September 2023 (available here) (hereinafter "**UNFCCC, "Technical dialogue of the first global stocktake" (2023)**"), para. 98.

[45] UNFCCC, "Technical dialogue of the first global stocktake" (2023) (available here), para. 98; IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Summary for Policymakers (available here), C.2 and Table SPM.2.

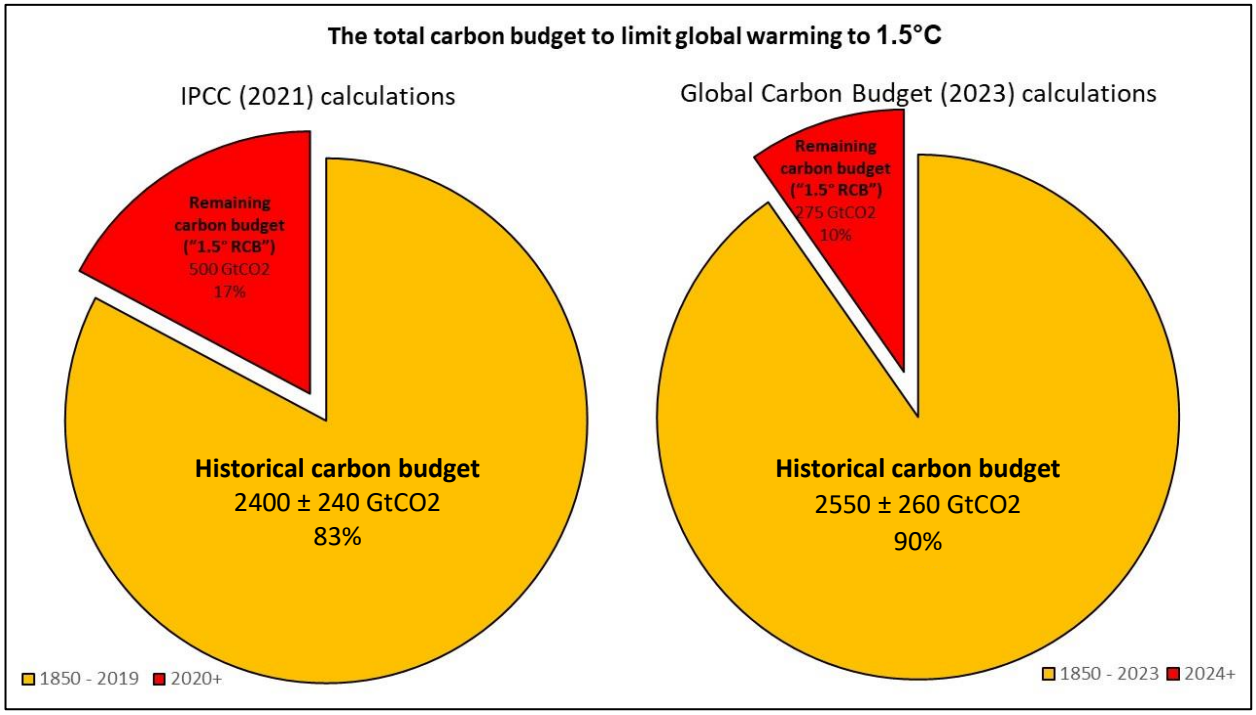
[46] IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Summary for Policymakers (available here), p. 17.

[47] Pierre Friedlingstein *et al.*, "Global Carbon Budget 2023", *Earth System Science Data*, 15(12), 5 December 2023 (available here), p. 5304.

[48] Pierre Friedlingstein *et al.*, "Global Carbon Budget 2023", *Earth System Science Data*, 15(12), 5 December 2023 (available here), p. 5345.

[49] Pierre Friedlingstein *et al.*, "Global Carbon Budget 2023", *Earth System Science Data*, 15(12), 5 December 2023 (available here), p. 5304.

Figure 4: The total carbon budget to limit global warming to 1.5°C (Sources: IPCC & Global Carbon Budget) [50]



48. To limit global warming to 1.5°C, States must now, collectively, limit their emissions to the amount represented by the red slice of pie. The red slice functions, therefore, as a shared global resource that must be divided among States, consistent with their obligations under international law. As Antigua and Barbuda explains below, this requires that the 1.5°C RCB be divided equitably among States based on the principle of fairness, equity and CBDR-RC.

C. The impact of anthropogenic GHG emissions on the environment and human populations

49. Anthropogenic emissions leading to climate change are already causing severe, and in some cases, irreversible, harm to the environment, with equally severe consequences

[50] IPCC, Sixth Assessment Report, 2021, *The Physical Science Basis* (Working Group I), Summary for Policymakers (available here), p. 29; and Pierre Friedlingstein *et al.*, "Global Carbon Budget 2023", *Earth System Science Data*, 15(12), 5 December 2023 (available here), p. 5327. The updated 1.5°C RCB by Friedlingstein *et al*., is based on the IPCC Sixth Assessment Report and a recent revision of the IPCC estimates. *See*, P. Forster *et al.*, "Indicators of Global Climate Change 2022: Annual update of large-scale indicators of the state of the climate system and human influence", *Earth System Science Data*, 15(6) (2023) (available here), pp. 2295-2327; R. Lamboll *et al.*, "Assessing the size and uncertainty of remaining carbon budget", *Nature Climate Change*, 13, 8 June 2023 (available here), pp. 1360-1367.

for human populations.[51] Antigua and Barbuda, for its part, has already suffered considerable harms, *i.e.*, loss and damage, and will continue to do so.

50. The IPCC has concluded, with "very high confidence", that the "risks and projected adverse impacts and related **losses and damages from climate change will escalate with every increment of global warming**".[52] These harms are "higher for global warming of 1.5°C than at present";[53] indeed, warming of 1.5°C is projected to cause "unavoidable increases in multiple climate hazards and present multiple risks to ecosystems and humans (*very high confidence*)".[54] These risks are "even higher at 2°C".[55] The harms caused by climate change differs substantially across States, disproportionally affecting countries, such as SIDS, that are highly vulnerable to climate hazards.[56]

51. In sub-section II.C.1, Antigua and Barbuda identifies the three key drivers of harm resulting from anthropogenic GHG emissions: temperature increase, sea level rise and ocean acidification. In sub-section II.C.2, Antigua and Barbuda addresses the knock-on harms to human populations. Antigua and Barbuda describes these harms from a global perspective – since they are occurring globally – with a particular focus on the special vulnerability of SIDS, including Antigua and Barbuda.

52. These harms are extreme, interrelated and reinforcing. The harms caused in one instance amplify and drive other harms caused, and *vice-versa*. The harms are too extensive to be summarised comprehensively in this Written Statement (an exercise, in

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[51] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Summary for Policymakers (available here), para. B.1.

[52] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Summary for Policymakers (available here), para. B.2.2.

[53] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Summary for Policymakers (available here), para. B.2.2.

[54] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Summary for Policymakers (available here), para. B.3; *see also*, Caribbean Climate Science Report, March 2024 (**Annex 1**), p. 22.

[55] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Summary for Policymakers (available here), para. B.2.2; Caribbean Climate Science Report, March 2024 (**Annex 1**), p. 22.

[56] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Summary for Policymakers (available here), para. B.2.4; *see also*, Caribbean Climate Science Report, March 2024 (**Annex 1**), p. 17.

any event, already conducted by IPCC and IPBES experts).[57] Instead, Antigua and Barbuda provides a brief overview of the damage resulting from anthropogenic GHG emissions, based on international scientific consensus, to provide a solid factual basis for the subsequent legal arguments.

1. The key drivers of harm: temperature increase, sea level rise and ocean acidification

53. There are three immediate consequences of anthropogenic GHG emissions that drive harm to the environment and human populations: temperature increase, sea level rise, and ocean acidification. Antigua and Barbuda unpacks below the causal connection between anthropogenic emissions and these three drivers.

a. Temperature increase

54. As anthropogenic GHGs cause the Earth's atmosphere to warm, land surface temperatures and ocean temperatures also increase. Antigua and Barbuda addresses each in turn.

i. Land temperature

55. Climate change resulting from anthropogenic GHG emissions causes rising temperatures across land territories.[58] Global land surface temperature has increased faster since 1970 than in any other 50-year period over at least the last 2000 years.[59] Temperatures during 2011-2020 were collectively the warmest in around 6500 years.[60] The summer of 2023 was the hottest on record.[61] It is "virtually certain" that the

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[57] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Summary for Policymakers (available here); *see also*, IPBES, 2019, *Global Assessment Report on Biodiversity and Ecosystem Services*, Summary for Policymakers (available here).

[58] This includes statistically significant warming in the Caribbean region; *see*, Caribbean Climate Science Report, March 2024 (**Annex 1**), p. 13.

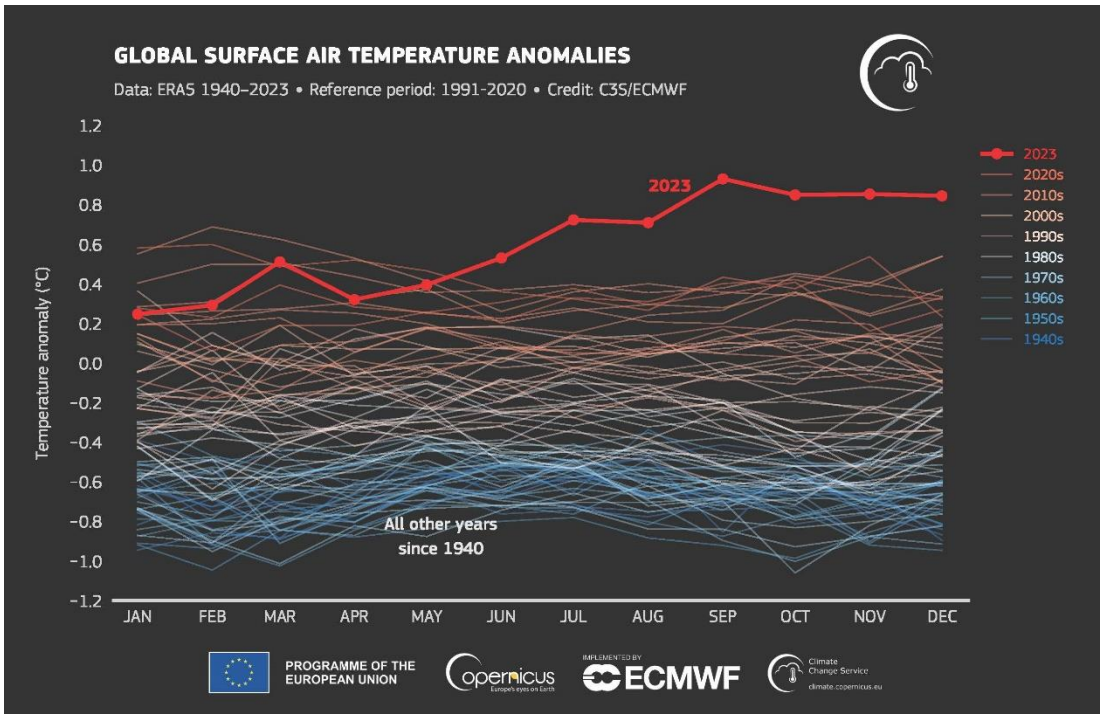
[59] IPCC, Sixth Assessment Report, 2021, *The Physical Science Basis* (Working Group I), Summary for Policymakers (available here), para. A.2.2.

[60] IPCC, Sixth Assessment Report, 2021, *The Physical Science Basis* (Working Group I), Summary for Policymakers (available here), para. A.2.2.

[61] *See*, *Financial Times*, "Climate Graphic of the Week: Critical 1.5C threshold breached over 12-month period for first time", 8 February 2024 (available here); *see also*, *Copernicus*, "Global Climate Highlights 2023: 2023 is the hottest year on record with global temperatures close to the 1.5°C limit" (available here); *Berkeley Earth* "Global Temperature Report for 2023", 12 January 2024 (available here).

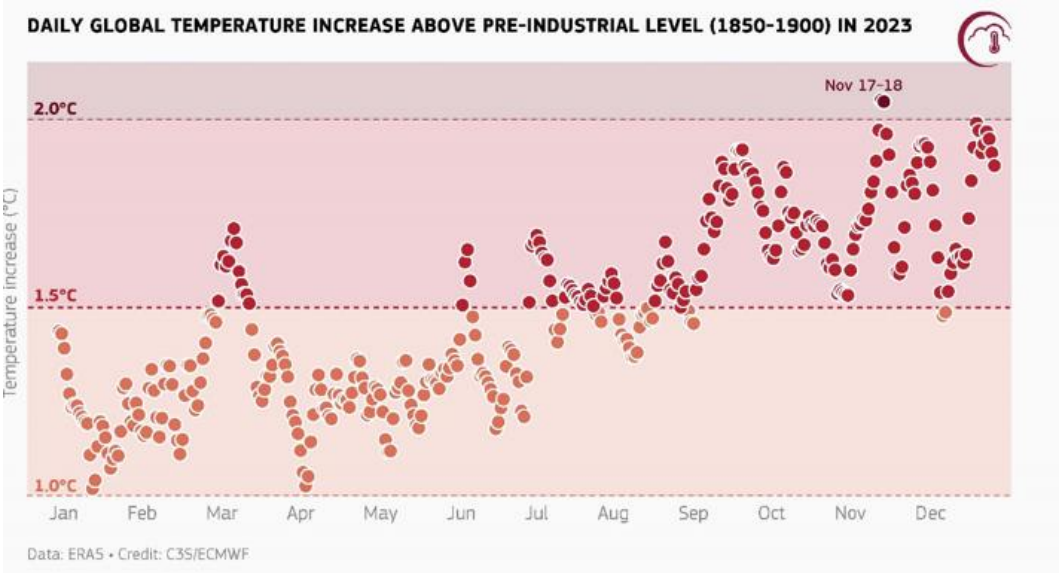
frequency, intensity and duration of heatwaves will increase with each increment of warming beyond pre-industrial levels.[62]

Figure 5: Global surface air temperature (Source: Copernicus Global Climate Highlights 2023)



[62] IPCC, Sixth Assessment Report, 2021, *The Physical Science Basis* (Working Group I), Summary for Policymakers (available here), para. A.3.1.

Figure 6: Daily global temperature increase above pre-industrial level (1850-1900) in 2023 (Source: Copernicus Global Climate Highlights 2023)



56. Temperature increases vary across regions; some are more affected than others. African countries, for example, are expected to experience unprecedented high temperatures much earlier than the generally wealthier, higher latitude countries.[63]

57. Increases in global temperatures come with a swathe of harmful consequences, most obviously melting sea ice, heatwaves, drought and wildfires, but also disruptions to the Earth's water cycle and seasonal weather patterns more generally. These consequences have, themselves, knock-on and interacting effects on the environment, and on human populations, as developed in the sub-sections below.

ii. Ocean temperature

58. The world's oceans have "mammoth" heat trapping ability – oceans have already absorbed around 93 percent of the excess heat generated from anthropogenic GHG emissions.[64] Ocean temperatures in the warmest *and* coolest months of the year have

[63] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here), p. 1320.

[64] IPCC, Fifth Assessment Report, 2014, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report Part B (available here), p. 1664 ("The Ocean has absorbed 93% of the extra heat arising from the enhanced greenhouse effect"); *The Guardian*, "Oceans have been absorbing the world's extra heat. But there's a huge payback", 14 May 2023 (available here); United Nations, "The ocean – world's greatest ally against climate change" (available here); NASA, "Ocean Warming" (available here).

increased, in most regions, since 1950.[65] In 2023, sea surface temperatures across the globe smashed virtually all existing records, and this trend continues into 2024.[66]

59. Ocean temperature increase is particularly dangerous because oceans play a key role in regulating the climate system as a whole. The ability of the oceans to absorb CO2 and atmospheric heat alleviates some of the impact of climate change on land, with oceans capturing around 30 percent of CO2 emissions released in the atmosphere, and around 90 percent of excess atmospheric heat.[67] But as the ocean gets hotter, the ability to absorb CO2 and heat diminishes, in turn resulting in more global warming.

60. This vicious cycle is getting worse over time, with the ocean getting hotter at a faster rate.[68] Indeed, analysis of isotherms, which measure temperature increase over time, shows the rate of ocean warming is increasing.[69]

61. Increased ocean temperatures, like land temperatures, drive a myriad of other environmental and human harms, not least rising sea levels – itself a key driver of harm. The acceleration in ocean warming also ramps up the speed at which populations must either move or adapt to survive.[70] Marine heatwaves – periods of extremely high ocean temperatures – have already negatively affected marine organisms and ecosystems in all ocean basins over the last two decades, including critical "foundation species" such as corals, seagrass and kelp forests.[71]

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[65] IPCC, Fifth Assessment Report, 2014, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report Part B (available here), p. 1664.

[66] *The Guardian*, "Record ocean temperatures put Earth in 'unchartered territory', say scientists", 26 April 2023 (available here); *BBC*, "Ocean heat record broken, with grim implications for the planet", 4 August 2023 (available here); *Africa News*, "EU scientists say ocean surface temperatures reach record high in February [2024]", 8 March 2024 (available here); Bloomberg, "Record-Smashing Heat in the World's Oceans, Explained", 4 March 2024 (available here); Lijing Cheng *et al*., "New Record Ocean Temperatures and Related Climate Indicators in 2023", *Advances in Atmospheric Sciences*, 11 January 2024 (available here).

[67] IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Full Report (available here), p. 456.

[68] IPCC, Fifth Assessment Report, 2014, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report Part B (available here), Table 30-1, p. 1667.

[69] IPCC, Fifth Assessment Report, 2014, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report Part B (available here), Table 30-1, Table 30-3, and p. 1677.

[70] IPCC, Fifth Assessment Report, 2014, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report Part B (available here), p. 1667.

[71] IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Full Report (available here), p. 67.

62. Increased ocean temperatures also cause ocean deoxygenation: warm water holds less oxygen than cold water, so as the ocean absorbs heat from the atmosphere, its overall oxygen content decreases.[72] Like humans and other animals, fish and other aquatic organisms need oxygen to breathe. With insufficient oxygen, aquatic creatures become physically stressed, reproduction is impaired, growth rates slow, and they become more susceptible to disease and predation.[73] Oxygen levels have already decreased by around two percent since the 1950s,[74] and it is "virtually certain" that risks from deoxygenation will increase with every increment of additional warming.[75]

63. Increased ocean temperatures also disrupt "ocean stratification", *i.e.*, the natural separation of the ocean into layers, which in turn hinders the movement of nutrients to the water's surface, and the movement of oxygen to deep ocean layers. This, combined with other key drivers, further disrupts the thermohaline circulation system, or "global conveyor belt" – the complex system of ocean currents that circulate essential heat, nutrients and oxygen around the Earth's oceans, and helps regulate the Earth's climate system *writ large*. Latest research (*i.e.*, post-dating the IPCC's Sixth Assessment Report), using new early warning systems, indicates that Atlantic Ocean current systems are nearing "collapse".[76] This would be a critical climate "tipping point" (*i.e.*, a threshold point which triggers large-scale, rapid, and irreversible changes to the climate system as a whole).[77]

64. As unpacked below, this large-scale disruption to habitats and ecosystems has severe consequences for ocean biodiversity and the human populations that rely on it.

b. Sea level rise

65. A second major driver of environment and human harm caused by anthropogenic GHG emissions is sea level rise.

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[72] IUCN, "Ocean Deoxygenation", December 2019 (available here).

[73] IUCN, "Ocean Deoxygenation", December 2019 (available here).

[74] IUCN, "Ocean Deoxygenation", December 2019 (available here).

[75] IPCC, 2018, *Special Report on Global Warming of 1.5°C*, Full Report (available here), p. 224.

[76] René M. Van Westen, Michael Kliphuis and Henk A. Dijkstra, "Physics-based early warning signal shows that AMOC is on tipping course", *Sciences Advances*, 10(6) (2024) (available here); *LA Times*, "Researchers Warn of a Catastrophic Collapse of Ocean Currents", 26 February 2024 (available here).

[77] *See*, footnote 76, *above.*

66. It is "virtually certain" that global mean sea level attributable to anthropogenic GHG emissions is rising, and that the rate of sea level rise is accelerating.[78] Anthropogenic GHG emissions leading to climate change causes sea level rise in two ways. *First*, warmer temperatures cause ice sheets, icebergs and mountain glaciers to melt, adding additional fresh water to the ocean.[79] *Second*, as the ocean absorbs more heat it becomes less dense, and expands physically ("thermal expansion").[80]

67. The overall *degree* of sea level rise is "strongly dependent" on which emission scenario is used in the modelling, *i.e.*, the extent of mitigation actions in the coming decades.[81] The rate of sea level rise is already accelerating, and will continue to do so up to 1.5°C.[82] Global mean sea level rise is projected to be around 0.1m higher with a warming of 2°C compared to 1.5°C,[83] amounting to approximately 10 million more people exposed to related risks.[84]

68. It is "virtually certain" that continued emissions will further global mean sea level rise.[85] Moreover, extreme sea level events "that occurred once per century in the recent past are projected to occur at least annually at more than half of all tide gauge locations by 2100".[86] Caribbean islands are among those projected to suffer the most loss of territory; as between 1m to 6m of sea level rise, approximately 9 to 50 percent of

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[78] IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Technical Summary (available here), p. 55.

[79] IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Full Report (available here), p. 326.

[80] IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Full Report (available here), p. 326.

[81] IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Technical Summary (available here), p. 55.

[82] IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Technical Summary (available here), pp. 55-56: "[Sea level rise] at the end of the century is projected to be faster under all scenarios".

[83] IPCC, 2018, *Special Report on Global Warming of 1.5°C*, Summary for Policymakers (available here), para. B.2.

[84] IPCC, 2018, *Special Report on Global Warming of 1.5°C*, Summary for Policymakers (available here), para. B.2.1. *See* further on risks to human populations in sub-section II.C.3.

[85] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Summary for Policymakers (available here), para. B.1.3.

[86] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Full Report (available here), p. 77.

Caribbean islands will be entirely submerged.[87] The loss of territory for Barbuda resulting from different levels of sea level rise is depicted in the Figure 7 below.

Figure 7: Loss of territory for Barbuda resulting from sea level rise (Source: Climate Central Mapping)

For a sea-level rise of 1m

For a sea-level rise of 3m

69. Projections of sea level rise also involve an assessment of "tipping points", one of which is the melting of the Greenland and West Antarctic sheets, associated with an irreversible sea level rise of several metres over the next two centuries.[88] While there is uncertainty around the triggering temperature range for this event, current research estimates full-scale, irreversible melting at somewhere between 1.5°C and 2°C.[89]

[87] Caribbean Climate Science Report, March 2024 (**Annex 1**), p. 4.

[88] IPCC, 2018, *Special Report on Global Warming of 1.5°C*, Full Report (available here), p. 257.

[89] IPCC, 2018, *Special Report on Global Warming of 1.5°C*, Summary for Policymakers (available here), para. B.2.2.

70. Sea level rise causes destruction to coastal ecosystems and infrastructure, including to community livelihoods, agriculture and habitability.[90] Of course, these impacts are not felt uniformly. By their nature – bounded by ocean and small in territory – SIDS are uniquely vulnerable.[91] In a 1.5°C warming scenario, the amount of territory expected to be subject to flooding will more than triple for all SIDS.[92] This means that for SIDS, sea level rise is indisputably an existential threat.[93]

71. Urban atoll islands are already expected to experience moderate to high risk of erosion, inundation and salination due to sea level rise (including, for some islands, total disappearance), and will continue to face greater risks even under a low emission pathway. Under a high emission pathway, that risk increases to "high" for "all low-lying coastal settings".[94]

c. Ocean acidification

72. Ocean acidification is caused specifically by CO2 emissions (as opposed to the other types of GHGs). When CO2 is absorbed into the ocean, it increases the concentration of hydrogen ions in the water and lowers the ocean's pH levels, increasing acidity.[95]

73. Approximately 30 percent of the CO2 released into the atmosphere each year is absorbed into the ocean; it is "virtually certain" that ocean surface pH has already declined over the past four decades.[96] Increased acidity in the water interferes with the physical development of marine life in a variety of ways, compromising their ability to

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[90] IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Technical Summary (available here), p. 55.

[91] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here), pp. 2050-2053 and pp. 2053-2063.

[92] Michalis I. Vousdoukas *et al*., "Small Island Developing States under threat by rising seas even in a 1.5°C warming world", *Nature Sustainability*, 6 (2023) (available here), pp. 1552-1564.

[93] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Summary for Policymakers (available here), para. B.4.5.

[94] IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Technical Summary (available here), p. 56.

[95] IPCC, Fourth Assessment Report, 2007, *The Physical Science Basis* (Working Group I), Full Report (available here), p. 714.

[96] IPCC, Fifth Assessment Report, 2014, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report Part B (available here), p. 1673; IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here), Table 3.2.

find food and detect predators.[97] Acidification rates caused by GHG emissions associated with 1.5°C warming would negatively impact a wide range of marine ecosystems, aquaculture fisheries, worsening considerably as temperatures rise towards 2°C,[98] and compounding other drivers of harm.

2. How anthropogenic GHG emissions harm the environment

a. Extreme weather events

74. Anthropogenic GHG emissions cause large-scale disruptions to the Earth's climate system, resulting in more frequent, and more extreme, weather events.[99] It is intuitive that climate change causes an increase in extreme heat waves, droughts and wildfires. However, it also disrupts, among others, the planet's water cycle, as higher land and ocean temperatures mean more water is evaporated into the atmosphere than would otherwise be the case.

75. Depending on the region, this leads to more intense hurricanes and storms (since storm systems draw their energy from warm atmospheric water vapor); higher precipitation and therefore flooding and, counterintuitively, more severe winters (since trapped atmospheric water vapor leads to heavier snowfall).[100]

76. These are not purely theoretical conclusions. Since the IPCC's Fifth Assessment Report in 2014, there has been an observable increase in such weather events, with scientific consensus that the increase is attributable to warming caused by anthropogenic GHG emissions.[101] The WMO has concluded that such events are "the new norm".[102]

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[97] *See*, The One UN Climate Change Learning Partnership, "*Ocean Acidification: A Summary for Policymakers from the Second Symposium on the Ocean in a High CO2 World*" (available here), p. 5.

[98] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Summary for Policymakers (available here), para. B.1.3.

[99] IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Technical Summary (available here), p. 45.

[100] *EarthJustice*, "How Climate Change is Fueling Extreme Weather", 19 July 2023 (available here); *see also*, IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Technical Summary (available here), p. 45; IPCC, Sixth Assessment Report, 2021, *The Physical Science Basis* (Working Group I), Technical Summary (available here), pp. 82-86.

[101] IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Technical Summary (available here), p. 45.

[102] World Meteorological Organization, "Extreme weather is the 'new norm'" 22 August 2023 (available here).

Extreme weather causes "widespread, pervasive impacts to ecosystems, people, settlements, and infrastructure".[103]

77. Moreover, changes in extremes continue to become larger with every additional increment of warming.[104] For example, the intensity and frequency of extreme heatwaves, heavy precipitation, agricultural and ecological droughts will discernibly increase with every additional 0.5°C of global warming.[105] Periods of extreme heat have already caused mass species mortality on both land and in the ocean.[106] Such "unprecedented" events will occur increasingly with additional global warming, even if limited at 1.5°C.[107]

78. Due to their geography, SIDS are unusually vulnerable to such disruptions to ocean circulation systems, experiencing, for example, high variation (even without climate disruptions) in annual rainfall.[108] Along with heightened exposure to sea level rise, this makes SIDS especially vulnerable to climate-induced extreme weather, in particular the increased severity of tropical cyclones, storm surges, droughts and changing rainfall patterns.[109]

79. Antigua and Barbuda is already experiencing a significant uptick in dangerous extreme weather events, such as Hurricane Irma in 2017, extreme rainfall throughout November 2020, Tropical Storm Phillipe and Hurricane Tammy in 2023.

b. Coastal erosion, inundation and salinization

80. Sea level rise caused by global warming results in coastal erosion (the disappearance of land through the erosive effects of the rising sea levels and weathering) and

[103] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Summary for Policymakers (available here), para. B.1.1.

[104] IPCC, Sixth Assessment Report, 2021, *The Physical Scientific Basis* (Working Group I), Summary for Policymakers (available here), para. B.2.2.

[105] IPCC, Sixth Assessment Report, 2021, *The Physical Scientific Basis* (Working Group I), Summary for Policymakers (available here), para. B.2.2.

[106] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Summary for Policymakers (available here), para. A.2.3.

[107] IPCC, Sixth Assessment Report, 2021, *The Physical Scientific Basis* (Working Group I), Summary for Policymakers (available here), para. B.2.2.

[108] UNFCCC, 2005, *Climate Change and Small Island Developing States* (available here), p. 14.

[109] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here), p. 2045; *see also*, Caribbean Climate Science Report, March 2024 (**Annex 1**), pp. 19 and 25.

inundation (the covering of normally dry land with water). Sea level rise also results in saline intrusion, *i.e.*, the movement of saltwater into freshwater aquifers, compromising sources of drinking water and soil quality.[110]

81. In the absence of "major additional adaptation efforts", the risk of erosion, inundation and salination is expected to "significantly increase" by the end of this century along *all* low-lying coasts.[111] Large-scale coastal erosion and inundation – for obvious reasons – threatens ecologically important coastal and estuarine ecosystems, such as saltmarshes, mangroves, vegetated dunes and wetlands.[112] Coastal ecosystems – already vulnerable to other climate-related disruptions – are expected to experience severe biodiversity loss over the course of the century.[113] The consequences for agriculture and food security (among others) are discussed further in the next section.

82. Coastal erosion and inundation also mean that historically rare "extreme sea level" events – triggered by a combination of storm surges, tides and waves – will become "common" by 2100 under *all* scenarios modelled by the IPCC.[114] Many low-lying cities and small islands, at most latitudes, will experience these events annually by 2050.[115]

c. Habitat and biodiversity loss

83. Severe habitat and biodiversity loss is the ultimate consequence of every driver of harm associated with anthropogenic GHG emissions. As a result of existing levels of warming, biodiversity is "declining faster than at any time in human history".[116] Climate change has already altered terrestrial, marine and freshwater ecosystems all around the world, including the first climate-driven extinctions.[117] These alterations

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[110] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here), p. 611.

[111] IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Technical Summary (available here), p. 56; *see also*, Caribbean Climate Science Report, March 2024 (**Annex 1**), pp. 16 and 29.

[112] IPCC, 2019, *Special Report on the Ocean and Cryosphere*, Technical Summary (available here), p. 55.

[113] IPCC, 2019, *Special Report on the Ocean and Cryosphere*, Technical Summary (available here), p. 56.

[114] *See*, footnote 113, *above*.

[115] *See*, footnote 113, *above*.

[116] IPBES, 2019, *Global Assessment Report on Biodiversity and Ecosystem Services* (available here), p. xiv.

[117] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 45; *see also*, Caribbean Climate Science Report, March 2024 (**Annex 1**), pp. 15 and 26-27.

are "approaching irreversibility".[118] Risks to ecosystem integrity, functioning and resilience are projected to escalate "with every tenth of a degree increase in global warming (*very high confidence*)".[119] Below, Antigua and Barbuda unpacks some of these consequences, focusing first on terrestrial biodiversity and second on marine biodiversity.

i. Land biodiversity

84. The IPCC's Sixth Assessment Report found that terrestrial ecosystem deterioration resulting from climate change has occurred *earlier* and is *more widespread* than first anticipated.[120] For thousands of species across the world, destruction of ecosystems means increased rates of disease, mass mortality events, and – irreversibly – extinction.[121] Already, nearly half of threatened terrestrial mammals, and a quarter of threatened birds are experiencing negative effects from current levels of post-industrial warming.[122]

85. The IPCC and IPBES have both concluded that land-based biodiversity loss and degradation will continue to escalate across the globe with every increment of global warming.[123] As between 1.5°C and 2°C, the majority of terrestrial species ranges are projected to "shrink dramatically".[124] At approximately 4°C, nearly 16 percent of studied terrestrial species are expected to go extinct.[125]

86. The biodiversity of SIDS is a particular concern. Despite making up only 2 percent of the Earth's terrestrial surface, islands are remarkably biodiverse, home to around 25

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[118] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Summary for Policymakers (available here), para. A.2.3.

[119] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 55.

[120] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 45.

[121] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Summary for Policymakers (available here), p. 9.

[122] IPBES, 2019, *Global Assessment Report on Biodiversity and Ecosystem Services* (available here), p. XXXIII.

[123] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Summary for Policymakers (available here), p. 14; IPBES, 2019, *Global Assessment Report on Biodiversity and Ecosystem Services* (available here), p. XXVIII.

[124] IPBES, 2019, *Global Assessment Report on Biodiversity and Ecosystem Services* (available here), p. XX.

[125] *See*, footnote 124, *above*.

percent global flora species, 12 percent of bird species and 10 percent of mammal species.[126] Islands also host nearly half the world's critically endangered species.[127] In short, when the biodiversity of SIDS is threatened, global biodiversity *writ large* is threatened.[128] New studies forecast that small islands are likely to experience some of the largest increases in endemic extinctions as a result of climate change, substantially contributing to future global biodiversity loss.[129]

87. Of particular note, a changing climate creates new ecological niches that leave land-based ecosystems especially vulnerable to invasive species – already a significant problem for SIDS.[130] For example, since 2011, Antigua and Barbuda has been severely affected by Sargassum seaweed.[131] A highly invasive species, the increasing abundance of Sargassum in the Caribbean Sea (and elsewhere) is largely attributable to higher sea surface temperatures.[132] Sargassum has well-documented negative ecological effects, has substantially disrupted beach tourism in the Caribbean, and has imposed millions of dollars in clean-up costs annually on affected beaches.[133]

ii. Ocean biodiversity

88. The habitats and biodiversity of the world's oceans are faring no better. Warming waters, deoxygenation, sea level rise and ocean acidification are, already, interacting to place unprecedented stress on ocean ecosystems, disrupting the migratory patterns, predation activities and reproductive processes of species ranging from phytoplankton

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[126] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here), p. 2060.

[127] *See*, footnote 126, *above*.

[128] *See*, footnote 126, *above*; *see also*, Caribbean Climate Science Report, March 2024 (**Annex 1**), p. 27.

[129] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here), p. 2046; *see also*, Caribbean Climate Science Report, March 2024 (**Annex 1**), pp. 15 and 26-27.

[130] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here), pp. 200, 205 and 208; IPBES, Thematic Assessment Report, 2023, *Invasive Alien Species Assessment*, Summary for Policymakers (available here), pp. 21-22.

[131] Caribbean Climate Science Report, March 2024 (**Annex 1**), p. 15; *see*, Western Atlantic Fishery Commission, "Impacts of Sargassum on marine resources in the region and utilization of initiatives", September 2023 (available here).

[132] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here), p. 467.

[133] *See*, footnote 132, *above*; *see also*, Caribbean Climate Science Report, March 2024 (**Annex 1**), p. 15.

to marine mammals.[134] For each affected species, there are knock-on effects throughout the whole ecosystem.[135] Each trend becomes "more pronounced" as temperatures increase yet further.[136]

89. There has, as a result, been an average decrease in the population replenishment of fisheries stocks of approximately 3 percent per decade over the course of the 20th century.[137] These warming-induced changes in the special distribution and abundance of fish stocks have already challenged the management of biologically and economically significant fisheries.[138] It thus goes without saying, that "limiting global warming to 1.5°C is projected to reduce risks to marine biodiversity, fisheries, and ecosystems".[139]

90. Of the many thousands of marine species threatened by climate change, coral reefs deserve particular attention. Coral reefs have enormous ecological, cultural and economic importance.[140] They are among the most diverse and valuable ecosystems on Earth, supporting more species per unit area than any other marine environment.[141] They form natural barriers protecting coastlines from waves, storms and floods, and provide stability for other crucial biodiverse coastal ecosystems like mangroves and seagrass beds.[142] They are of profound importance to many SIDS, including Antigua and Barbuda, as an indispensable source of food, cultural life, and economic value.

91. Coral reefs are also profoundly susceptible to the effects of climate change. In 2022, the IPCC's Sixth Assessment Report concluded that mass coral bleaching and mortality

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[134] IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Full Report (available here), pp. 450-451.

[135] C. Mackenzie *et al.*, "Ocean Warming, More than Acidification, Reduces Shell Strength in a Commercial Shellfish Species during Food Limitation", *PLOS one* 9 (2014) (available here), p. 2.

[136] IPCC, 2018, *Special Report on Global Warming of 1.5°C*, Full Report (available here) p. 222.

[137] IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Full Report (available here), p. 451.

[138] IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Full Report (available here), p. 451.

[139] IPCC, 2018, *Special Report on Global Warming of 1.5°C*, Summary for Policymakers (available here), para. B.4.

[140] *See*, Global Fund for Coral Reefs, "2022 Action Report" (available here), p. 1.

[141] *See*, IPCC, Fifth Assessment Report, 2014, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report Part A (available here), p. 97.

[142] *See*, footnote 141, *above*.

was already "the most widespread and conspicuous impact of climate change".[143] Because coral reefs have such a narrow temperature tolerance, they are susceptible to even small increases in ocean temperatures. Already experiencing severe decline, at 1.5°C of warming, coral reefs are expected to decline by a further 70-90 percent.[144] At 2°C of warming, decline is expected to reach 99 percent.[145] Put simply: coral reefs, and their myriad attendant benefits, will disappear.[146]

3. How anthropogenic GHG emissions harm human populations

92. In this section, Antigua and Barbuda unpacks the harms to human populations caused by anthropogenic emissions. Around 3.3 billion people are living in countries with high vulnerability to climate change.[147] The harms to human populations flow directly from the key drivers, especially temperature increase and sea level rise; as well as indirectly from damage to the environment, *i.e.*, from extreme weather events, coastal erosion, inundation and salinisation, and biodiversity loss.

93. Moreover, these widespread harmful impacts will disproportionally affect those vulnerable communities "who have historically contributed the least to current climate change".[148] Some of these harmful impacts are irreversible and their likelihood, and severity, increases with every increment of warming.[149]

a. Full or partial loss of territory

94. Coastal erosion and inundation caused by global-warming induced sea level rise and extreme weather events results in the outright disappearance of States' territory,

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[143] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here), p. 413.

[144] IPCC, 2018, *Special Report on Global Warming of 1.5°C*, Summary for Policymakers (available here) p. 8; *see also*, Caribbean Climate Science Report, March 2024 (**Annex 1**), p. 26.

[145] IPCC, 2018, *Special Report on Global Warming of 1.5°C*, Summary for Policymakers (available here), p. 8.

[146] *The Guardian*, "'Huge' coral bleaching unfolds across the Americas prompt fears of global tragedy", 11 August 2023 (available here); *The Guardian*, "Fifth mass coral bleaching event in eight years hits Great Barrier Reef, marine park authority confirms", 8 March 2024 (available here); *Reuters*, "World on brink of fourth mass coral reach bleaching event", 5 March 2024 (available here).

[147] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 52.

[148] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Summary for Policymakers (available here), para. A.2.

[149] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Summary for Policymakers (available here), para. B.3.

including land currently occupied by human settlements, and key infrastructure like port and transport services.

95. Kiribati – a nation of 12,000 people, comprised of 33 coral atolls distributed across the Pacific Ocean – is frequently cited as the first State that will be rendered permanently uninhabitable if sea levels continue to rise.[150] Some of its islands have already effectively disappeared.[151]

96. Thus, for SIDS, the threat posed by coastal erosion and inundation is literally "existential".[152] Small islands will faced reduced habitability even below 1.5°C.[153] Island settlements are typically concentrated along coastlines, exposing decades of high-density urban development to multiple climate-related hazards.[154] The "vast majority" of low-lying islands and coastal regions face "substantial risk" to territory;[155] for example, based on current sea level rise projections, almost all port and harbour facilities in the Caribbean will suffer inundation in the future.[156]

[150] *The Guardian*, "'No safe place': Kiribati seeks donors to raise islands from encroaching seas", 18 November 2022 (available here).

[151] *See*, footnote 150, *above*.

[152] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Summary for Policymakers (available here), para. B.4.5.

[153] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here) p. 2046; *see also*, Caribbean Climate Science Report, March 2024 (**Annex 1**), pp. 29-30.

[154] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here), pp. 2045-2047.

[155] IPCC, 2019, *Special Report on the Ocean and Cryosphere in a Changing Climate*, Full Report (available here), p. 328.

[156] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here), p. 2064; *see also*, Caribbean Climate Science Report, March 2024 (**Annex 1**), p. 30.

Figure 8: Populations living in small islands that may be exposed to coastal inundation by 2100 under RCP 4.5 (Source: IPCC)

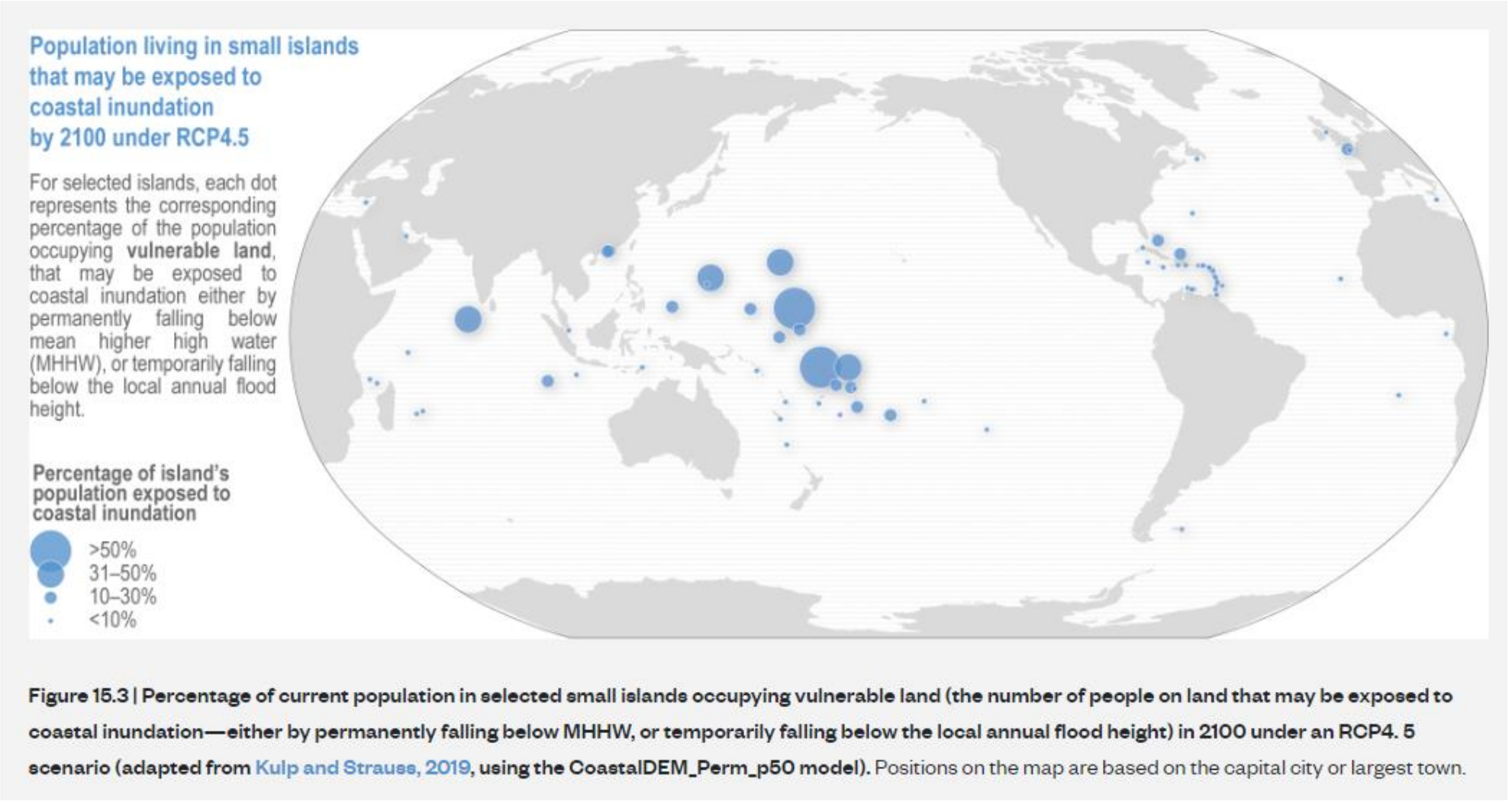

Figure 15.3 | Percentage of current population in selected small islands occupying vulnerable land (the number of people on land that may be exposed to coastal inundation—either by permanently falling below MHHW, or temporarily falling below the local annual flood height) in 2100 under an RCP4. 5 scenario (adapted from Kulp and Strauss, 2019, using the CoastalDEM_Perm_p50 model). Positions on the map are based on the capital city or largest town.

b. Harm to human physical and mental health

97. Climate change has "already harmed human physical and mental health".[157] Under a high emissions scenario, over nine million climate-related deaths per year are projected by the end of the century,[158] with tens of thousands of deaths from heat-related morbidity alone.[159] Each additional unit of warming will increase heat-related morbidity and mortality.[160] For countries "highly vulnerable" to climate change – like SIDS – observed mortality from floods, drought and storms alone was 15 times higher in the last decade than for less vulnerable countries.[161]

98. Climate change has already contributed to malnutrition and disease susceptibility, especially for women, children, low-income households and Indigenous Peoples.[162] Moreover, reductions in projected food availability are larger at 2°C than at 1.5°C.[163] Climate-related food safety risks have increased globally, as has the transmission of vector-, water- and food-borne diseases.[164] Disruptions to ecosystems give increased opportunities for pathogens to spread from wildlife to human populations, increasing emergence of zoonotic disease epidemics.[165] As just one example: higher global temperatures are already increasing the geographic distribution of mosquito-borne diseases like dengue fever, malaria, and the Zika virus.[166]

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[157] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 50.

[158] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 63.

[159] *See*, footnote 158, *above*.

[160] IPCC, 2018, *Special Report on Global Warming of 1.5°C*, Full Report (available here), p. 241.

[161] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 50; *see also*, Caribbean Climate Science Report, March 2024 (**Annex 1**), pp. 30-31.

[162] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 51.

[163] IPCC, 2018, *Special Report on Global Warming of 1.5°C*, Summary for Policymakers (available here), p. 11.

[164] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 51.

[165] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 51.

[166] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here), p. 1062; *see also*, Caribbean Climate Science Report, March 2024 (**Annex 1**), pp. 30-31.

99. Mental health impacts are also increasing, brought on by exposure to extreme weather events, displacement, famine, loss of cultural practices and traditional ways of life, as well as anxiety and grief about climate change.[167]

c. Compromised access to food and water

100. Climate change is already stressing the world's food production systems, with negative consequences for the livelihoods, food security and nutrition of hundreds of millions of people.[168] Climate-related extremes have compromised the productivity of all agricultural and fishery sectors, with particularly acute and severe impacts for people living in sub-Saharan Africa, Asia, small islands, and Central and South America.[169] Adverse impacts on food security will worsen with every increment of warming.[170] Indeed, even warming below 1.5°C is predicted to result in a reduction in the range of available crops in certain regions, including the Caribbean.[171]

101. Water-related risks, including drought and associated social risks, also increase with every increment of warming.[172] With warming of 4°C, up to 4 billion people are predicted to experience water scarcity – potentially over half the world's population.[173] Small islands are especially vulnerable to water scarcity, since they rely on groundwater sources prone to salinisation from sea level rise.[174] For small island regions, freshwater resource stress would be 25 percent higher at 2°C compared to 1.5°C.[175]

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[167] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 63.

[168] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 44.

[169] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 49.

[170] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 57.

[171] *See*, Caribbean Climate Science Report, March 2024 (**Annex 1**), p. 28 ("Crop suitability modelling on several commercially important crops grown in Jamaica found that even an increase of less than 1.5°C could result in a reduction in the range of crops that farmers may grow").

[172] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 61.

[173] *See*, footnote 172, *above*.

[174] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here), p. 14, B.4.2, and pp. 2095-2096.

[175] *See*, Caribbean Climate Science Report, March 2024 (**Annex 1**), p. 28.

d. Damage to cities, settlements and infrastructure

102. Climate change is already affecting every inhabited region across the globe.[176] With further warming, "every region is projected to increasingly experience concurrent and multiple changes in climatic impact-drivers".[177] Human settlements and infrastructure are experiencing cascading climate-related risks, from, among others, sea level rise, heatwaves, droughts, floods, wildfires and permafrost thaw.[178] These cause disruption to key infrastructure and services such as energy supply, communications, food and water supply and transport systems,[179] with the brunt of damage felt by the most economically and socially marginalised populations.[180]

103. These risks will continue to increase with each increment of warming.[181] For example: even under a "moderate" emissions scenario, by 2050 in Europe, permafrost thaw in the pan-Arctic is expected to impact nearly 70 percent of infrastructure, more than 1200 settlements, and four million people.[182] Under a high emissions scenario, risks to critical infrastructure in many cities becomes "severe and pervasive".[183]

104. For coastal cities and settlements in particular, climate-driven risks to people and infrastructure are "already high and will get progressively worse over the 21st century

[176] IPCC, Sixth Assessment Report, 2021, *The Physical Scientific Basis* (Working Group I), Summary for Policymakers (available here), para. A.3; Caribbean Climate Science Report, March 2024 (**Annex 1**), pp. 16-17 and 27-28.

[177] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Summary for Policymakers (available here), para. B.1.4.

[178] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 53.

[179] *See*, footnote 178, *above*.

[180] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 50.

[181] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Summary for Policymakers (available here), para. B.2.2.

[182] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 66.

[183] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 113.

and beyond".[184] While well-designed coastal protection is highly effectively in reducing expected damage, it is frequently unaffordable for rural and poorer areas.[185]

e. Forced migration and displacement

105. Under all predicted emissions scenarios, some regions that are currently densely populated will become unsafe or uninhabitable over time.[186] Inevitably, populations will be forced to migrate, and will suffer displacement. From sea level rise alone – which increases with every increment of warming – the projected number of people potentially at risk of future displacement ranges from tens of millions to hundreds of millions by the end of this century.[187]

D. Efforts to address climate change

106. Despite the severe harms caused by climate change (including loss and damage already experienced by Antigua and Barbuda), and despite understanding the need for urgent action, States still fail to address climate change effectively (**D.1)**. They do so despite the presence of concrete policy options which are available to tackle climate change effectively (**D.2**).

1. States are failing to effectively address climate change

107. For decades, States have understood the adverse impact of human activity on climate change, the severe harm caused by climate change, and, accordingly, the need to take effective action to combat climate change. Yet, as a factual matter, States' efforts to do so have, thus far, been limited and insufficient.

108. This conclusion is clear from the COP Global Stocktake Decision, which, every five years, assesses progress on meeting the Paris Agreement's goals.[188] The technical dialogue of the COP Global Stocktake was released in September 2023, and concluded that States' current efforts to combat climate change, and its associated harms, are

[184] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 66.

[185] *See*, Caribbean Climate Science Report, March 2024 (**Annex 1**), p. 29.

[186] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 64.

[187] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 65.

[188] Paris Agreement, Article 14.

falling woefully short – with regard to mitigation, adaptation, and financing.[189] The COP Global Stocktake Decision itself confirms this and underscores that "Parties are not yet collectively on track towards achieving the purpose of the Paris Agreement and its long-term goals".[190]

109. *First*, with regard to **mitigation**, global emissions to date are "not in line with modelled global mitigation pathways consistent with the *global temperature goal of the Paris Agreement*, nor are they aligned with *longer-term emission reduction goals*".[191]

110. The objective of the UNFCCC, established in 1992, is the "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system".[192] To contribute to that objective, the Paris Agreement of 2015 defined the following temperature goal: "*holding the increase in the global average temperature to well below 2°C above pre-industrial levels and pursuing efforts to limit the temperature increase to 1.5°C above pre-industrial levels*".[193] This temperature goal was a product of fierce negotiation and compromise.[194] It was based on contemporary IPCC assessments as to what temperature levels would avoid the most catastrophic human and environmental consequences. Crucially, however, it was *not* based on holding global warming to a level that would prevent *significant* environmental and human harm. As is clear from the preceding section, and the recent work from the IPCC, such harms are *already* occurring, at current average warming levels of 1.1°C – 1.35°C.

111. The COP Global Stocktake Decision of December 2023 identifies gaps in both the *ambition* and the *implementation* of States' so-called "nationally determined

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[189] UNFCCC, "Technical dialogue of the first global stocktake" (2023) (available here), paras. 9, 29 and 48.

[190] UNFCCC COP, Draft decision -/CMA.5: "Outcome of the first global stocktake" UN Doc. FCCC/PA/CMA/2023/L.17, 13 December 2023 (available here) (hereinafter "**UNFCCC COP, Draft Decision -/CMA.5, "Outcome of the first global stocktake" (2023)**").

[191] UNFCCC, "Technical dialogue of the first global stocktake" (2023) (available here), p. 13 (emphasis added).

[192] UNFCCC, Article 2.

[193] Paris Agreement, Article 2.1(a).

[194] *See*, Navraj Singh Ghaleigh, "Article 2: Aims, Objectives and Principles" in Geert van Calster and Leonie Reins (eds.), *The Paris Agreement on Climate Change* (Elgar Publishing Commentaries, 2021), p. 78; *see also*, *The Guardian*, "Climate coalition breaks cover in Paris to push for binding and ambitious deal", 8 December 2015; *The Washington Post*, "How tiny islands drove huge ambition at the Paris climate talks", 12 December 2015 (available here).

contribution", or "NDC", to meet the Paris temperature goal.[195] That is, the technical dialogue of the COP Global Stocktake identifies:

(a) Lack of NDC ambition: the mitigation ambition of NDCs is not collectively sufficient to achieve the Paris temperature goal.[196] In other words, even taking current NDCs on their face, assuming perfect implementation, the volume of proposed reductions still place 1.5°C out of reach; and make 2°C harder after 2030.[197]

(b) Lack of NDC implementation: even for the current NDCs lacking ambition, implementation of the NDCs is, in fact, lagging behind; currently stated policies and actions fall short of reaching stated targets and pledges.[198]

112. In sum, "*action is needed*" to bridge both ambition and implementation gaps.[199]

113. The COP Global Stocktake Decision, therefore, confirms as a factual matter that States have, to date, failed to take effective action to prevent significant harm resulting from the impact of anthropogenic emissions on the climate system. As States are undertaking insufficient action to meet the Paris Agreement temperature goal, their actions are certainly insufficient to prevent significant harm, which occurs already at lower temperatures.

114. *Second*, the technical dialogue of the COP Global Stocktake also found serious gaps in adaptation measures, as well as measures to address loss and damage already occurring from climate change. Most observed adaptation efforts are "fragmented, incremental, sector-specific and unequally distributed across regions".[200] There is "a rapidly closing

[195] UNFCCC COP, Draft Decision -/CMA.5, "Outcome of the first global stocktake" (2023) (available here), para. 94.

[196] UNFCCC, "Technical dialogue of the first global stocktake" (2023) (available here), p.16.

[197] IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Technical Summary (available here), p. 70.

[198] UNFCCC, "Technical dialogue of the first global stocktake" (2023) (available here), p. 16; IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Summary for Policymakers (available here), p. 14.

[199] UNFCCC, "Technical dialogue of the first global stocktake" (2023) (available here), p. 16. *See also*, UNFCCC COP, "Draft decision -/CMA.5: Outcome of the first global stocktake" (2023) (available here), paras. 63 and 94.

[200] UNFCCC, "Technical dialogue of the first global stocktake" (2023) (available here), p. 7.

window" as regards adaptation measures "to secure a liveable and sustainable future for all".[201]

115. *Third*, as regards financing, the technical dialogue of the COP Global Stocktake also addressed the gap between pledged and realised financing for developing countries' mitigation and adaptation efforts, and to address loss and damage. The technical dialogue confirmed that these gaps remain significant.[202] Subsequent to the Paris Agreement, the Parties agreed to mobilise 100 billion United States Dollar ("**USD**") per year to address the climate-related needs of developing countries.[203] Developed countries have consistently failed to meet the target, with the Parties – repeatedly – expressing "deep regret" and "serious concern" at the state of climate financing, and "urging" developed countries to increase their efforts.[204] Moreover, the Technical Dialogue of the COP Global Stocktake stated that financing and support for adaptation, as well as loss and damage, "need to be rapidly scaled up", to meet "urgent and increasing needs".[205]

2. Concrete policy options are available for States to effectively address climate change

116. There is no shortage of concrete guidance for States committed to scaling-up their mitigation efforts;[206] nor is there any ambiguity about the scale of what needs to be done to effectively combat the crisis.

117. The IPCC's Sixth Assessment Report includes thousands of pages of analysis of existing and available mitigation measures, including an assessment of their cost-effectiveness relative to their potential to achieve, in combination, the Paris temperature

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[201] UNFCCC, "Technical dialogue of the first global stocktake" (2023) (available here), p. 7. *See also*, UNFCCC COP, "Draft decision -/CMA.5: Outcome of the first global stocktake" (2023) (available here), para. 24.

[202] UNFCCC, "Technical dialogue of the first global stocktake" (2023) (available here), p. 33.

[203] UNFCCC COP, Decision 2/CP.15, "Copenhagen Accord", UN Doc. No. FCCC/CP/2009/11/Add.1, 18 December 2009 (available here) (hereinafter "**UNFCCC COP, Decision 2/CP.15, "Copenhagen Accord" (2009)**"), pp. 5-7, para. 8 ("In the context of meaningful mitigation actions and transparency on implementation, developed countries commit to a goal of mobilizing jointly USD 100 billion dollars a year by 2020 to address the needs of developing countries").

[204] UNFCCC COP, "COP26 Report: Addendum", UN Doc. FCCC/CP/2021/12/Add.1, 8 March 2022 (available here), pp. 5 and 12; *see also*, UNFCCC COP, "COP27 Report on Climate Finance", UN Doc. FCCC/CP/2022/10/Add.2, 17 March 2023 (available here), p. 2.

[205] UNFCCC, "Technical dialogue of the first global stocktake" (2023) (available here), p. 7.

[206] For further discussion of this principle, *see*, sub-section III.A.2, *below*.

goal. It is clear that all modelled pathways holding temperature increase to 1.5°C require transitioning from unabated fossil fuels to very low or zero-carbon energy sources; and, deploying carbon dioxide removal[207] methods to counterbalance residual emissions.[208]

118. The IPCC's work also makes clear that, to this end, "several mitigation options" are "technically viable", "increasingly cost effective" and "generally supported by the public". Indeed, in some regions and sectors, "maintaining emissions-intensive systems may […] be more expensive than transitioning to low emission systems".[209] There are, therefore, "many opportunities for implementing more ambitious mitigation measures in all sectors and systems";[210] and, "more effective international cooperation and credible initiatives can contribute to bridging emissions and implementation gaps."[211]

119. The COP Global Stocktake Decision similarly finds that "feasible, effective and low-cost mitigation options are already available in all sectors to keep 1.5°C within reach in this critical decade with the necessary cooperation on technologies and support".[212] Notably, the IPCC has identified mitigation options costing less than USD 100 per tonne of CO2 which could reduce global GHG emissions by at least half of the 2019 level by 2030.[213] Around 50 percent of that reduction could be achieved by mitigation options costing less than USD 20 per tonne.[214]

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[207] "Carbon Dioxide Removal" refers to "technologies, practices, and approaches that remove and durably store carbon dioxide (CO2) from the atmosphere." Possible removal methods include soil carbon sequestration, enhanced rock weathering, peat and wetland restoration and ocean fertilisation. *See*, IPCC, Sixth Assessment Report, CDR Factsheet (available here).

[208] IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Summary for Policymakers (available here), p. 24.

[209] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Summary for Policymakers (available here), para. A.4.2.

[210] UNFCCC, "Technical dialogue of the first global stocktake" (2023) (available here), para. 102.

[211] UNFCCC, "Technical dialogue of the first global stocktake" (2023) (available here), para. 22.

[212] UNFCCC COP, "Draft Decision -/CMA.5: Outcome of the first global stocktake" (2023) (available here), para. 16(c).

[213] IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Technical Summary (available here), p. 108.

[214] IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Technical Summary (available here), p. 108.

120. More specifically, the IPCC provides sector-by-sector accounting of where, precisely, cost-effective emissions reductions can be found, including granular assessments of energy systems,[215] agriculture, forestry and other land uses ("**AFOLU**"),[216] urban systems and other settlements,[217] buildings,[218] transport,[219] and industry.[220] For illustrative purposes, these are summarised in the table below.

[215] IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Full Report (available here), pp. 613-746.

[216] IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Full Report (available here), pp. 747-860.

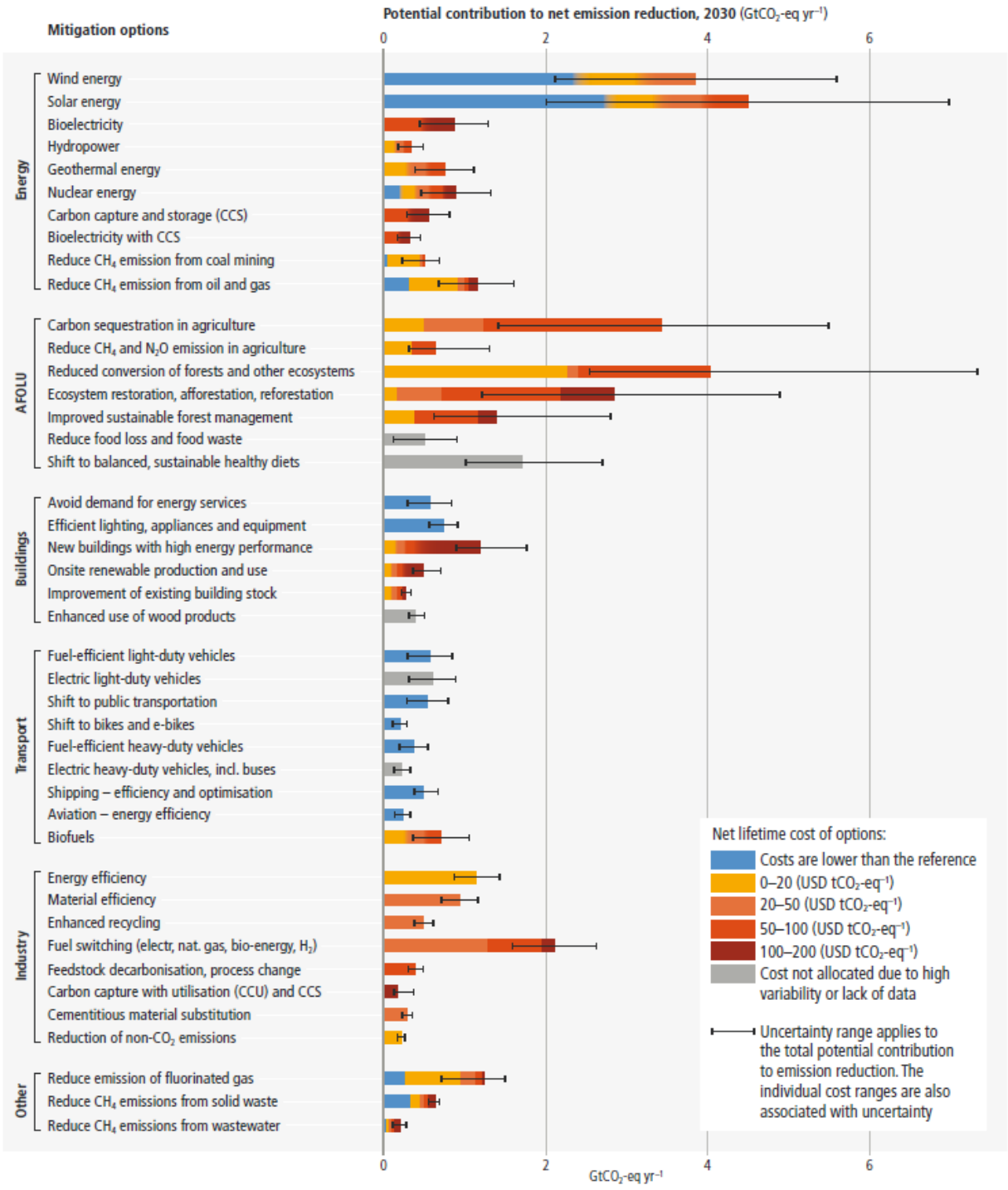
[217] IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Full Report (available here), pp. 861-952.

[218] IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Full Report (available here), pp. 953-1048.

[219] IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Full Report (available here), pp. 1049-1160.

[220] IPCC, Sixth Assessment Report, 2022, *Mitigation of Climate Change* (Working Group III), Full Report (available here), pp. 1161-1244.

Figure 9: "Many options available now in all sectors are estimated to offer substantial potential to reduce net emissions by 2030" (Source: IPCC)



III. QUESTION (A): RELEVANT OBLIGATIONS AND THEIR CONTENT

121. The consequences of climate change touch on virtually every aspect of life on Earth. It is not surprising, therefore, that the range of norms of international law engaged by the climate crisis is as broad as the crisis itself. This is recognised in the request to the Court, which identifies, illustratively and non-exhaustively, a great variety of rules of international law ranging from those in human rights treaties, instruments agreed under the international climate change regime and the law of the sea, to customary international law.

122. In this Section, Antigua and Barbuda identifies and summarises the key international law rules and principles that regulate States' conduct in the face of climate change.

123. **Sub-section A** addresses: (1) the customary international law obligation of prevention; (2) the principle of "Common but Differentiated Responsibilities and Respective Capabilities" ("**CBDR-RC**"), including in light of different national circumstances;[221] (3) the relevant rules and principles contained in the climate change regime (UNFCCC and Paris Agreement): (4) human rights; (5) the United Nations Convention on the Law of the Sea ("**UNCLOS**"); (6) the Convention on Biological Diversity ("**CBD**"); and (7) international trade law.

124. **Sub-section B** applies these various rules and principles, to identify what States are obliged to do under international law to ensure the protection of the climate system and other parts of the environment from anthropogenic GHG emissions. In this regard, Antigua and Barbuda also emphasises the obligations set out in sub-section B are *primary* obligations; they do not, therefore, address responsibilities arising as regards a *breach* of those obligations (including resulting loss and damage already suffered by States including Antigua and Barbuda); such responsibilities are instead addressed in **Section 0** of this Written Statement.

[221] For ease of reference, the term "CBDR-RC" is used throughout this Written Statement; this reference includes the full term "common but differentiated responsibilities and respective capabilities *in the light of different national circumstances*".

A. Key international rules and principles

1. The obligation of prevention

125. The obligation of prevention is the cornerstone of international environmental law. It originates in the customary international law principle of "no harm", first formulated in the *Trail Smelter* Arbitration (1941) in the form of a duty of diligence not to cause harm to the territory of other States.[222] It was later extended in both the 1972 Stockholm Declaration on the Human Environment (Principle 21),[223] and in the 1992 Rio Declaration on Environment and Development (Principle 2) to encompass harm to areas beyond national jurisdiction. The latter provides as follows:

> 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 development 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.[224]

126. The Court has repeatedly recognised the existence of the customary obligation of prevention on States "to ensure that activities within their jurisdiction and control respect the environment of other States or of areas beyond national control".[225]

127. The importance of prevention in the context of environmental law arises from the reality that environmental harm is often irreversible and, therefore, cannot be cured through

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[222] *Trail smelter case (United States, Canada)*, Awards of 16 April 1938 and 11 March 1941, United Nations, *Reports of International Arbitral Awards* ("**RIAA**"), Vol. III, pp. 1905-1982 (hereinafter "***Trail Smelter***"); *Corfu Channel (United Kingdom v. Albania), Merits, Judgment, I.C.J. Reports 1949* (hereinafter "***Corfu Channel***").

[223] UN Conference on the Human Environment, *Declaration on the Human Environment*, U.N. Doc. A/CONF.48/14/Rev.1, 16 June 1972 (hereinafter "**Stockholm Declaration**").

[224] UN Conference on Environment and Development, *Rio Declaration on Environment and Development*, U.N. Doc. A/CONF.151/26/Rev.1 Vol. I, Annex I, 12 August 1992, (hereinafter "**Rio Declaration**").

[225] *Legality of the Threat or Use of Nuclear Weapons, Advisory Opinion, I.C.J. Reports 1996 (I)* (hereinafter "***Nuclear Weapons Advisory Opinion***"), pp. 241-242, para. 29. *See also, Gabčikovo-Nagymaros Project (Hungary v. Slovakia), Judgment, I.C.J. Reports 1997* (hereinafter "***Gabčikovo-Nagymaros***"), pp. 77-78, para. 140; *Pulp Mills on the River Uruguay (Argentina v. Uruguay), Judgment, I.C.J. Reports 2010* (hereinafter "***Pulp Mills***"), pp. 55-56, paras. 101-102; pp. 75-77, paras. 181-189; pp. 82-83, para. 204; *Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v. Nicaragua), I.C.J. Reports 2015 (II)* (hereinafter "***Certain Activities (Merits)***"), p. 706, para. 104; pp. 711-712, para. 118.

financial compensation.[226] Absent cure, prevention is the only real option, and hence the primary goal of many environmental obligations.

128. As noted above, the obligation of prevention has customary status.[227] In addition, it has been codified in a number of treaties. Importantly, the customary and the conventional obligation of prevention shed light on one another: on the one hand, conventional obligations expressing the obligation of prevention may elaborate on the content of the customary obligation of prevention. On the other hand, the customary obligation of prevention is relevant in the interpretation of conventional obligations expressing the obligation of prevention.[228]

a. When is the prevention obligation triggered?

129. The prevention obligation applies when (1) an activity within a State's jurisdiction is (2) causing, or risks causing, significant harm that is (3) transboundary in nature. Antigua and Barbuda unpacks these conditions in turn.

130. *First*, the prevention obligation applies to any activity planned or carried out in the territory of a State, or otherwise under its jurisdiction or control.[229]

131. *Second*, the prevention obligation applies only in the case of *significant* harm, or risk thereof.[230] The significant harm could occur to the environment, persons, and/or

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[226] In *Gabčíkovo-Nagymaros*, p. 78, para. 140, the ICJ noted that it was "mindful that, in the field of environmental protection, vigilance and prevention are required on account of the often irreversible character of damage to the environment and of the limitations inherent in the very mechanism of reparation of this type of damage".

[227] ***Nuclear Weapons Advisory Opinion***, pp. 241-242, para. 29. *See also*, *Arbitration regarding the Iron Rhine ('Ijzeren Rijn') Railway (Belgium v. Netherlands)*, Award of 24 May 2005, PCA Award Series (2007), RIAA Vol. XXVII (hereinafter "***Iron Rhine***"), p. 116, paras. 222-223. *See also*, ILC, "Draft Articles on Prevention of Transboundary Harm from Hazardous Activities, with commentaries", *ILC Yearbook 2001*, vol. II, Part Two ("hereinafter, **"ILC, Draft Articles on Prevention of Harm from Transboundary Activities**"), commentary, para. 3.

[228] *See*, the *Vienna Convention on the Law of Treaties*, 23 May 1969, 1155 U.N.T.S. 331, entered into force 27 January 1980 (hereinafter "**Vienna Convention**" or "**VCLT**"), Article 31(3)(c); *see also*, *South China Sea Arbitration (Philippines v. China)*, Award, PCA Case No 2013-19, ICGJ 495 (PCA 2016), 12 July 2016 (hereinafter "***South China Sea Arbitration***"), para. 941; Inter-American Commission on 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-23/17, IACHR Series A No 23, 15 November 2017 (hereinafter "***IACHR Advisory Opinion***"), paras. 131-133.

[229] The activity should also not be prohibited by international law. *See*, ILC, *Draft Articles on Prevention of Transboundary Harm from Hazardous Activities*, commentary to Article 1.

[230] *Pulp Mills*, pp. 55-56, para. 101. *See also*, *Convention on the Law of the Non-Navigational Uses of International Watercourses*, 21 May 1997, 2999 U.N.T.S. 77, entered into force 17 August 2014, Article 7(1);

property.[231] Harm is considered "significant" if it is "more than 'detectable'", and need not rise to "the level of 'serious' or 'substantial'".[232] The significance of the harm must be assessed on a case-by-case basis, taking account, in particular, of developments in scientific knowledge and understanding.

132. The prevention principle applies not only when significant harm has occurred, but whenever there is a *risk* thereof. There is, however, no need for scientific certainty that the risk will occur; the obligation also "applies in situations where scientific evidence concerning the scope and potential negative impact of the activity in question is insufficient but where there are plausible indications of potential risks".[233]

133. *Third*, to trigger the prevention obligation, the significant harm must be *transboundary* in nature.[234] This means that the harm must occur in the territory of another State, irrespective of whether the affected State shares a border with the State where the activity takes place; or in areas outside the jurisdiction of any State, such as the global commons.[235]

b. What does the prevention obligation require?

i. Substantive element

134. The obligation of prevention has a positive and proactive character, requiring a duty of due diligence to prevent harm to the environment (*i.e.*, in the territory of another State

ILC, *Draft Articles on Prevention of Transboundary Harm from Hazardous Activities*, commentary to Article 2(a).

[231] ILC, *Draft Articles on Prevention of Transboundary Harm from Hazardous Activities*, Article 2(b).

[232] ILC, *Draft Articles on Prevention of Transboundary Harm from Hazardous Activities*, commentary to Article 2, para. 4.

[233] *See*, *Responsibilities and obligations of States with respect to activities in the Area*, *Advisory Opinion, 1 February 2011*, *ITLOS Reports 2011* (hereinafter "***Responsibilities in the Area***"), p. 10, para. 57.

[234] *See*, ILC, *Draft Articles on Prevention of Transboundary Harm from Hazardous Activities*, commentary to Article 2, para. 9.

[235] These include, for instance, the high seas, international air space or the Antarctic. *See*, *United Nations Convention on the Law of the Sea*, 10 December 1982, 1833 U.N.T.S 3, entered into force 16 November 1994 (hereinafter "**UNCLOS**"), Article 116-118 and 192; *see also*, *Air Transport Association of America and others v. Secretary of State for Energy and Climate Change* (Case C-366/10) [2011] ECJ I-13755; *Protocol on Environmental Protection to the Antarctic Treaty*, 4 October 1991, 2941 U.N.T.S. 3, entered into force 14 January 1998, Article 2.

or in areas beyond national jurisdiction).[236] In the 2010 *Pulp Mills* decision, the ICJ described the positive action required from States to respect the obligation of prevention:

> A State is … obliged to use *all the means at its disposal* in order to avoid activities which take place in its territory, or in any area under its jurisdiction, causing significant damage to the environment of another State.[237]

135. A State must, thus, "use *all the means at its disposal*" to prevent transboundary harm (or, put differently, must "deploy adequate means, exercise best possible efforts, … do the utmost").[238] If, and only if, a State does its "utmost" – "using all the means at its disposal" – to prevent transboundary harm (including fulfilment of the relevant procedural obligations), does the State fulfil its duty to prevent significant harm.[239]

136. The level of diligence required from a State varies depending on the risk(s) involved; and the means at the State's disposal. Indeed, the standard of "due diligence" is a "variable concept",[240] altering with: the degree of risk; the evolution in our understanding of the risk and how to tackle it; and the means to address the risk at the disposal of a given State.

137. *First*, the level of due diligence varies with the degree of risk: a higher standard of care applies to activities involving higher risks, as compared to activities with lower risks. The standard of care must be "*appropriate and proportional to* the degree of risk of transboundary harm in the particular instance".[241]

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[236] The original formulation in *Trail Smelter* was, at p. 1965: "[N]o State has the right to use or permit the use of its territory in such a manner as to cause injury… to the territory of another or the properties or persons therein…".

[237] *See*, *Pulp Mills*, pp. 55-56, para. 101 (emphasis added). The Seabed Disputes Chamber of ITLOS described the duty of due diligence as requiring States "to deploy adequate means, to exercise best possible efforts, to do the utmost" (*see*, *Responsibilities in the Area*, p. 43, para. 117); *see also*, *Request for an Advisory Opinion submitted by the Sub-Regional Fisheries Commission*, *Advisory Opinion, 2 April 2015*, *ITLOS Reports 2015* (hereinafter "***IUU Advisory Opinion***"), p. 41, para. 131; *Indus Waters Kishenganga Arbitration (Pakistan v. India)*, Partial Award, 18 February 2013, PCA Award Series (2014), para. 451, citing to *Iron Rhine*, para. 59; and *South China Sea Arbitration*, para. 941.

[238] *See*, *IUU Advisory Opinion*, p. 40, para. 129, citing to *Responsibilities in the Area*, p. 41, para. 110.

[239] *See*, *e.g.*, *South China Sea Arbitration*, paras. 941 and 977.

[240] *See*, *Responsibilities in the Area*, p. 43, para. 117.

[241] ILC, *Draft Articles on Prevention of Transboundary Harm from Hazardous Activities*, commentary to Article 3, para. 11 (emphasis added).

138. *Second*, and relatedly, the level of diligence varies over time, in light of new knowledge about the level of risk and how to tackle it. That is, "measures considered sufficiently diligent at a certain moment may become not diligent enough in light, for instance, of new scientific or technological knowledge".[242] If new scientific or technological knowledge shows that the risk is, or may be, higher than previously considered, a higher standard of diligence will be required.

139. It follows that the prevention obligation is of a "continuing character",[243] requiring States to review the adequacy of their level of diligence in light of new scientific or technological knowledge. Only when States do so, are they able to adapt their level of diligence in light of the evolving understanding on the level of risk.

140. *Third*, and finally, the level of diligence also varies depending on the "means at [the] disposal" of each State.[244] This means that, for a given risk, the standard of care required from developed States – with greater means at their disposal – is higher than that required for other States.

ii. Procedural element

141. There exists a further procedural component of the customary international law obligation of prevention, specifically the obligation to cooperate, particularly through notification and consultation with potentially affected States.[245] States must comply with the obligation at an early stage and in good faith.[246]

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[242] *Responsibilities in the Area*, p. 43, para. 117. *See also*, ILC, *Draft Articles on Prevention of Transboundary Harm from Hazardous Activities*, commentary to Article 3, para. 11.

[243] ILC, *Draft Articles on Prevention of Transboundary Harm from Hazardous Activities*, commentary to Article 3, para. 5.

[244] *See*, *Pulp Mills*, pp. 55-56, para. 101.

[245] For a formulation of this obligation, *see* Principle 19 of the Rio Declaration: "States shall provide prior and timely notification and relevant information to potentially affected States on activities that may have a significant adverse transboundary environmental effect and shall consult with those States at an early stage and in good faith."

[246] *See*, *Corfu Channel*, p. 22; *see also*, *North Sea Continental Shelf (Federal Republic of Germany/Denmark; Federal Republic of Germany/Netherlands)*, *Judgment*, *I.C.J. Reports 1969* (hereinafter "***North Sea Continental Shelf***"), pp. 46-47, para. 85; *Nuclear Tests (Australia v. France), Judgment, I.C.J. Reports 1974*, p. 268, para. 46; *Nuclear Tests (New Zealand v. France), Judgment, I.C.J. Reports 1974*, p. 473, para. 49; *Pulp Mills*, p. 67, paras. 145-146; *MOX Plant (Ireland v. United Kingdom), Provisional Measures, Order of 3 December 2001, ITLOS Reports 2001* (hereinafter "***MOX Plant***"), p. 110, para. 82; *Delimitation of the Maritime Boundary in the Atlantic Ocean (Ghana v. Côte d'Ivoire), Provisional Measures, Order of 25 April 2015, ITLOS Reports 2015* (hereinafter "***Delimitation of the Maritime Boundary***"), pp. 160-161, para. 73; *IUU Advisory Opinion*, p. 43, para. 140.

142. This obligation to cooperate has been construed in different ways by different international courts and tribunals. At its most basic, cooperation requires, in all events, notification of, and consultation with, potentially affected States.[247] It can also include exchange of information[248] and/or joint evaluation of the environmental impact of certain activities.[249]

2. The principle of common but differentiated responsibilities and respective capabilities in light of different national circumstances

143. The principle of common but differentiated responsibilities and respective capabilities[250] has its origin in the general principle of equity.[251]

144. The concepts behind CBDR-RC were first expressed in the Stockholm Declaration, which recognises the need to "tak[e] into account the circumstances and particular requirements of developing countries";[252] and that "the applicability of standards which are valid for the most advanced countries … may be inappropriate and of unwarranted social cost for the developing countries".[253]

145. The first formal expression of CBDR-RC is found in Principle 7 of the Rio Declaration on Environment and Development:

> States shall cooperate in a spirit of global partnership to conserve, protect and restore the health and integrity of the Earth's ecosystems. In view of the different contributions to global environmental degradation, States have common but differentiated responsibilities. The developed countries acknowledge the responsibility they bear in the international pursuit of sustainable development in view of the pressures their societies play on the global environment.

146. CBDR-RC, therefore, entails two interconnected dimensions. First, CBDR-RC stands for universal solidarity, recognising the *common* responsibility of all States, both

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[247] *See*, Rio Declaration, Principle 19; *see also*, *Certain Activities (Merits)*, pp. 707-708, para. 106; *South China Sea Arbitration*, paras. 946, and 984-985.

[248] *See*, *MOX Plant*, p. 111, para. 89(a).

[249] *See*, *Pulp Mills*, para. 281; *see also*, *MOX Plant*, p. 111, para. 89(b).

[250] *See*, footnote 221, *above*.

[251] Equity is recognised as a general principle of international law under Article 38.1(c) of the ICJ Statute.

[252] *See*, Stockholm Declaration, Principle 12.

[253] *See*, Stockholm Declaration, Principle 23.

developing and developed, to address environmental degradation. Second, CBDR-RC recognises that States have *different* responsibilities, in light of different levels of (i) historical responsibility for environmental degradation; (ii) development; and (iii) capacities to take effective action.

147. Consequently, CBDR-RC acknowledges equity and fairness in identifying who *should* bear the burden of addressing environmental degradation; as well as calling for effective action to be taken by States with the *capacity* – financial and technical – to bear the burden.

148. CBDR-RC has found its way into virtually every multilateral environmental agreement, and in particular features strongly throughout the international climate change regime.[254] The consistent recognition of the principle of CBDR-RC has been crucial in securing the support of developing countries for the conclusion and implementation of such multilateral agreements.

149. Over time, the principle has developed further nuance and flexibility, including through recognition that the principle is also applied *"in the light of different national circumstances*".[255] This means that, under the principle, developing countries are not treated as an undifferentiated group. Instead, the principle recognises that there are differences between and among developing countries themselves, both in terms of their contribution to environmental degradation and their capacity to address that degradation.

150. Initially, in the climate change regime, the UNFCCC and the Kyoto Protocol (1997) treated "developing countries" as a single group, which was not subject to legally binding obligations *vis-à-vis* emissions reduction targets.[256] The Paris Agreement

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[254] *See, e.g., United Nations Framework Convention on Climate Change*, 9 May 1992, 1771 U.N.T.S. 107, entered into force 21 March 1994 (hereinafter "**UNFCCC**"), Article 3.1 (among others); *Convention on Biological Diversity*, 5 June 1992, 1760 U.N.T.S. 79, entered into force 29 December 1993 (hereinafter "**Convention on Biological Diversity**"), Articles 8(m), 9(e), 12 and 20; *Montreal Protocol on Substances that Deplete the Ozone Layer*, 16 September 1987, 1522 U.N.T.S. 3, entered into force 1 January 1989, Article 5 (among others).

[255] *Paris Agreement to the United Nations Framework Convention on Climate Change*, 12 December 2015, U.N.T.S. 79, entered into force 4 November 2016 (hereinafter "**Paris Agreement**"), third preambular paragraph.

[256] The Kyoto Protocol to UNFCCC only established binding emission limitations for the "developed" country Parties listed in Annex I; *see also*, Report of an International Legal Expert Group, "Principles of International Law Relevant for Consideration in the Design and Implementation of Trade-Related Climate Measures and

(2015), by contrast, places obligations on *all Parties*, with the extent of the common obligations differentiated on the basis of respective capabilities, *in light of national circumstances*. The greater burden of emissions reductions, therefore, falls on developed States, with the burden on developing States differentiated according to circumstance. The Paris Agreement also acknowledges the special needs and circumstances of least developed countries ("**LDCs**") and SIDS. The importance of the principle of CBDR-RC in the international climate change regime is addressed in further detail below.

3. Climate change regime

a. UNFCCC

151. Agreed in 1992, the UNFCCC provides the legal "framework" for the international climate change regime. The Convention begins with a provision that establishes an overarching objective for the international climate regime as a whole:

> The **ultimate objective of this Convention and any related legal instruments** that the Conference of the Parties may adopt is to achieve, in accordance with the relevant provisions of the Convention, **stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system**. Such a level should be achieved within a time-frame sufficient to allow ecosystems to adapt naturally to climate change, to ensure that food production is not threatened, and to enable economic development to proceed in a sustainable manner.[257]

152. Thus, from the outset, the regime picks up a core principle from customary international law, namely: the need to **prevent significant ("dangerous") environmental harm** (interference with the climate system) resulting from anthropogenic GHG emissions. It also calls for the objective to be achieved in a manner that enables the **sustainable economic development** which is critical to the developing world.

153. Next, the UNFCCC sets out core "Principles", which the Parties "**shall** be guided [] by", not only in their actions "to implement its provisions" but also in "their actions to

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Policies", 2023, Forum on Trade, Environment, & the SDGs (TESS) (hereafter "TESS Expert Report, *Principles of International Law Relevant for Consideration in the Design and Implementation of Trade-Related Climate Measures and Policies*, September 2023") (available here), p. 31.

[257] UNFCCC, Article 2 (emphasis added).

achieve the objective of the Convention".[258] These echo the key features identified in the UNFCCC's objective.

154. *First, the Principles reflect the need for measures to prevent "dangerous" environmental harm.*

155. Specifically, *Principle 1* provides that the Parties "should protect the climate system for the benefit of present and future generations of humankind"; and, *Principle 3* provides that the Parties "should take precautionary measures to anticipate, prevent or minimise the causes of climate change and mitigate its adverse effects." It further addresses the need for a precautionary approach, providing that "where there are threats of serious or irreversible damage, lack of full scientific certainty should not be used as a reason for postponing such measures".

156. *Second, the Principles reflect the need for a differentiated approach based on the principle of CBDR-RC and the need for sustainable development.*

157. Specifically, *Principle 1* expressly incorporates the principle of CBDR-RC into the principles of the international climate change regime, providing that the climate system should be protected "on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities". In the same vein, it provides that "the developed country Parties should take the lead".[259] *Principle 2* adds that "full consideration" should be given to "the specific needs and special circumstances of developing country Parties, especially those that are particularly vulnerable to the adverse effects of climate change".[260]

158. *Principle 4* expressly recognises, among the principles of the climate change regime, "the right" to "sustainable development". Again acknowledging the need for differentiation, it provides that "[p]olicies and measures to protect the climate system against human-induced change should be appropriate for the specific conditions of each

[258] UNFCCC, Article 3 (emphasis added).

[259] UNFCCC, Article 3.1.

[260] UNFCCC, Article 3.2.

Party", "taking into account that economic development is essential for adopting measures to address climate change".[261]

159. Finally, *Principle 5* calls on Parties to "cooperate to promote a supportive and open international economic system that would lead to sustainable economic growth and development in all Parties, particularly developing country Parties, thus enabling them better to address the problems of climate change".[262]

160. In this regard, *Principles 4* and *5* establish a link between the objective of preventing dangerous harm to the climate system, on the one hand, and the principles of CBDR-RC and sustainable development, on the other. *Principles 4* and *5* recognise that, to address their GHG emissions effectively (and thereby contribute to the prevention of harm), it is "essential" for developing countries to progress along the pathway of economic development. In other words, the Convention recognises that the capacity to tackle climate change is inherently linked to development. This, in turn, requires differentiation in favour of developing countries, through the principle of CBDR-RC (*Principle 1*), accounting for the specific needs and special circumstances of developing countries (*Principle 2*), with developed countries "to take the lead in combatting climate change" (*Principle 1*).

161. Finally, the UNFCCC provides a basic set of commitments. All parties must develop national inventories of GHG emissions;[263] must formulate policies and measures to limit GHG emissions;[264] and submit communications containing information relating to their national inventories, and steps taken or envisaged to implement the Convention.[265]

162. Developed countries (as defined in Annex I) must adopt policies and measures to limit GHG emissions "with the aim of returning individually or jointly" to their 1990 levels by "the end of the present decade", *i.e.*, the year 2000.[266] A sub-set of Annex I

[261] UNFCCC, Article 3.4.

[262] UNFCCC, Article 3.5.

[263] UNFCCC, Article 4.1(a).

[264] UNFCCC, Article 4.1(b).

[265] UNFCCC, Article 12.1.

[266] UNFCCC, Article 4.2(a) and (b).

developed countries, that is the Organisation for Economic Co-operation and Development countries, have additional commitments to provide "new and additional financial resources to meet the agreed full costs incurred by developing country Parties" in complying with their reporting requirements; *and* "to meet the full incremental costs" of their emissions reduction measures.[267] A subset of developed countries (as defined in Annex II) commit to assisting particularly vulnerable developing countries in "meeting costs of adaptation" to the adverse effects of climate change.

b. Paris Agreement

163. In 2015, the Paris Agreement was adopted "in pursuit of the objective of the Convention" and is "guided by its principles".[268] The Paris Agreement "enhances the implementation of the Convention, including its objective".[269] The Paris Agreement thus provides a series of specific commitments that pursue the overall objective of **preventing dangerous anthropogenic interference with the climate system** in a way that **enables economic development to proceed in a sustainable manner.**

164. To this end, Article 2.1 of the Paris Agreement identifies three high level goals through which the Parties "aim[] to strengthen the global response to the threat of climate change", consistent with the objective of the UNFCCC.[270] These goals are:

- **a temperature goal**: "hold[] the increase in the global average temperature to well below 2°C and pursue efforts to limit the temperature increase to 1.5°C", in recognition that this would "significantly reduce the risks and impacts of climate change"[271] ("**Paris temperature goal**");
- **an adaptation goal**: "[enhancing] the ability to adapt to the adverse impacts of climate change and foster climate resilience";[272]
- **a financing goal**: "making finance flows consistent with a pathway towards low greenhouse gas emissions and climate-resilient development".[273]

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[267] UNFCCC, Article 4.3. and 4.4.

[268] *See*, Paris Agreement, preamble; *see also*, Article 2.1 which provides "[t]his Agreement, **in enhancing the implementation of the Convention**, including its objective, aims to …". (emphasis added).

[269] Paris Agreement, Article 2.1.

[270] Paris Agreement, Article 2.1.

[271] Paris Agreement, Article 2.1(a).

[272] Paris Agreement, Article 2.1(b); *see also*, Article 7.1, "the global adaptation goal".

[273] Paris Agreement, Article 2.1(c).

165. Like the UNFCCC, Article 2.2 of the Paris Agreement expressly sets forth that the Agreement "will be implemented to reflect equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances". As explained above, this provision adds considerable nuance to the principle of CBDR-RC, through the words "in the light of different national circumstances".

166. Much of the remainder of the Paris Agreement sets out provisions operationalising how the Agreement's goals are to be achieved. In general terms, these provisions address three distinct aspects of the response to climate change: actions to mitigate global warming (climate change mitigation); actions to adapt to the effects of climate change (climate change adaptation); and loss and damage resulting from climate change.

167. *First*, with respect to **mitigation**, Article 4 sets out requirements related to NDCs, which are the "contribution" that each State makes to achieving the Paris temperature goal by reducing emissions, as one aspect of preventing dangerous anthropogenic interference with the climate system.

168. *Second*, Article 7 elaborates on the need for **adaptation measures**, providing, among other things, that "[e]ach Party *shall*, as appropriate, engage in adaptation planning processes and the implementation of actions" and "*should*, as appropriate, submit and update periodically an adaptation communication".[274]

169. *Third*, as regards support for developing countries, Article 9 provides that developed country States "shall provide **financial resources** to assist developing country Parties with respect to **both mitigation and adaptation**". In addition, Articles 10 and 11 provide for alternative forms of assistance from developed to developing States, in particular technology transfer and capacity building.

170. Finally, Article 8 "recognizes the importance of averting, minimizing and addressing loss and damage associated with the adverse of effects of climate change".[275] That is,

[274] Paris Agreement, Article 7.9 and 7.10 (emphasis added).

[275] UNFCCC COP, Draft Decision -/CMA.5, "Outcome of the first global stocktake" (2023) (available here), paras. 121-135.

the harms of climate change that have already occurred and will occur, which cannot be addressed through adaptation measures.

4. International human rights law

171. The term "human rights" refers to a catalogue of legal rights, developed through international texts, inherent to all human beings – regardless of their nationality, place of residence, sex, national or ethnic origin, colour, religion, language, or any other status. These rights are interrelated, interdependent and indivisible. With regard to all human rights, States have three obligations.

172. These obligations are: (1) a "negative" obligation to *respect* human rights, namely to refrain from interfering with the enjoyment of human rights; (2) a "positive" obligation to *protect* human rights, which requires action to safeguard individuals, and groups of individuals, against possible human rights abuses from third parties; and (3) a further "positive" obligation to *fulfil* human rights, namely to take positive action to facilitate the enjoyment of human rights.

173. Below, Antigua and Barbuda addresses *first* how these obligations are expressed in various binding legal instruments; *second* the (non-binding) recognition of the right to a clean, healthy and sustainable environment by the UN General Assembly; and *third* how climate change has impacted human rights.

a. International texts on human rights

174. In human rights law, the key text is the Universal Declaration of Human Rights ("**UDHR**"), adopted by the UN General Assembly in 1948.[276] It is the first legal instrument aimed at the universal protection of fundamental human rights, and it is the cornerstone of modern human rights law. Its 30 articles provide the principles and foundations of present and future conventions, treaties and other legal instruments relating to human rights.

175. Since 1948, a number of treaties and intergovernmental declarations have supplemented the UN's proclamation of human rights. In particular, the UDHR was complemented in 1966 by the International Covenant on Civil and Political Rights

[276] UN General Assembly, *Resolution 217 A III: Universal Declaration of Human Rights*, A/RES/3/217, 10 December 1948 ("**Universal Declaration of Human Rights**").

("**ICCPR**") and the International Covenant on Economic, Social and Cultural Rights ("**ICESCR**").[277] Each of these Covenants has been ratified by 167 States and they both entered into force in 1976.

176. In addition to the UDHR and the two Covenants, the UN system is the source of many other international human rights instruments. They include, for instance:

- the International Convention on the Elimination of All Forms of Racial Discrimination;[278]
- the Convention on the Elimination of All Forms of Discrimination Against Women;[279]
- the Convention on the Rights of the Child;[280]
- the International Convention on the Protection of the Rights of all Migrant Workers and their Families;[281]
- the International Convention on the Rights of Persons with Disabilities.[282]

177. Several regional human rights instruments have also been adopted over the last 70 years. While regional in membership, these treaties are broad in scope, because they are not confined to the protection of specific human rights or specific categories of rightsholders. The interpretation and application of these instruments by relevant regional bodies (while legally binding only in the regional context) can help to inform the content of the equivalent rights as expressed in the UN instruments.

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[277] UN General Assembly, *International Covenant on Civil and Political Rights*, 16 December 1966, 999 U.N.T.S. 171, entered into force 23 March 1976 (hereinafter "**ICCPR**"); UN General Assembly, *International Covenant on Economic, Social and Cultural Rights*, 16 December 1966, 993 U.N.T.S. 3, entered into force 3 January 1976 (hereinafter "**ICESCR**").

[278] UN General Assembly, *International Convention on the Elimination of All Forms of Racial Discrimination*, 21 December 1965, 660 U.N.T.S. 195, entered into force 4 January 1969 (hereinafter "**ICERD**").

[279] UN General Assembly, *Convention on the Elimination of All Forms of Discrimination against Women*, 18 December 1979, 1249 U.N.T.S. 13, entered into force 3 September 1981 (hereinafter "**CEDAW**").

[280] UN General Assembly, *Convention on the Rights of the Child*, 20 November 1989, 1577 U.N.T.S 3, entered into force 2 September 1990 (hereinafter "**CRC**").

[281] UN General Assembly, *International Convention on the Protection of the Rights of All Migrant Workers and Their Families*, 18 December 1990, 2220 U.N.T.S. 3, entered into force 1 July 2003 (hereinafter "**ICRMW**").

[282] UN General Assembly, *Convention on the Rights of Persons with Disabilities*, 8 February 2007, 2515 U.N.T.S. 3, entered into force 3 May 2008 (hereinafter "**CRPD**").

178. The formulation and development of human rights is not limited to binding international treaties – whether of universal or regional character. In fact, a series of soft law instruments complete the framework of human rights law relating to climate change. Such soft law instruments include in specific declarations adopted by States; and resolutions of the UN General Assembly and other UN bodies, including UN human rights bodies – such as the Human Rights Council, and the Office of the High Commissioner for Human Rights. This includes, most notably, the UN General Assembly's recognition of the right to a clean, healthy and sustainable environment (addressed below).

179. Treaty bodies have also adopted a wide range of instruments that have further developed the content of human rights and the corresponding State obligations. Notable examples are the general comments and recommendations adopted by the Committee on Economic, Social and Cultural Rights, the Committee on the Rights of the Child, the Committee on the Elimination of Discrimination against Women, and, more broadly, by the Human Rights Committee.

b. The right to a clean, healthy and sustainable environment for present and future generations

180. The right to a clean, healthy and sustainable environment has been recognised as a universal human right by the Human Rights Council and by the UN General Assembly.[283]

181. Specifically, in October 2021, the Human Rights Council, in its Resolution 48/13, recognised "the right to a clean, healthy and sustainable environment as a human right that is important for the enjoyment of human rights", and encouraged States "to adopt

[283] UN Human Rights Council, *Resolution 48/13: The Human Right to a Clean, Healthy and Sustainable Environment*, UN Doc. A/HRC/RES/48/13, 18 October 2021 (hereinafter "**UN Human Rights Council, *Resolution 48/13: The Human Right to a Clean, Healthy and Sustainable Environment*, 2021**"); UN General Assembly, *Resolution 76/300: The Human Right to a Clean, Healthy and Sustainable Environment*, A/RES/76/300, 28 July 2022 (hereinafter "**UN General Assembly, *Resolution 76:300: The Human Right to a Clean, Healthy and Sustainable Environment*, 2022**"). The origins of the right to a clean, healthy and sustainable environment date back to Principle 1 of the Stockholm Declaration. The right is also included in several regional human rights instruments drafted after the 1970s, such as the *African Charter on Human and Peoples' Rights*, 27 June 1981, 1520 U.N.T.S. 217, entered into force 21 October 1986 (hereafter "**ACHPR**"). *See also*, Organization of American States ("**OAS**"), *American Convention on Human Rights*, 22 November 1969, 1144 U.N.T.S. 123, entered into force 18 July 1978; *Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights*, 16 November 1999, A-52 (hereinafter "**Protocol of San Salvador**"), Article 11(1); *Arab Charter on Human Rights*, Article 38; *ASEAN Human Rights Declaration*, 18 November 2012, para. 28(f).

policies for the enjoyment of the right to a clean, healthy and sustainable environment".[284] This was followed by the adoption of a Resolution of the UN General Assembly in July 2022.[285]

182. The recognition of the right at the universal level acknowledges the inherent interdependence of environmental protection and enjoyment of human rights – a healthy environment is fundamental to the full enjoyment of a vast range of human rights and, conversely, environmental degradation interferes with the enjoyment of these rights. Over the past 45 years, the meaning, content, and scope of the human right to a healthy environment – as well as its relationship with other human rights – have been progressively refined and clarified by national tribunals and regional human rights courts.[286] There is now no doubt that the right to a healthy environment is an autonomous right, which "differs from the environmental content that arises from the protection of other rights".[287]

183. In the 2001 *Ogoni* case, the African Commission on Human and Peoples' Rights considered the content of the right, finding that (as enshrined in Article 24 of the African Charter on Human and Peoples' Rights), it "*requires the State to take reasonable and other measures to prevent pollution and ecological degradation, to promote conservation, and to secure an ecologically sustainable development and use of natural resources*".[288] In other words, to comply with the human rights in Article 24, States need to comply with the environmental principle of prevention, which requires each State to act with *due diligence* to avoid transboundary harm.[289]

184. In its 2017 Advisory Opinion, the Inter-American Court of Human Rights confirmed that the right to a healthy environment (as enshrined in the Protocol of San Salvador)

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[284] UN Human Rights Council, *Resolution 48/13: The Human Right to a Clean, Healthy and Sustainable Environment*, 2021.

[285] UN General Assembly, *Resolution 76:300: The Human Right to a Clean, Healthy and Sustainable Environment*, 2022.

[286] *See also, Framework Principles on Human Rights and the Environment*, in "Report of the Special Rapporteur on the Issue of Human Rights Obligations Relating to the Enjoyment of a Safe, Clean, Healthy and Sustainable Environment", UN Doc. A/HRC/37/59, 24 January 2018, Annex.

[287] *IACHR Advisory Opinion*, para 63.

[288] ACHPR, *Communication 155/96: Social and Economic Rights Action Center (SERAC) and Center for Economic and Social Rights (CESR) v. Nigeria* (2001) (hereinafter "***Ogoni***"), para. 52.

[289] Rio Declaration, Principle 2.

presents both individual and collective connotations and that, "*[i]n its collective dimension*", it "*constitutes a universal value that is owed to both present and future generations*".[290]

185. Climate change shares this clear and defining *collective* dimension. The environment and the climate system are indeed a "common good", which is a collective right and which may benefit all humans. Moreover, climate change is an inherently intergenerational problem,[291] with extremely serious implications not only for the present but for future generations as well. It follows that, in the context of climate change, this *collective right* should be collective also in a temporal rather than merely spatial dimension, as it can include the rights of future generations as well as those of the present.[292]

c. Impact of climate change on human rights

186. The impact of climate change on human rights is vast and uncontested. In the words of Mary Robinson, former UN High Commissioner for Human Rights, climate change is "potentially the greatest threat to human rights in the twenty-first century".[293]

187. In 2008, the Human Rights Council adopted Resolution 7/23 on *Human rights and Climate Change*, which represented the first UN resolution to state explicitly that climate change poses "*an immediate and far-reaching threat to people and communities around the world and has implications for the full enjoyment of human*

[290] *IACHR Advisory Opinion*, para. 59.

[291] Edith Brown Weiss, "Climate Change, Intergenerational Equity, and International Law", *Vermont Journal of Environmental Law* 9 (2008), p. 615.

[292] *Legal Consequences of the Separation of the Chagos Archipelago from Mauritius in 1965, Advisory Opinion, I.C.J. Reports 2019*, Separate Opinion of Judge Cançado Trindade, pp. 237-238, para. 261; Alan Boyle, 'The Role of International Human Rights Law in the Protection of the Environment' in Alan Boyle and Michael Anderson (eds.), *Human Rights Approaches to Environmental Protection* (Oxford University Press, 1996), p. 46; Edith Brown Weiss, "Our Rights and Obligations to Future Generations for the Environment", *American Journal of International Law* 84 (1990), pp. 198 and 203.

[293] *See*, Mary Robinson, "Why climate change is a threat to human rights", *TED Women*, May 2015 (available here).

rights".[294] Today, the fact that climate change strongly affects human rights is set forth in a wide variety of UN procedures and instruments,[295] as well as in legal scholarship.[296]

188. Similarly, the link between human rights and climate change is expressed in legal instruments relating to climate change, such as the Cancún Agreements – the first to call for Parties to "*fully respect human rights*" in all climate change related actions[297] – and the Paris Agreement.[298] The Paris Agreement addresses human rights in its preamble:

> Acknowledging that climate change is a common concern of humankind, **Parties should, when taking action to address climate change, respect, promote and consider their respective obligations on human rights, the right to health, the rights of indigenous peoples, local communities, migrants, children, persons with disabilities and people in vulnerable situations and the right to development, as well as**

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[294] UN Human Rights Council, *Resolution 7/23: Human Rights and Climate Change*, UN Doc. A/HRC/RES/7/23, 28 March 2008. In the Resolution, the Human Right Council asked the Office of the United Nations High Commissioner for Human Rights (OHCHR) to prepare a study on the implications of climate change for the enjoyment of human rights; *see*, OHCHR, *Report on the Relationship between Climate Change and Human Rights*, UN Doc. A/HRC/10/61, 15 January 2009 (hereinafter "OHCHR, *Report on the Relationship between Climate Change and Human Rights*").

[295] *See, e.g.*, Joint Statement of the Special Procedure Mandate Holders of the Human Rights Council on the UN Climate Change Conference, 7 December 2009 (available here); UN General Assembly, *Report of the Independent Expert on the Issue of Human Rights Obligations Relating to the Enjoyment of a Safe, Clean, Healthy and Sustainable Environment, John H. Knox*: *Mapping Report*, UN Doc. A/HRC/25/53, 30 December 2013. *See also*, the following resolutions passed by the UN Human Rights Council: *Resolution 18/22: Human rights and climate change*, UN Doc. A/HRC/RES/18/22, 17 October 2011; *Resolution 26/27: Human rights and climate change*, UN Doc. A/HRC/RES/26/27, 15 July 2014; *Resolution 28/11: Human rights and the environment*, UN Doc. A/HRC/RES/28/11, 7 April 2015; *Resolution 29/15: Human rights and climate change*, UN Doc. A/HRC/RES/29/15, 22 July 2015; *Resolution 32/33: Human rights and climate change*, UN Doc. A/HRC/RES/32/33, 18 July 2016; *Resolution 35/20: Human rights and climate change*, UN Doc. A/HRC/RES/35/20, 7 July 2017; *Resolution 38/4: Human rights and climate change*, UN Doc. A/HRC/RES/38/4, 16 July 2018; *Resolution 41/21: Human rights and climate change*, UN Doc. A/HRC/RES/41/21, 12 July 2019; *Resolution 44/7: Human rights and climate change*, UN Doc. A/HRC/RES/44/7, 23 July 2020; *Resolution 47/24: Human rights and climate* change, UN Doc. A/HRC/RES/47/24, 26 July 2021; *Resolution 50/9: Human rights and climate change*, UN Doc. A/HRC/RES/50/9, 14 July 2022. *See also*, United Nations Development Programme ("**UNDP**"), *Human Development Report 2007/2008 Fighting Climate Change: Human solidarity in a divided world*; UNEP, *Climate Change and Human Rights*, December 2015.

[296] *See, e.g.*, J.H. Knox, "Linking Human Rights and Climate Change at the United Nations", *Harvard Environmental Law Review*, 33(477), 2009, p. 477; and L. Rajamani, "Human Rights in the Climate Change Regime" in J.H. Knox and R. Pejan (eds.), *The Human Right to a Healthy Environment* (Cambridge University Press 2018), p. 236.

[297] UNFCCC COP, Decision 1/CP.16, "The Cancun Agreements: Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention", UN Doc. FCCC/CP/2010/7/Add.1, 15 March 2011 (available here), para. 8.

[298] Paris Agreement, third preambular paragraph.

> **gender equality, empowerment of women and intergenerational equity** [emphasis added].

189. Given the scope of its effects, climate change could, in principle, bear upon the enjoyment of all human rights. At the same time, certain specific rights are most directly and clearly implicated, according to the facts as established by the IPCC.[299] These are set out below.

190. **The right to life** is explicitly protected under the ICCPR as well as several other universal and regional human rights instruments.[300] It has been described by the Human Rights Committee as the "supreme right", "basic to all human rights", from which no derogation is permitted even in case of public emergency.[301] It has further held that climate change is among "the most pressing and serious threats to the ability of present and future generations to enjoy the right to life".[302] Observed and projected climate change effects already pose direct and indirect threats to the right to life, and will continue to do so.[303] Among others, the latest IPCC Report stresses with high confidence that climate change "will significantly increase ill health and premature death from the near- to long-term", and that increased heatwaves and droughts linked to climate change will "lead to health risks of malnutrition and climate-related mortality", especially in developing countries and in tropical regions.[304] Climate change will also exacerbate the rate and intensity of extreme weather events, which are already significantly impairing individuals' enjoyment of their right to life,[305] especially in developing countries and in SIDS.

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[299] *See*, sub-sections II.C.2 and II.C.3, *above*.

[300] ICCPR, Article 6; CRC, Article 6; UDHR, Article 3.

[301] Human Rights Committee, General Comment No. 6, *Article 6: Right to life*, 30 April 1982, para. 1.

[302] Human Rights Council, *Views adopted by the Committee under article 5(4) of the Optional Protocol, concerning communication No. 2728/2016*, para. 9.4, citing to Human Rights Committee, *General Comment No. 36, Article 6: right to life*, UN Doc. CCPR/C/GC/36, 3 September 2019, para. 62 (hereinafter "**HRC, General Comment No. 36**").

[303] OHCHR, *Report on the Relationship between Climate Change and Human Rights*, paras. 21-24.

[304] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Full Report (available here), pp. 63 and 95; *see also*, sub-section II.C.2, *above*.

[305] HRC, General Comment No. 36, para. 26. *See also*, Inter-Agency Standing Committee ("**IASC**"), *IASC Operational Guidelines on Human Rights and Natural Disasters – Protecting Persons Affected by Natural Disasters, Guiding Principles on Internal Displacement*, UN Doc. E/CN.4/1998/53/Add.2, 11 February 1998, p. 5, Annex.

191. **The right to adequate food**[306] is linked to the "fundamental right of everyone to be free from hunger",[307] which requires States to "take necessary action to mitigate and alleviate hunger … even in times of natural or other disasters".[308] The IPCC has emphasised the widespread impact of climate change on food security, in particular as far as vulnerable communities are concerned.[309]

192. **The right to water**[310] "entitles everyone to sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses".[311] With regard to the right to water, States have a "constant and continuing" obligation to ensure, expeditiously and effectively, the full realisation of the right to water,[312] and to ensure that there is sufficient safe water for both present and future generations.[313] Climate change, and in particular the loss of glaciers and the increase in frequency and intensity of extreme weather events, have exposed millions of peoples to reduced water security, especially in developing countries, SIDS, and among vulnerable communities.[314]

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[306] ICESCR, Article 11; CRC, Article 24(c); CRPD, Article 25(f) and Article 28(1); CEDAW, Article 14(2)(h); ICERD, Article 5.

[307] ICESCR, Article 11(2).

[308] CESCR, General Comment No. 12, *Article 11: Right to adequate food*, UN Doc. E/C.12/1999/5, 12 May 1999, para. 6.

[309] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III) (available here), p. 16.

[310] CESCR, General Comment No. 15, *Articles 11 and 12: Right to water*, UN Doc. E/C.12/2002/11, 20 January 2003 (hereinafter "**General comment No. 15**"). *See*, CEDAW, Article 14(2)(h); CRPD, Article 28(2)(a); CRC, Article 24(2)(c).

[311] CESCR, General Comment No. 15, para. 2.

[312] CESCR, General Comment No. 15, para. 18.

[313] CESCR, General Comment No. 15, para. 28. *See also*, United Nations Conference on Environment and Development, *Report of the United Nations Conference on Environment and Development - Agenda 21*, UN Doc. A/CONF.151/26/Rev.1 (Vol.1), p. 9, Chapters 5, 7 and 18; *Report of the World Summit on Sustainable Development, Annex: Plan of Implementation of the World Summit on Sustainable Development*, UN Doc. A/CONF.199/20*, 2002, paras. 7 (a), 7(l), 7(m), 36 and 38.

[314] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Full Report (available here), p. 16; OHCHR, *Report on the Relationship between Climate Change and Human Rights*, para. 29. *See also*, Human Rights Committee, *Report of the United Nations High Commissioner for Human Rights on the scope and content of human rights obligations related to equitable access to safe drinking water and sanitation under international human rights instruments*, UN Doc. A/HRC/6/3, 16 August 2007; United Nations Economic and Social Council, *Realization of the right to drinking water and sanitation*, UN Doc. E/CN.4/Sub.2/2005/25, 11 July 2005; *see also*, sub-section II.C.2, *above*.

193. **The right to health**[315] refers to "the right of everyone to the enjoyment of the highest attainable standard of physical and mental health"[316] and it extends to the underlying determinants of health, such as "food and nutrition, housing, access to safe and potable water and adequate sanitation, safe and healthy working conditions, and a healthy environment".[317] Climate change has already adversely affected human physical and mental health in many different ways,[318] especially in developing countries, including SIDS, as well as with regard to the most vulnerable segments of the population (*i.e.*, women, children, persons with disabilities).[319]

194. **The right to adequate housing**[320] has been defined as "the right to live somewhere in security, peace and dignity".[321] A number of observed and projected effects of climate change are already, and will continue producing, significant adverse impacts on the right to adequate housing. These include for instance, sea level rise and stronger and more frequent hurricanes, in particular as far as SIDS and low-lying coastal States are concerned, as well as flooding. In Antigua and Barbuda, the most serious threat to housing is the increased frequency and strength of hurricanes. These effects will have impacts on many coastal settlements and will lead to the relocation of peoples and communities, as well as to internal displacement and international migration.

195. **The right to self-determination**[322] has been defined in the ICCPR as the right to determine freely one's political status and freely pursue one's economic, social and

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[315] ICESCR, Article 12; CEDAW, Articles 12 and 14(2)(b); ICERD, Articles 5(e)(iv); CRC, Article 24; CRPD, Articles 16(4), 22(2), and 25; ICRMW, Articles 43(1)(e), 45(1)(c), and 70. *See also* ICESCR Articles 7(b) and 10.

[316] ICESCR, Article 12(1).

[317] CESCR, General Comment 14, *Article 12: The right to the highest attainable standard of health*, UN Doc. E/C.12/2000/4, 11 August 2000, para. 4.

[318] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Technical Summary (available here), p. 50.

[319] Committee on the Rights of the Child, General Comment No. 4, *Adolescent Health and Development in the Context of the Convention on the Rights of the Child*, UN Doc. CRC/GC/2003/4, 1 July 2003; Committee on the Elimination of Discrimination against Women, General recommendation 24, *Article 12 of the Convention on the Elimination of All Forms of Discrimination against Women – women and health*, UN Doc. A/54/38, 4 May 1999, (Part I) Chapter I.

[320] ICESCR, Article 11. *See also*, UDHR, Article 25(1); ICERD, Article 5 (e)(iii); CEDAW, Article 14(2); CRC, Article 27, para. 3; ICRMW, Article 43(1)(d); CRPD, Articles 9(1)(a), 28(1) and 28(2)(d).

[321] CESCR, General Comment No. 4, *The Right to Adequate Housing (Art. 11(1) of the Covenant)*, contained in UN Doc. E/1992/23, reprinted in UN Doc. HRI/GEN/1/Rev. 6, p.18, 12 May 2003, para. 7.

[322] The right to self-determination is enshrined in Articles 1 and 55 of the *Charter of the United Nations* (1945); *see also*, United Nations General Assembly, *Resolution 41/128: Declaration on the Right to Development*,

cultural development.[323] Sea level rise, coastal erosion and inundation are threatening the habitability and, in the longer term, the territorial existence of a number of SIDS and low-lying island States.[324] Changes in the climate are also threatening to deprive indigenous populations of their traditional territories and sources of livelihood. Both impacts have clear implications for the right to self-determination.[325]

196. **The right to a clean, healthy and sustainable environment** has been incorporated in a number of regional human rights treaties, more than a hundred national constitutions and has been recognised as a human right by the HRC and the UN General Assembly.[326] A number of observed and projected effects of climate change are already, and will continue producing, significant adverse impacts on the right to a clean, healthy and sustainable environment, whose substantive components include, "*clean air, a safe [and stable] climate, access to safe water and adequate sanitation, healthy and sustainably produced food [as well as] healthy biodiversity and ecosystems*".[327]

197. Moreover, climate change is susceptible of producing effects that are and will be felt most acutely by those segments of the population that are already in vulnerable situations due to factors such as poverty, gender, age, minority status, and disability.[328] These include, for instance, women, children, persons with disabilities, and indigenous peoples.

5. United Nations Convention on the Law of the Sea

198. The UNCLOS establishes "a legal order for the seas and oceans which will facilitate … the equitable and efficient utilization of their resources, the conservation of their living

4 December 1986, Article 1, para. 2; United Nations General Assembly, *Resolution 61/295*: *United Nations Declaration on the Rights of Indigenous Peoples*, UN Doc. A/RES/61/295, 13 September 2007, Articles 3 and 4.

[323] ICCPR, Article 1.

[324] OHCHR, *Report on the Relationship between Climate Change and Human Rights*, para. 40.

[325] OHCHR, *Report on the Relationship between Climate Change and Human Rights*, para. 40.

[326] *See*, sub-section III.B.3, *above*.

[327] Human Rights Committee, *Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment*, UN Doc. A/HRC/43/53, 30 December 2019, para. 2.

[328] *See*, *e.g.*, IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Full Report (available here), p. 145.

resources and the … protection and preservation of the marine environment".[329] Currently, there are 169 Parties to UNCLOS.

199. Part XII of the UNCLOS, "Protection and Preservation of the Marine Environment", is of particular relevance to the question before the Court.

200. Part XII opens with Article 192, titled "General Obligation". It reads: "*States have the obligation to protect and preserve the marine environment*". The ordinary meaning of the term "protect" is to "defend or guard from danger or injury", "keep safe, take care of".[330] The ordinary meaning of the term "preserve" is "to keep from perishing", "prevent", or "make lasting".[331] Together, the verbs in Article 192 – "protect" and "preserve" – require States Parties to safeguard the marine environment against future harm, and to maintain and improve its present condition.[332]

201. The "general obligation" in Article 192 is further elaborated in other, more detailed, provisions of Part XII. Among those is Article 194, which concerns the protection and preservation of the marine environment against one particular threat, "pollution of the marine environment".

202. The expression "pollution of the marine environment" is defined in Article 1(4) of the UNCLOS. Under that definition "pollution of the marine environment" is defined as: (1) "the introduction by man, directly or indirectly, of substances or energy into the marine environment"; and (2) when that results, or is likely to result, in "deleterious effects" for the marine environment.

203. When there is "pollution of the marine environment", Article 194 sets out obligations for the States Parties in following terms:

> States shall take, individually or jointly as appropriate, all measures consistent with this Convention that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practicable means at their disposal and in accordance with their capabilities,

[329] *See*, UNCLOS, fourth preambular paragraph.

[330] Oxford English Dictionary, "protect, n." (available here).

[331] Oxford English Dictionary, "preserve, n." (available here).

[332] *See*, *South China Sea Arbitration*, para. 941.

> and they shall endeavour to harmonize their policies in this connection.[333]

204. This provision requires States Parties to identify the measures that are necessary to *prevent, reduce*, and *control* pollution of the marine environment; and – using the best practical means available in accordance with their capabilities – adopt these measures.

205. The terms prevent, reduce and control are cumulative, and each term has a distinct meaning which must be given effect. *First*, the term "prevent" means "[t]o preclude the occurrence of (an anticipated event, state, etc.); to render (an intended, possible, or likely action or event) impractical or impossible by anticipatory action; to put a stop to".[334] *Second*, the ordinary meaning of "reduce" is "[t]o bring down or diminish to … a smaller number, amount, quantity, extent, etc. … ".[335] *Third*, "control" means "[t]o restrain from action, hold in check; (in later use) esp. to curb the growth or spread of"; and "regulating and directing"; "management".[336]

206. There are circumstances that may engage all three verbs, such as where pollution has already occurred and is still accumulating in the marine environment. In such circumstances, taking the necessary measures to merely "control" marine pollution would not be sufficient to discharge the obligation in Article 194.

207. Article 194 establishes a due diligence obligation. In practice, this requires States to employ "all the means at their disposal", "in accordance with their capabilities", to prevent, reduce and control pollution to the marine environment.[337] Put differently, States must "deploy adequate means, exercise best possible efforts, [] do the utmost".[338]

208. Finally, this language introduces differentiation between and among Parties to UNCLOS in the performance of their obligations, with a view to addressing the

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[333] UNCLOS, Article 194(1).

[334] Oxford English Dictionary, "prevent, v." (available here); *see also*, M.H. Nordquist (ed.), *United Nations Convention on the Law of the Sea, A Commentary*, (Dordrecht, Martinus Nijhoff, 1985), para. 194.10(b).

[335] Oxford English Dictionary, "reduce, v." (available here).

[336] Oxford English Dictionary, "control, v." (available here).

[337] *Alleged Violations of Sovereign Rights and Maritime Spaces in the Caribbean Sea (Nicaragua v. Colombia), Preliminary Objections, Judgment, I.C.J. Reports 2016 (I)*, p. 43, para. 95.

[338] *IUU Advisory Opinion*, p. 40, para. 129, citing to *Responsibilities in the Area*, p. 41, para. 110.

concerns of some developing States that mandatory measures to protect the marine environment could compromise their development.[339]

6. Convention on Biological Diversity

209. The Convention on Biological Diversity, adopted in 1992 during the Rio Earth Summit, is the first international treaty comprehensively addressing biodiversity. The CBD arose from the growing recognition of the international community that biodiversity is "a global asset of tremendous value to present and future generations" and "the threat to species and ecosystems has never been so great as it is today".[340]

210. The objectives of the CBD are the "conservation of biological diversity, the sustainable use of its components and the fair and equitable sharing of the benefits arising out of the utilization of genetic resources … and by appropriate transfer of relevant technologies … ".[341]

211. Article 3 recognises, as a principle, that States have "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".

212. Article 6 of the CBD requires Contracting Parties to "[d]evelop national strategies, plans and programmes for the conservation and sustainable use of biological diversity" and "[i]ntegrate, as far as possible and *as appropriate*, the conservation and sustainable use of biological diversity into relevant sectoral or cross-sectoral plans, programmes and policies".[342] These two prongs of the general obligation of Article 6 function as a "chronological series of steps" for States to develop a blueprint which "at minimum" reflect how the obligations of the CBD will be implemented.[343]

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[339] The language was included in the Convention by the Kenyan draft articles, but its origin can be found in Principle 7 of the Stockholm Declaration. *See*, M.H. Nordquist (ed.), *United Nations Convention on the Law of the Sea, A Commentary* (Dordrecht, Martinus Nijhoff, 1985), para. 194.10(b).

[340] Convention on Biological Diversity, Introduction.

[341] Convention on Biological Diversity, Article 1; *see also*, Article 2, defining "biodiversity" as "the variability among living organisms from all sources including, inter alia, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems".

[342] Convention on Biological Diversity, Articles 6(a) and 6(b) (emphasis added).

[343] *See*, L. Glowka, F. Burhenne-Guilmin, H. Synge, JA. McNeely, L. Gündling, *A Guide to the Convention on Biological Diversity* (IUCN Environmental Law Centre 1994) (available here), p. 29.

213. Building on Article 6, the remainder of the CBD requires Contracting Parties to take specific action in view of the objectives of the CBD. For instance, States shall "promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings" and "adopt measures for the recovery and rehabilitation of threatened species".[344]

214. The CBD also gives expression to the principle of CBDR-RC. Its key obligations are qualified by the terms "in accordance with its particular conditions and capabilities".[345] The *Principles* further recognise that "economic and social development and poverty eradication are the first and overriding priorities of developing countries".[346]

7. International trade law

215. The measures adopted by States in response to climate change may implicate areas of international law relating to the environment; *and* they may also implicate international law related to trade, mostly notably under the World Trade Organization's ("**WTO**") "covered agreements".[347] This will be the case where, for example, States' emissions reduction measures include border charges and restrictions, internal taxes, regulations, production standards and subsidies. Such measures are legal hybrids, for which it is appropriate to take account of all relevant parts of international law. To this end, Antigua and Barbuda sets out certain key rules and principles of international trade law.

216. The first preambular recital to the WTO Agreement provides as follows:

> *Recognizing that relations in the field of trade and economic endeavor should be conducted* with *a view to raising standards of living, ensuring full employment and a large and steadily growing volume of real income and effective demand, and expanding the production of and trade in goods and services,* ***while allowing for the optimal use of the world's resources in accordance with the objective of sustainable development, seeking both to protect and preserve the environment and to enhance the means for doing so in a manner consistent with***

[344] Convention on Biological Diversity, Article 8(d) and Article 9(c).

[345] Convention on Biological Diversity, Article 6.

[346] Convention on Biological Diversity, nineteenth preambular paragraph.

[347] The WTO "covered agreements" are those listed in the *Marrakesh Agreement Establishing the World Trade Organization*, 15 April 1994, 1867 U.N.T.S. 3, 1868 U.N.T.S. 3, 1869 U.N.T.S. 3, entered into force 1 January 1995, Article 2.2 and 2.3.

> ***their respective needs and concerns at different levels of economic development*** [emphasis added].

217. WTO adjudicators have found that the *preamble* thus contains a "specific acknowledgment [] about the importance of coordinating policies on trade and the environment",[348] and indicates that the drafters of the Agreement were "fully aware of the importance and legitimacy of environmental protection as a goal of national and international policy".[349]

218. To this end, the *preamble* "explicitly acknowledges" the objective of "sustainable development".[350] The preamble, thereby, explicitly acknowledges that the protection of the environment happens "in a manner consistent with [WTO Members'] respective needs and concerns at different levels of economic development". This preambular language gives "colour, texture and shading" to the interpretation of the General Agreement on Tariffs and Trade 1994 ("**GATT 1994**") (and other WTO covered agreements).[351]

219. Article 3.2 of the WTO's Dispute Settlement Understanding ("**DSU**") directs WTO adjudicators to interpret the provisions of the WTO agreements "in accordance with the customary rules of interpretation of public international law", including, specifically, Article 31 of the Vienna Convention. It is well-accepted in WTO law that the direction in Article 3.2 of the DSU "reflects a measure of recognition" that WTO law "is not to be read in clinical isolation from public international law".[352]

220. This position is consistent with the presumption in international law that different parts of international law should, as far as possible, be interpreted and applied in a coherent and consistent manner.[353] In the words of the International Law Commission ("**ILC**"), "[i]t is a generally accepted principle that when several norms bear on a single issue they should, to the extent possible, be interpreted so as to give rise to a single set of

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[348] Appellate Body Report, *US – Gasoline*, p. 30.

[349] Appellate Body Report, *US – Shrimp*, paras. 129-131.

[350] Appellate Body Report, *US – Shrimp*, paras. 129-131.

[351] Appellate Body Report, *US – Shrimp*, paras. 129-131.

[352] Appellate Body Report, *US – Gasoline*, p. 17.

[353] *See*, TESS Expert Report, *Principles of International Law Relevant for Consideration in the Design and Implementation of Trade-Related Climate Measures and Policies*, September 2023 (available here), p. 8.

compatible obligations."[354] This principle of systemic integration avoids fragmentation, and gives full effect to all relevant aspects of international law, in a coherent and effective manner.

221. In considering the relevance of international trade law to climate-related measures, two categories of provisions under the GATT 1994 bear particular emphasis: those setting out obligations on WTO Members; and those setting out possible defences to a violation of those obligations. Antigua and Barbuda briefly describes each in turn.

222. There are two key sets of "cornerstone" obligations in the GATT 1994 which promote the liberalization of international trade. The first relates to market access, *i.e.*, the ability of imported goods to cross the border, and access the market, of an importing country.[355] Market access can be impeded through the imposition of tariffs (*i.e.*, broadly, charges imposed on or in connection with importation) or quantitative restrictions (limits on the volume of goods that may be imported or exported into or from a Member's territory). Under Article II of the GATT 1994, WTO Members may not impose tariffs on imported goods which are in excess of a negotiated maximum level.[356] Further, under Article XI of the GATT 1994, quantitative restrictions – which include outright bans – are prohibited altogether.

223. The second cornerstone set of obligations in the GATT 1994 relates to non-discrimination. Under the "most favored nation" principle set out in Article I, WTO Members may not discriminate between "like" products originating from different exporting countries. Under the "national treatment" principle set out in Article III, WTO Members may not discriminate between domestic products, on the one hand, and

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[354] Report of the Study Group of the International Law Commission, "Fragmentation of International Law: Difficulties Arising from the Diversification and Expansion of International Law", UN Doc. A/CN.4/L.702, 18 July 2006 (available here) (hereinafter "**ILC, *Report on Fragmentation of International Law*"**), p. 8. Referring to this ILC Report, the WTO Appellate Body also explained that "Article 31(3)(c) of the Vienna Convention is considered an expression of the 'principle of systemic integration' which, in the words of the ILC, seeks to ensure that 'international obligations are interpreted by reference to their normative environment' in a manner that gives 'coherence and meaningfulness' to the process of legal interpretation" (Appellate Body Report, *EC and Certain member States – Large Civil Aircraft*, para. 845); *See also*, Panel Report, *Indonesia – Autos*, para. 14.28 ("in public international law there is a presumption against conflict"), and footnote 649 (with references to the literature).

[355] *See*, Katherine Connolly and Nicolas Lockhart, "An Introduction to Core Principles of International Trade Law" in Daniel Bethlehem *et al.* (eds) *The Oxford Handbook of International Trade Law* (OUP, 2023).

[356] The negotiated maximum level is referred to as a "tariff binding"; each tariff binding is product-specific, and is recorded in each Member's "Schedule of Concessions".

any "like" imported products, on the other hand, either in their fiscal treatment of the relevant products (Article III:2) or their regulatory treatment (Article III:4).

224. Under the GATT 1994, the policy objective behind a measure is not, as a general rule, taken into account when assessing whether the measure violates one of these obligations. For example, WTO adjudicators have consistently rejected arguments that a difference in treatment stemming from a "legitimate regulatory distinction" must be considered under the non-discrimination obligations.[357]

225. Instead, such considerations are assessed under the provisions providing possible defenses to a violation of the GATT 1994. Of particular note is Article XX (general exceptions), consisting of ten paragraphs and a *chapeau*.

(a) The paragraphs set out a closed list of justifiable measures, corresponding to specific policy objectives. WTO adjudicators have adopted a two-step approach under Article XX: *First*, is the measure provisionally justified under one of the subparagraphs? *Second*, does the measure satisfy the conditions in the *chapeau*?[358] The responding Member bears the burden of proof under each step.[359]

(b) The *chapeau* provides that measures cannot be justified if they constitute "arbitrary or unjustified discrimination" or "a disguised restriction on international trade".

226. As regards trade-related climate measures, two paragraphs are especially relevant: (b), covering measures "necessary for the protection of human, animal or plant life or health"; and (g) measures "relating to the conservation of exhaustible natural resources". To successfully rely on a subparagraph, the responding Member must show the measure indeed pursues the identified *objective*; and that the measure has the requisite *connection* to that objective (*i.e.*, "necessary for", or "related to").

227. Under the *chapeau*, the adjudicator will typically broaden the analysis, looking at how the measure is applied in practice; this assessment can take into account a broad range

[357] *See*, *e.g.*, Appellate Body Report, *EC – Seal Products*, para. 5.117.

[358] Appellate Body Report, *US – Gasoline*, p. 22; and Appellate Body Report, *Brazil – Retreaded Tyres*, para. 139.

[359] Appellate Body Reports, *US – Gasoline*, p. 22; *US – Wool Shirts and Blouses*, p. 16; *Indonesia — Import Licensing Regimes*, para. 5.42.

of factors, including provisions from binding or non-binding international legal instruments, beyond international trade.[360]

B. What are the obligations of States under international law to ensure the protection of the climate system and other parts of the environment from anthropogenic GHG emissions?

1. Obligations related to mitigation

228. States are under an obligation to do their utmost, using all the means at their disposal to achieve rapid, deep and sustained GHG emission reductions sufficient to prevent significant environmental harm, in a manner consistent with the principle of fairness, equity and CBDR-RC.

229. This obligation arises independently under several sources of law, and in each instance the obligation arising under one source of law support those arising under the other sources. The key sources of this mitigation obligation are addressed in turn.

230. Antigua and Barbuda begins with the **international climate change regime**, which comprises the UNFCCC and the Paris Agreement (sub-section (a)). Other sources of international law impose parallel and complementary obligations on States to prevent significant environmental harm resulting from GHG emissions, in a manner consistent with the principle of fairness, equity and CBDR-RC. In this respect, Antigua and Barbuda examines the **customary obligation of prevention** (sub-section (b)), followed by **human rights law** (sub-section (c)); and **the law of the sea** (sub-section (d)). Finally, **international trade law** imposes obligations on States adopting mitigation measures affecting international trade (sub-section (e)). Antigua and Barbuda refers to other rules and principles of international law where relevant under each section.

[360] In *US - Shrimp*, for example, the Appellate Body took into account provisions of treaties, and several soft law instruments of international environmental law, including Principle 12 of the Rio Declaration and Agenda 21. Appellate Body Report, *US - Shrimp*, paras 168 and 169. *See also*, Appellate Body Report, *US - Shrimp (Art. 21.5)*, para. 124. In *EC - Seals*, in interpreting Article 2.1 of the *TBT Agreement* (where some of the analysis was considered to apply to Article XX of the GATT as well), the panel referred to other international law instruments such as the UN Declaration on the Rights of Indigenous Peoples, the UN General Assembly Resolution 61/295 (2007), ILO Convention 169, and the Charter of the Inuit Circumpolar Council.

a. Obligations arising under the international climate change regime

231. The UNFCCC establishes the framework for the international climate change regime. The objective of the UNFCCC, and of "any related legal instruments that the Conference of the Parties may adopt", is to stabilise GHG emissions in the atmosphere at a level that prevents dangerous anthropogenic interference with the climate system.[361] To contribute to that objective, Article 2.1(a) of the Paris Agreement establishes a temperature goal for climate change mitigation. That goal calls for mitigation action to hold global warming well below 2.0°C, and to pursue efforts to limit the increase in atmospheric warming to 1.5°C, recognising that the latter temperature "would significantly reduce the risks and impacts of climate change" ("**Paris temperature goal**").[362]

232. Article 4 is the main provision of the Paris Agreement establishing mitigation-related obligations. The key subparagraphs are Article 4.2 and Article 4.3:

> 2. Each Party shall prepare, communicate and maintain successive nationally determined contributions that it intends to achieve. Parties shall pursue domestic mitigation measures, with the aim of achieving the objectives of such contributions.
>
> 3. Each Party's successive nationally determined contribution will represent a progression beyond the Party's then current nationally determined contribution and reflect its highest possible ambition, reflecting its common but differentiated responsibilities and respective capabilities, in the light of different national circumstances.

233. These terms establish a mandatory obligation to "*prepare*, *communicate* and *maintain* successive nationally determined contributions".[363] States are in violation of Article 4 if they do not do so.

234. Below, the Written Statement addresses the term "nationally determined contribution" in Article 4.2, before turning to each of the three key verbs in Article 4.2.

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[361] UNFCCC, Article 2.

[362] Paris Agreement, Article 2.1(a).

[363] Paris Agreement, Article 4.2 (emphasis added).

i. "Nationally determined contribution"

235. The term "nationally determined contribution" appears first in Article 3 of the Paris Agreement, which provides:

> As **nationally determined contributions** to the global response to climate change, all Parties are to undertake and communicate ambitious efforts as defined in Articles 4, 7, 9, 10, 11 and 13 with the view to achieving the purpose of this Agreement as set out in Article 2.

236. The ordinary meaning of the word "contribution" means the "*action of … giving as one's part to a common fund or stock; the action of lending aid or agency to bring about a result*."[364]

237. The term "contribution" in Article 4.2, read in light of Articles 2 and 3, refers to the mitigation action of each State, in particular, its national share towards the achievement of the collective "global response to climate change".[365] A COP Decision, Decision 4/CMA.1, clarifies that an NDC is expected to contribute, more specifically, to the Paris temperature goal and, with separate mention, the broader UNFCCC objective of preventing dangerous anthropogenic interference with the climate system.[366]

238. Article 4.1 sets forth a collective pathway for States to achieve the Paris temperature goal. Under that pathway, Parties "aim to reach global peaking of greenhouse gas emissions *as soon as possible*" and "to undertake *rapid* reductions thereafter in accordance *with best available science*".[367] Article 4.1 also recognises that "peaking will take longer for developing country Parties", which is consistent with facilitating a

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[364] Oxford English Dictionary, "contribution, n." (available here) (emphasis added).

[365] Paris Agreement, Article 2.

[366] *See*, UNFCCC COP, Decision 4/CMA.1, "Further guidance in relation to the mitigation section of decision 1/CP.21", UN Doc. FCCC/PA/CMA/2018/3/Add.1, 15 December 2018 (available here) (hereinafter "**UNFCCC COP, Decision 4/CMA.1, "Further guidance in relation to the mitigation section of decision 1/CP.21" (2018)**"), Annex I to the Decision, para. 7. This decision was adopted pursuant to Article 4.8 of the Paris Agreement, which provides that in "communicating their nationally determined contributions, all Parties shall provide the information necessary for clarity, transparency and understanding" of those NDCs.

[367] Paris Agreement, Article 4.1 (emphasis added).

fair and just transition that allows developing countries to progress along the development curve.[368]

239. In order to contribute to the collective pathway, Articles 4.2 and 4.3 of the Paris Agreement impose obligations on States with respect to their respective national pathways to reducing emissions. This national pathway is set forth through the NDC, with "successive" NDCs due every five years.[369] For each successive NDC, Article 4.2 establishes three distinct and cumulative obligations: States are under an obligation to (i) "*prepare*" (ii) "*communicate*"; and, (iii) "*maintain*" their successive NDCs.

240. States are constrained in *how* they perform each of these three obligations, pursuant to the terms of Article 4, read in context with the relevant COP Decision and in light of the object and purpose of the Paris Agreement.

ii. States shall prepare a nationally determined contribution

241. Under Article 4.2 of the Paris Agreement, States must "prepare" an NDC "that it intends to achieve". The ordinary meaning of the verb "prepare" is to make ready for some purpose.[370] The relevant purpose of the NDC is identified in Article 3 (quoted above) as being "to achiev[e] the purpose of this Agreement". In this context, "prepare" in Article 4.2 means that States must make ready an NDC that is fit for the purposes of contributing to the collective efforts to meet the Paris temperature goal and to prevent dangerous anthropogenic interference within the climate system.

242. As the text of Article 4.2 provides, the NDC reflects the contribution that the State "intends to achieve". The use of the verb "intend" shows that an NDC is forward-looking, setting out the State's emissions reduction target. This is confirmed by COP Decision 4/CMA.1, which refers to an NDC as establishing a "target" for emissions reductions.[371]

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[368] The Paris Agreement recognises that States are at varying stages in the development curve; s*ee*, Paris Agreement, third preambular paragraph, Articles 2.2 and 4.3; UNFCCC, sixth preambular paragraph, Articles 3.1 and 4.1.

[369] Paris Agreement, Articles 4.2, 4.9, 4.10.

[370] Oxford English Dictionary, "prepare, v." (available here).

[371] UNFCCC COP, Decision 4/CMA.1, "Further guidance in relation to the mitigation section of decision 1/CP.21" (2018) (available here), Annex I to the Decision, paras. 1(b), 1(d), 2(b), and 3(a).

243. The Paris Agreement leaves States with a degree of discretion as to how they "prepare" their NDC and, in particular, what level of emission reductions they set as target, and how they will achieve that target. At the same time, Article 4, read together with COP Decision 4/CMA.1,[372] places limits on that discretion.

244. Antigua and Barbuda address two aspects of these limits in turn. The first set of limits concerns temporal and other scoping dimensions of an NDC, while the second concerns the level of the NDC.

(1) Scoping of an NDC

245. To "prepare" an NDC, States must necessarily consider certain factors that determine the scope of an NDC. The consideration of these factors is, by definition, inherent in the task of preparing an emissions reduction target. The scoping factors include: the baseline or starting-point for the target; the period over which the target will be achieved; the type of emissions included; the type of emission-generating activities included; and the methodologies used for making the necessary assessments (*e.g.*, GHG measurement).

246. The need for States to assess these scoping factors in preparing an NDC is confirmed expressly by COP Decision 4/CMA.1. This COP Decision is focused on the elements of an NDC that must be "communicate[d]" by a State, pursuant to Article 4.13 of the Paris Agreement. These requirements are addressed again below under the "communication" limb of Article 4.2.

247. COP Decision 4/CMA.1 calls for an explanation of the following elements that bear upon the scope of an NDC: (a) the reference (*i.e.*, starting) point for calculating emission reductions; (b) time frames for implementation; (c) scope and coverage, including sectors, gases, categories and pools covered by the NDC; and (d) assumptions and methodological approaches used for accounting for GHG emissions and

[372] COP Decisions can be considered subsequent agreements under Article 31.3(a) of the VCLT. The ICJ has clarified that resolutions like COP decisions have interpretive relevance "when they are adopted by consensus or by a unanimous vote" (*see*, *Whaling in the Antarctic (Australia v. Japan: New Zealand intervening), Judgment, I.C.J. Reports 2014* (hereinafter "***Whaling in the Antarctic***"), p. 248, para. 46). Equally, the ILC has explained that the "legal effect of a decision adopted within the framework of a Conference of States Parties ... may embody, explicitly or implicitly, a subsequent agreement under article 31, paragraph 3 (*a*)" (*see*, ILC, "Draft conclusions on subsequent agreements and subsequent practice in relation to the interpretation of treaties", 2018, UN Doc. A/73/10, Conclusion 11.2 and *see* commentary para. 35 thereto as regards Article 31.3 and other subsequent practice for the purpose of Article 32).

removals.[373] To be able to *communicate* these elements, a State must give proper consideration to each of them in *preparing* its NDC.

(2) Level of the emissions reduction target in each successive NDC

248. The level of the emissions reduction target in each successive NDC is among the most important features of an NDC. Again, although States enjoy some discretion in setting the level of their NDC, limits are placed on that discretion.

249. Specifically, with respect to the level of the emissions reduction target, an NDC must: (a) be prepared in light of best available scientific evidence; (b) reflect the "highest possible ambition" and a "progression"; (c) reflect fairness, equity and CBDR-RC; (d) reflect special dispensation for least developed States and SIDS; and (e) be informed by the results of the Global Stocktake. Antigua and Barbuda addresses each factor in turn.

(a) *Consideration of the best available scientific evidence*

250. The inherent nature of an NDC requires States to prepare an NDC, under Article 4.2, using the best available scientific evidence. Article 4.1, which serves as immediate context, confirms this point, with an express reference to "best available science".

251. The purpose of an NDC is to hold global warming to levels that meet the Paris temperature goal and that avert dangerous anthropogenic interference with the climate system. It is impossible for a State to prepare an NDC fit for these purposes without considering the relevant science. Indeed, science informs necessary judgments on virtually every question relevant to the preparation of an NDC, including: expected national and international emissions pathways, according to different emissions reductions scenarios; expected temperature increases and harms under these different scenarios; sources of GHG emissions; the quantum and impact of different GHGs; technology for reducing emissions; and methodologies for making measurements. The list goes on.

[373] UNFCCC COP, Decision 4/CMA.1, "Further guidance in relation to the mitigation section of decision 1/CP.21" (2018) (available here), Annex I to the Decision. This COP Decision is relevant to the interpretation of Article 4.2 and 4.8 of the Paris Agreement (*see*, footnote 372, *above*).

252. With respect to the best available science, the work of the IPCC serves as a valuable resource for States in making these assessments. Indeed, COP Decision 4/CMA.1 expressly mentions that the work of the IPCC is to be used in preparing an NDC.[374]

(b) *The NDC must reflect the "highest possible ambition" and a "progression"*

253. In preparing an NDC, a State must decide on the extent of the target emissions reductions and, hence, the extent of its "contribution". The target encompasses the pace of emissions reductions over time, because a more ambitious target for the NDC period means a faster pace of reductions during that period.

254. Under Article 4.3 of the Paris Agreement, each successive NDC "will … reflect [States'] highest possible ambition" at the time when the NDC is established; and each successive NDC "will represent a progression" from the last, ratcheting up the emissions reduction target from one NDC to the next.

255. The word "will" in Article 4.3 must be interpreted using the usual rules of treaty interpretation.[375] The ordinary meaning of the word, as used in the provision, is straightforward, without any uncertainty or ambiguity. The word is an auxiliary verb, which connotes a "command, promise, or determination".[376]

256. Article 4.3 must also be understood in light of COP Decision 4/CMA.1. This Decision requires a State to explain how it considers that an NDC represents: (1) the State's highest possible ambition at that time; and (2) a progression from the previous NDC.[377] The need for a State to explain these two points shows that a State is bound to prepare an NDC that demonstrably (in the communication) meets these requirements.

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[374] UNFCCC COP, Decision 4/CMA.1, "Further guidance in relation to the mitigation section of decision 1/CP.21" (2018) (available here), Annex I to the Decision, paras. 3(b), 5(d), 5(e), and 5(f)(iii).

[375] Specifically, the rules of treaty interpretation set out in Articles 31 and 32 of the VCLT.

[376] Oxford English Dictionary, "will n." (available here). The Cambridge Dictionary further defines the term as a "determination to do something, despite any difficulties or opposition". *See*, Cambridge Dictionary, "will n." (available here).

[377] UNFCCC COP, Decision 4/CMA.1, "Further guidance in relation to the mitigation section of decision 1/CP.21" (2018) (available here), Annex 1 to the Decision, para. 6. Specifically, para. 6 of Annex 1 to the Decision requires States to explain how their NDC addresses Article 4.3 of the Paris Agreement ("Each Party's successive nationally determined contribution will represent a progression beyond the Party's then current nationally determined contribution and reflect its highest possible ambition…") (emphasis added).

257. As a result, Article 4.3, read in context of the COP Decision 4/CMA.1, therefore establishes an obligation on States to set the level of their NDC at its "highest possible ambition", with each successive NDC representing a "progression" on the last.[378]

258. In this regard, Antigua and Barbuda wishes to highlight that the meaning of the word "highest" is also free from doubt. "Highest" is a superlative, here denoting the greatest emissions reduction target that can be achieved ("possible"). The term "highest ambition possible" must be shaped by the purpose of an NDC, which is to contribute to the Paris temperature goal and prevent dangerous anthropogenic interference with the climate system.

259. In that regard, there is a scientific consensus that significant harm is *already* occurring; that, as between the 1.5°C and 2°C, harms for people and the environment are significantly worse at the higher temperature and, indeed, that, with each increment of warming, the harm is markedly worse.[379] The Paris Agreement confirms explicitly that 1.5°C "would significantly reduce the risks an impacts of climate change", as compared with 2°C. Two further COP Decisions resolve to pursue efforts to the increase to 1.5°C.[380] These decisions also explicitly recognise the scientific consensus, expressed in the IPCC's findings, that States must collectively make *rapid, deep and sustained* reductions to their emissions.

260. The IPCC has found that, to hold global warming to 1.5°C with no or limited overshoot, collective emissions must be reduced by 43 percent by 2030, by 60 percent by 2035, by 69 percent by 2040, by 84 percent by 2050, compared with 2019 level; reaching net zero CO2 emissions by early 2050; and net zero GHG emissions by early 2070.[381]

261. As explained in paragraphs 41 to 47 above, to calculate these figures, the IPCC has concluded that, to hold global warming to 1.5°C, cumulative total atmospheric

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[378] Paris Agreement, Article 4.3.

[379] *See*, sub-sections II.C.2 and II.C.3, and para. 49.

[380] UNFCCC COP, Decision 1/CMA.3, "Glasgow Climate Pact", UN Doc. FCCC/PA/CMA/2021/10/Add. 1, 13 November 2021 (available here) (hereinafter "**UNFCCC COP, Decision 1/CMA.3, "Glasgow Climate Pact"** (2021)"); UNFCCC COP, Decision 1/CMA.4, "Sharm el-Sheikh Implementation Plan", UN Doc. FCCC/PA/CMA/2022/10/Add.1, 20 November 2022 (available here).

[381] UN, "New Analysis of National Climate Plans: Insufficient Progress Made, COP28 Must Set Stage for Immediate Action", 14 November 2023 (available here). *See also*, IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Full Report (available here), para. B.6.1, Table SPM.1, Figure 2.5 Panel b and Table 3.1.

emissions, subsequent to 2019, cannot exceed a defined quantity (500 $GtCO^2$ from the beginning of 2020). This is the RCB to hold global warming to 1.5°C ("**1.5°C RCB**").[382] If cumulative emissions exceed this RCB, global warming will exceed the temperature goal.

262. Recent research by the Global Carbon Project has concluded that the 1.5°C RCB is significantly smaller than the IPCC reported in 2021.[383] Specifically, the new data shows that the 1.5°C RCB from the beginning of 2024 (275 GtCO) is *almost half* of the 1.5°C RCB, available from the beginning of 2020 (500 GtCO), as previously estimated by the IPCC.[384]

263. At this stage, in 2024, humanity has already exploited a very considerable portion of the 1.5°C RCB.[385] In part, this is because past emissions reduction efforts, including since 2019, have not been significant enough.

264. As a result, based on the most recent research, States are obliged to accelerate their mitigation efforts in light of the small and, indeed, dwindling 1.5°C RCB. According to the IPCC, to meet their obligations under Article 4.3, States must, collectively, reduce emissions by the collective targets aligned with the IPCC 1.5°C pathway; that is, by at least 43 percent by 2030, 60 percent by 2035, by 69 percent by 2040, and 84 percent by 2050, compared with 2019 levels; and to reach net zero CO2 emissions by early 2050; and net zero GHG emissions by early 2070. Antigua and Barbuda recalls that the IPCC's work reflects an international scientific consensus. Antigua and Barbuda also notes that States must take into account the most recent scientific evidence, implying that, collectively, States must reduce their emissions by considerably more than the collective targets aligned with the IPCC 1.5°C pathway.

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[382] *See*, sub-section II.B.4.

[383] Pierre Friedlingstein *et al.*, "Global Carbon Budget 2023" in *Earth System Science Data*, 15(12), 5 December 2023 (available here), p. 5304.

[384] *See*, sub-section II.B.4, *above*.

[385] UNFCCC COP, Draft Decision -/CMA.5, "Outcome of the first global stocktake" (2023) (available here), para. 25.

265. In the section below, Antigua and Barbuda explains that the responsibility of each State to contribute to the collective targets aligned with the IPCC 1.5°C pathway must be based on the principle of fairness, equity and CBDR-RC.

266. In sum, without prejudice to whether States have already violated Article 4.3, they will violate Article 4.3 if they do not now prepare an NDC that accelerates their mitigation efforts through *rapid, deep and sustained* reductions to their emissions, reflecting their "highest possible ambition" and, as Antigua and Barbuda explains next, the principle of fairness, equity and CBDR-RC.

(c) *The NDC must reflect fairness, equity and the principle of CBDR-RC*

267. Article 4.3 of the Paris Agreement explicitly states that an intended NDC will reflect a State's own "common but differentiated responsibilities", its own "respective capabilities" to tackle climate change, and its own "national circumstances".

268. The context of Article 4.3 further confirms the importance of the principle of fairness, equity and CBDR-RC in the international climate change regime. It is expressed in the *Principles* in Article 3 of the UNFCCC and in Article 2.2 of the Paris Agreement. Parties have, thereby, committed to respect the principle of fairness, equity and CBDR-RC in their actions to implement the Paris Agreement.

269. The principle of fairness, equity and CBDR-RC recognises the different respective contributions made by developed and developing States to climate change, and their different capacities to tackle climate change, in light of different levels of development.[386]

270. Pursuant to Article 4.3, therefore, developed States must make a larger contribution to tackling climate change than developing States, especially least developed and SIDS. Several other paragraphs of Article 4 confirm this view:

- Article 4.1 recognises that "peaking will take longer for developing country Parties".
- Article 4.4 provides that "developed country Parties should continue taking the lead by undertaking economy-wide absolute emissions reduction targets",

[386] *See*, sub-section III.A.2**,** *above*.

whereas developing countries are "encouraged to move over time towards economy-wide emission reduction or limitation targets in the light of different national circumstances".

271. As a result, developed countries must "prepare" an NDC that includes a larger emissions reduction target than those set by developing countries, including relative to the size and scope of their respective economies.

272. This differentiation in the levels of the national contribution is consistent with the object and purpose of the UNFCCC (incorporated into the Paris Agreement),[387] which provides that climate change mitigation action "should be achieved …. [t]o enable economic development to proceed in a sustainable manner". The *Principles* of the UNFCCC also recognise that, to "contribute" effectively to global emissions reductions, developing countries may need to progress their economic development.

273. COP Decision 4/CMA.1 underscores the importance of equity and the principle of fairness, equity and CBDR-RC in the preparation of an NDC. In communicating an NDC, a State "shall"[388] include information on "[f]airness considerations, including reflecting on equity";[389] and it must explain how its NDC "has addressed" the differentiation between developed, developing countries, least developed and small island developing States.[390] The requirement for a State to explain these equity-related points when *communicating* its NDC shows that a State is bound to prepare an NDC that demonstrably reflects fairness, equity and CBDR-RC, which for developed States will be a proportionately larger emissions reduction target than those set by developing States.

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[387] *See*, Paris Agreement, third preambular paragraph and Article 2.

[388] UNFCCC COP, Decision 4/CMA.1, "Further guidance in relation to the mitigation section of decision 1/CP.21" (2018) (available here), para. 7 ("Parties shall provide the information necessary for clarity, transparency and understanding contained in Annex I as applicable to their nationally determined contributions").

[389] UNFCCC COP, Decision 4/CMA.1, "Further guidance in relation to the mitigation section of decision 1/CP.21" (2018) (available here), Annex I to the Decision, para. 6(b).

[390] UNFCCC COP, Decision 4/CMA.1, "Further guidance in relation to the mitigation section of decision 1/CP.21" (2018) (available here), para. 6 and Annex I to the Decision. Specifically, Annex I requires each Party to explain how it has addressed Article 4.3 ("[d]eveloped country parties should take the lead…") and Article 4.4 of the Paris Agreement ("[t]he least developed countries and small island developing States may prepare and communicate strategies, plans and actions for low greenhouse gas emissions development reflecting their special circumstances").

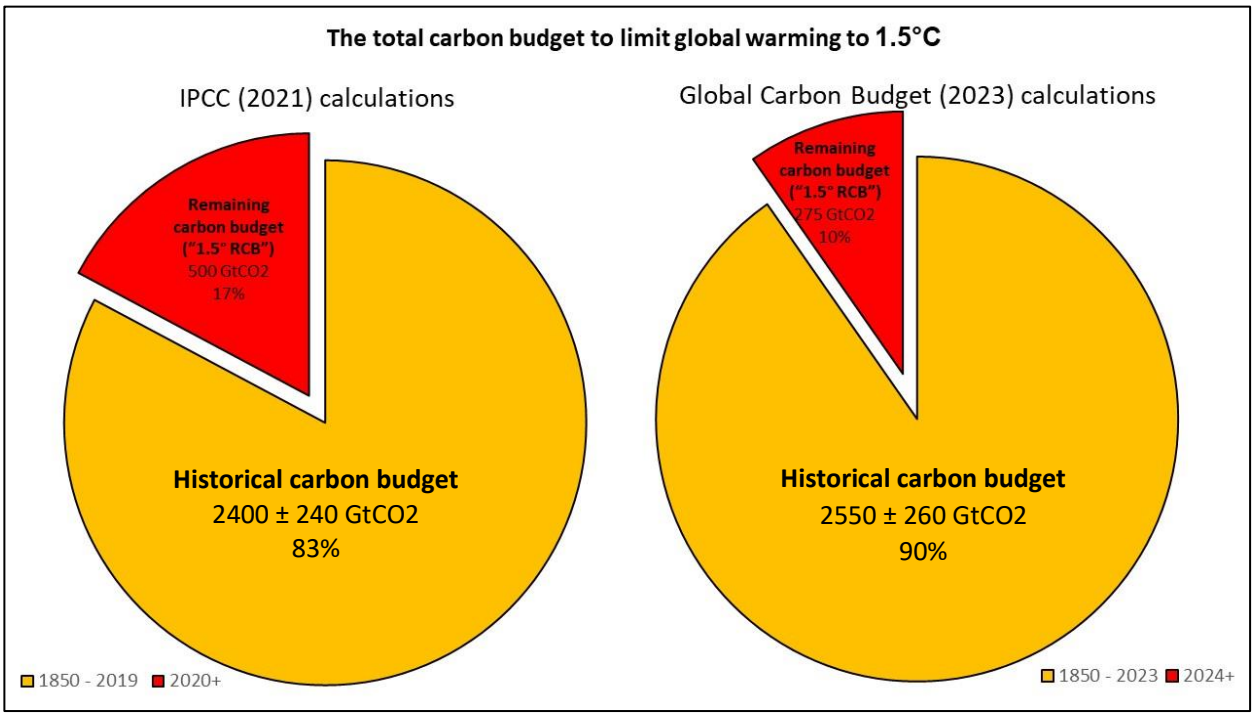
274. The COP's First Global Stocktake Decision, adopted on 13 December 2023, underscores the need for mitigation action to be equitable, based on the principle of fairness, equity and CBDR-RC, in order to ensure a just transition in the context of sustainable development and poverty eradication.[391] Specifically, emphasising "the need for urgent action and support to keep the 1.5°C goal within reach", States "commit[ted] to accelerate action in this critical decade on the basis of the best available science, *reflecting equity and the principle of common but differentiated responsibilities and respective capabilities in the light of different national circumstances* and in the context of *sustainable development* and efforts to *eradicate poverty*".[392]

275. The extent of the 1.5°C RCB is a key factor in formulating an NDC that is in line with the principle of fairness, equity and CBRD-RC. To recall, the 1.5°C RCB represents the total amount of emissions – *i.e.*, the carbon budget – that the States, collectively, can still emit to keep global warming to 1.5°C. As the pie chart in Figure 4 shows, the RCB functions like a shared global resource – the red slice of pie functions like a shared global resource that must be divided equitably among States in accordance with the principle of fairness, equity and CBRD-RC, in light of past and present emissions, as well as respective current levels of development and capabilities for tackling climate change.

[391] UNFCCC COP, Draft Decision -/CMA.5, "Outcome of the first global stocktake" (2023) (available here), paras. 6, 7, 10 and 11.

[392] UNFCCC COP, Draft Decision -/CMA.5, "Outcome of the first global stocktake" (2023) (available here), paras. 5 and 6 (emphasis added). In the same Decision, the Parties "underscore[d] Article 2, paragraph 2, of the Paris Agreement, which stipulates that the Agreement will be implemented to reflect equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances" (para. 7).

Figure 10: The total carbon budget to limit global warming to 1.5°C (Sources: IPCC & Global Carbon Budget)[393]



276. As a result, in preparing its NDC under Article 4.3, each State is obliged to determine its own contribution to the Paris temperature goal, by allocating to itself an equitable share of the 1.5°C RCB (*i.e.*, the red slice) and, consequently, by setting an emissions reduction target that will ensure that its future emissions remain within its equitable share of that budget.[394] If a State prepares an NDC that entails an inequitable share of the carbon budget, it will violate Article 4.3 of the Paris Agreement.

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[393] IPCC, Sixth Assessment Report, 2021, *The Physical Science Basis* (Working Group I), Summary for Policymakers (available here), p. 29; and Pierre Friedlingstein *et al.*, "Global Carbon Budget 2023", *Earth System Science Data*, 15(12), 5 December 2023 (available here), p. 5327. The updated 1.5°C RCB by Friedlingstein *et al.* is based on the IPCC Sixth Assessment Report and a recent revision of the IPCC estimates. *See* P. Forster *et al.*, "Indicators of Global Climate Change 2022: Annual update of large-scale indicators of the state of the climate system and human influence", *Earth System Science Data*, 15(6) (2023) (available here), pp. 2295-2327; R. Lamboll *et al.*, "Assessing the size and uncertainty of remaining carbon budget", *Nature Climate Change*, 13 (8 June 2023) (available here), pp. 1360-1367.

[394] Domestic courts have relied on the RCB in their reasoning on fair and appropriate national emission reduction targets. *See*, for example, Supreme Court of the Netherlands, *Urgenda Foundation v. State of the Netherlands*, 13 January 2020, paras. 2.1 (recital 7), 4.6, 5.7.2-5.7.5, 5.7.8, 6.3, 6.5, 7.2.1-7.2.9 and 7.4.1-7.5.1 (available here); German Constitutional Court, *Neubauer et al. v. Germany*, 24 March 2021, paras. 210-255 (available here); Brussels Court of Appeal, *VZW Klimaatzaak v. Kingdom of Belgium & Others*, 30 November 2023, paras. 184-202 (available here). In addition, in several countries, scientific advisory committees, established by law to advise the government on climate action, have determined an equitable NDC based on a country's fair share of the RCB. For instance, in the EU, the European Scientific Advisory Board on Climate Change, established by the European Climate Law of 2021, provides independent scientific advisory to the EU and uses the RCB to calculate the EU's fair share. In order to "deliver a contribution to achieving the temperature

277. The principle of fairness, equity and CBDR-RC imply that each developed State has to reduce its anthropogenic emissions by *2030* by *considerably more* than the collective targets aligned with the IPCC 1.5°C pathway. Otherwise, a developed State would emit more than its equitable share. To emit its equitable share, a developing State, on the other hand, may be permitted to set emission reduction targets that are less demanding than the collective targets aligned with the IPCC 1.5°C pathway, depending on each developing State's past and present emissions, level of development and capabilities for tackling climate change.

(d) *The NDC must reflect the special dispensation for least developed and small island developing States*

278. Under Article 4.6 of the Paris Agreement, least developed countries and SIDS are given special dispensation to prepare and communicate strategies, plans and actions that reflect their "*special circumstances*".

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goal of the Paris Agreement that is both fair and consistent with the physical science of climate change", the ESABCC "recommends that the EU consider: [i] emission pathways consistent at the global level with limiting warming to 1.5°C; and [ii] estimates of its fair share of the remaining global carbon budget consistent with limiting global warming to 1.5°C". Referring the Paris Agreement (*e.g.*, "highest possible ambition", and the principle of CBDR-RC) and EU law, the ESABCC explained that "when deciding on its climate targets beyond 2030, the EU needs to communicate how it has considered its responsibility for climate change or climate action, its capability to act and its national circumstances. As a party to a treaty in its own right, the EU has a legal responsibility to pursue the achievement of the Paris Agreement temperature goal, and it shares this with over 190 countries, each with different responsibilities, capacities and national circumstances." On this basis, the ESABCC recommends, for the EU, "a 2040 target of a reduction in emissions in the range of 90–95% compared to 1990, corresponding to a budget of 11–14 Gt CO_2e in 2030-2050" (*see*, ESABCC, "Scientific advice for the determination of an EU-wide 2040 climate target and a greenhouse gas budget for 2030–2050", 2023, pp. 14-15, 26 (available here)). In the UK, the UK Committee on Climate Change ("**CCC**"), established under the UK Climate Change Act, advises the UK government on the UK carbon budget and UK NDC. The CCC explains that "[t]he Paris Agreement requires that NDCs reflect each party's highest possible ambition and their [CBDR-RC]", implying that the UK's net zero GHG emission target for 2050 "is around two decades earlier than when global GHG emissions reach Net Zero in emissions pathways assessed by the IPCC as limiting warming to 1.5°C". To this end, the UK CCC recommends that the UK achieve a reduction in GHG emissions of at least 68 percent by 2030 (from 1990) and of 78 percent by 2035 (from 1990) (*see* Committee on Climate Change, "The Sixth Carbon Budget, the UK's path to Net Zero", December 2020, pp. 316, 338, and 370 (available here)). Similarly, in New Zealand, the Climate Change Commission advised its government in 2021 that its NDC "was not compatible with contributing to limiting warming to 1.5°C". It advised that "[a]s a developed country, Aotearoa[/New Zealand] has agreed to 'take the lead'", "the NDC needs to reflect deeper emission reductions than the global average necessary", and "that the NDC should reflect emissions much lower than just aligning with the middle of the IPCC interquartile range" (*see* He Pou a Rangi Climate Change Commission, "Ināia tonu nei: a low emissions future for Aotearoa Advice to the New Zealand Government on its first three emissions budgets and direction for its emissions reduction plan 2022 – 2025", 31 May 2021, p. 357 (available here)). As a final example, in Germany, the German Advisory Council on the Environment encouraged the German government to clarify its emissions reductions targets in 2020 noting that the RCB calculated on the basis of national climate protection targets was twice as high as its own RCB calculations based on Germany's compliance with the Paris Agreement (*see* German Advisory Council on the Environment, "Umweltgutachten 2020: Für eine entschlossene Umweltpolitik in Deutschland und Europa", 2020, pp. 47 and 55 (available here)).

279. As COP Decision 4/CMA.1 shows, this provision also has a bearing on the NDCs prepared by all other States: in addressing fairness and equity, this COP Decision requires each State to explain how it has prepared an NDC for itself that "*has addressed*" this differentiation in favour least developed countries and SIDS.[395]

280. Again, therefore, this aspect of fairness and equity must be assessed on a relative basis, *i.e.*, the "special circumstances" of a State must be assessed relative to the position of other States, including LDCs and SIDS.[396] States will violate Article 4.3 if they do not do so.

(e) *The NDC must be informed by the COP global stocktake*

281. Article 4.9 of the Paris Agreement provides that, in communicating their NDCs, Parties "shall … be informed by the outcomes of the Global Stocktake referred to in Article 14." Accordingly, in preparing an NDC, a State must weigh the significance of the available COP Global Stocktake reports.

282. The first COP Global Stocktake Decision, of December 2023, concluded that NDCs are collectively insufficient to secure the Paris temperature goal and prevent dangerous anthropogenic interference with the climate system. Specifically, looking backward, the Parties "note[d] with concern *the pre-2020 gaps in both mitigation ambition and* implementation *by developed country Parties* and that the [IPCC] had earlier indicated that developed countries must reduce emissions by 25–40 per cent below 1990 levels by 2020, ***which was not achieved***".[397]

283. Looking forward, the COP Global Stocktake notes that the "Parties are not yet collectively on track towards achieving the purpose of the Paris Agreement and its long-term goals".[398] As a result, the Parties "expresse[d] concern that the carbon budget

[395] UNFCCC COP, Decision 4/CMA.1, "Further guidance in relation to the mitigation section of decision 1/CP.21" (2018) (available here), Annex I to the Decision, para. 6.

[396] As explained above, the 1.5°C RCB represents the total amount of emissions that all States together can still emit to keep global warming to 1.5°C. The 1.5°C RCB must be distributed among States based on the principle of fairness, equity and CBDR-RC. This implies that, to prepare its NDC, each State has to determine its equitable share of the 1.5°C RCB, taking into account how much other States, including least developed countries and SIDS, are still permitted to emit.

[397] UNFCCC COP, Draft Decision -/CMA.5, "Outcome of the first global stocktake" (2023) (available here), para. 17 (emphasis added).

[398] UNFCCC COP, Draft Decision -/CMA.5, "Outcome of the first global stocktake" (2023) (available here), para. 2.

consistent with achieving the Paris Agreement temperature goal is *now small and being rapidly depleted*".[399] The Parties, therefore, stated, "with significant concern", that "there is a *rapidly narrowing window* for raising ambition and implementing existing commitments in order to achieve it".[400] The Parties noted that "***significantly greater emission reductions are required*** to align with [the Paris temperature goal]".[401] Today, therefore, the "highest possible ambition" for an NDC, and its "progression", under Article 4.3 of the Paris Agreement must reflect the fact that very little remains of the carbon budget in order to hold global warming to 1.5°C. At the rate of current emissions, the carbon budget will be completely exhausted in just six years.[402]

284. Pursuant to Article 4.9, a State must take this outcome of the COP Global Stocktake into account in preparing its subsequent NDCs. As a result, to ensure that NDCs collectively are capable of meeting the collective objectives of the Paris Agreement, States must individually raise the level of their ambition. They will violate Article 4.3 if they fail to do so.

(f) *Summary of required considerations in setting the level of an NDC*

285. In sum, Article 4.3 of the Paris Agreement requires that a State address five factors when "prepar[ing]" its NDC:

- ***Best available science***: A State must prepare its NDC based on the best available science;
- ***Highest possible ambition, and a progression***: A State must prepare its NDC in a way that accelerates mitigation efforts through rapid, deep and sustained emission reductions, reflecting the "highest possible ambition". Given the 1.5°C RCB, this requires, in practice, that a State prepare an NDC to reduce, collectively, emissions by considerably more than 43 percent by 2030, 60 percent by 2035, 69 percent by 2040, and 84 percent by 2050, compared with 2019 levels, and achieve net zero CO2 emissions well before early 2050 and net zero GHG emissions well before early 2070.

[399] UNFCCC COP, Draft Decision -/CMA.5, "Outcome of the first global stocktake" (2023) (available here), para. 25.

[400] UNFCCC COP, Draft Decision -/CMA.5, "Outcome of the first global stocktake" (2023) (available here), para. 24 (emphasis added).

[401] UNFCCC COP, Draft Decision -/CMA.5, "Outcome of the first global stocktake" (2023) (available here), para. 21 (emphasis added).

[402] *See*, sub-section II.B.4.

- ***The principle of fairness, equity and CBDR-RC***: A State must prepare an NDC that respects fairness, equity and the principle of fairness, equity and CBDR-RC. This requires, in practice, that each State prepare its NDC which reduces emissions according to its equitable share of the 1.5°C RCB.

- ***Special dispensation for LDCs and SIDS***: LDCs and SIDS are given special dispensation to prepare and communicate strategies, plans and actions that reflect their "special circumstances"; while other States must prepare an NDC that addresses this differentiation in favour of LDCs and SIDS.

- ***Informed by the Global Stocktake Decision***: A State must prepare its NDCs taking into account the outcome of the First Global Stocktake Decision. In light of this outcome, a State must prepare its NDC with an increased level of ambition, in order to meet the Paris temperature goal and prevent dangerous anthropogenic interference with the climate system.

iii. States shall communicate a nationally determined contribution

286. Under Article 4.2, the second obligation regarding NDCs is that States "shall" "*communicate*" their respective and successive 5-yearly NDCs. Article 4.8 adds a further mandatory obligation: in communicating their NDCs, States "shall provide the information necessary for clarity, transparency and understanding" in accordance with "any relevant" COP Decisions.

287. As noted above, COP Decisions have elaborated on the specific information needed to ensure "clarity, transparency and understanding".[403] In addressing obligations relating to the preparation of an NDC, Antigua and Barbuda has already referred to several aspects of Annex I of Decision 4/CMA.1, which is the most recent COP Decision under Article 4.8 of the Paris Agreement regarding information on NDCs. Antigua and Barbuda notes that, pursuant to Decision 4/CMA.1, Parties "shall" provide the following specific information when communicating their NDC:

- Quantifiable information on the reference point (including, as appropriate, a base year);

- Time frames and/or periods for implementation;

- Scope and coverage;

[403] UNFCCC COP, Decision 4/CMA.1, "Further guidance in relation to the mitigation section of decision 1/CP.21" (2018) (available here), Annex I to the Decision.

- Assumptions and methodological approaches, including those for estimating and accounting for anthropogenic greenhouse gas emissions and, as appropriate, removals;

- How the Party considers that its nationally determined contribution is fair and ambitious in the light of its national circumstances; and,

- How the nationally determined contribution contributes towards achieving the objective of the Convention as set out in its Article 2.[404]

288. To meet the requirements of "clarity", "transparency", and "understanding" under the "communicate" limb of Article 4.3, States must address these topics in a manner that ensures that each of the points enumerated in the Decision is sufficiently comprehensible. They will violate Article 4.3 if they fail to do so.

iv. States shall maintain a nationally determined contribution

289. Under Article 4.2, the third obligation regarding NDCs is that States "shall" "maintain" their NDCs.

290. The ordinary meaning of the word "maintain" means "to support or uphold in an action" and "[t]o keep up, preserve, cause to continue in being ... ; to keep vigorous, effective, or unimpaired."[405] The verb "maintain", therefore, speaks to an obligation to sustain an intended NDC over its 5-year lifetime. An NDC can be sustained over time only if a State takes sufficient action over the 5-year period to achieve the target, which reflects no more than an equitable share of the available carbon budget, as discussed above.

291. If insufficient action were taken, an NDC would quickly cease to provide a good faith statement of the State's emissions reduction target, which would violate the obligation to "maintain" an NDC throughout its life.[406] This is because, absent timely action, the NDC would rapidly become an unachievable, misleading, empty vessel.

292. The text of the Paris Agreement confirms that a State is under an obligation to take sufficient action to achieve an NDC. The second sentence of Article 4.2 provides that

[404] UNFCCC COP, Decision 4/CMA.1, "Further guidance in relation to the mitigation section of decision 1/CP.21" (2018) (available here), Annex I to the Decision. This COP Decision is relevant to the interpretation of Articles 4.2 and 4.8 of the Paris Agreement as explained in footnote 372 *above*.

[405] Oxford English Dictionary, "maintain v." (available here) (emphasis added).

[406] VCLT, Article 26.

"Parties *shall pursue* domestic mitigation measures, with the aim of achieving the objectives of such contributions". The highlighted words require States to take diligent action, in the form of "measures", with the purpose of achieving their NDC.

293. Other provisions of the Paris Agreement support the position that States must take action:

- Article 3 provides that States are "to undertake … ambitious efforts" to achieve the purposes of the Agreement.
- Article 4.1 provides that States "aim" to reduce current emissions to reach global peaking "as soon as possible", and to undertake rapid reductions thereafter.
- Article 4.2, in its first sentence, provides that an NDC must be a contribution that a State "intends to achieve".

294. The language in these provisions expresses a due diligence obligation that requires States to take all measures at their disposal to achieve their NDC, taking into account equity and the principle of fairness, equity and CBDR-RC. Under a due diligence obligation, States must take "all the means at [their] disposal" to do so.[407] Determining whether a State has undertaken sufficient action to "maintain" its NDC for the purpose of compliance with Article 4.2 is therefore determined according to whether it has met this due diligence standard.

295. The existence of such an obligation to take diligent action to achieve an NDC is consistent with the object and purpose of the Paris Agreement, which is to achieve the Paris temperature goal and prevent dangerous anthropogenic interference with the climate system. If States were under no obligation to take action to achieve their intended NDCs – and therefore make no contribution to preventing dangerous anthropogenic interference with the climate system – the object and purpose of the Paris Agreement would be wholly defeated.[408]

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[407] *Pulp Mills*, p. 56, para. 101.

[408] Indeed, the Court has repeatedly interpreted treaty provisions in a manner that gives effect to, rather than defeats, the object and purpose of the treaty. *See, e.g., Application of the Convention on the Prevention and Punishment of the Crime of Genocide (Bosnia and Herzegovina v. Serbia and Montenegro), Judgment, I.C.J. Reports 2007* (hereinafter "***Bosnia Genocide***"), p. 111, para. 162 and p. 113, para. 166; *Military and Paramilitary Activities in und against Nicaragua (Nicaragua v. United States of America), Merits, Judgment, I.C.J. Reports 1986* (hereinafter "***Military and Paramilitary Activities***"), p. 148, para. 292, *dispositif*, para. 10, finding that the United States had "committed acts calculated to deprive of its object and purpose the Treaty of Friendship, Commerce and Navigation between the Parties".

296. Below, Antigua and Barbuda addresses the contours of the due diligence obligations arising under customary international law in the context of climate change,[409] which informs the required conduct in the context of the Paris Agreement. In short, the level of diligence must be appropriate and proportionate in light of the severity and likelihood of the harm arising, and it must be differentiated across States according to their capabilities, consistent with equity and the principle of fairness, equity and CBDR-RC.

297. In sum, the obligation to "maintain" an NDC in Article 4.2 requires that States take action to achieve their NDCs that meets the threshold of diligence required, namely that it constitutes all means at their disposal to meet their NDC. States will violate their obligations under Article 4.3 where they fail to take diligent action to achieve their NDCs, including holding their emissions within the levels foreseen in the NDC and exploiting no more than an equitable share of the 1.5°C RCB.

b. Obligations arising under the customary international law obligation of prevention

i. Climate change triggers the customary international law obligation of prevention

298. The risk of significant harm to the environment caused by anthropogenic GHG emissions triggers a State's customary international law obligation to prevent significant harm to the environment. To comply with this obligation in the specific context of climate change, States are under a due diligence obligation to adopt rapid, deep and sustained emissions reduction measures sufficient to prevent significant environmental harm, consistent with fairness, equity and CBDR-RC.

299. In Section III.B.1 above, Antigua and Barbuda set out the elements of this customary obligation.

300. *First*, the obligation applies in respect of any activity planned or carried out in the territory of a State, or otherwise within a State's jurisdiction or control. In the context of climate change, the "activity" in question is industrial or another anthropogenic activity (*e.g.*, deforestation) that release GHG emissions.

[409] *See*, paras. 305-342, *below*.

301. *Second*, the relevant activities must cause, or risk causing, significant harm to the environment. In Section II.B.4 above, Antigua and Barbuda addresses the causal connection between anthropogenic GHG emissions and atmospheric warming, noting that there is a near-linear relationship between the two: each 1,000 GtCO2 emissions causes a temperature increase of between 0.27°C to 0.63°C.[410]

302. The associated environmental harms are similarly linear: environment harm is already occurring as a result of global warming, which has reached on average 1.1°C to 1.35°C,[411] compared with pre-industrial levels and, with every incremental degree of warming, environmental harm worsens.

303. There can also be no question that the harms in question are "significant". Recall that the threshold for "significant" is "something more than 'detectable'", but does not need to be at the level of "'serious' or 'substantial'". It is evident on the basis of a well-established international scientific consensus – as set out in Section 0 – that the harms of climate change are well beyond "detectable" and, indeed, rise to the level of "serious" or "substantial".

304. *Third*, the harms must be transboundary in nature. By their nature, the environmental harms arising from climate change are transboundary. Harm originates from the release of GHG emissions in one place, with the emissions cumulating in the atmosphere and being absorbed by the oceans, leading to increased land and ocean temperatures, sea level rise and ocean acidification. Evidently, these harms are not confined to the territory of the State where the emissions are released, but are inherently transboundary.

ii. Substantive obligations

305. As explained above, the customary obligation of prevention has a positive and proactive character, translating into a duty of due diligence: a State must deploy *all the means at its disposal* to avoid activities taking place under its jurisdiction from causing

[410] IPCC, Sixth Assessment Report, 2021, *The Physical Science Basis* (Working Group I), Summary for Policymakers (available here), para. D. 1.1. *See*, generally Section 0, *above*.

[411] *See*, sub-section II.B.4, *above*.

significant environmental harm to another State's territory or to areas beyond national jurisdiction.[412]

306. In the context of climate change, certain features of the due diligence obligations bear emphasis. These relate to: (1) the measures that States must take to comply with due diligence in the circumstances; (2) the level of due diligence must be appropriate and proportional to the risks of climate change; and (3) the level of due diligence in light of the different capabilities and responsibilities of States (in an expression of the principle of fairness, equity and CBDR-RC).

307. These same factors relating to due diligence under the customary obligation of prevention, as well as the analysis of these factors below, are relevant to the conventional sources of law addressed elsewhere in this Written Statement, to the extent that these conventional sources establish due diligence obligations.

(1) Measures required to comply with due diligence in the circumstances

308. To discharge its customary obligation of prevention, a State must deploy *all the means at its disposal*, *exercise best possible efforts*, and *do the utmost* to prevent harm. To meet this obligation requires a range of conduct by a State:

> Not only the adoption of *appropriate rules and measures*, but also a certain level of vigilance in their *enforcement* and the exercise of *administrative control* applicable to public and private operators, such as the *monitoring* of activities undertaken by such operators ….[413]

309. In the context of climate change mitigation, a first feature of due diligence requires States to adopt "appropriate rules and measures", which include those that lead to a rapid, deep and sustained reduction in emissions emanating from activities within the jurisdiction and control of the State.

310. In that regard, as set out above, the IPCC has undertaken a thorough analysis of the "appropriate rules and measures", including their likely impact on emissions, as well as

[412] *See*, Rio Declaration, Principle 2; s*ee also*, *Pulp Mills*, p. 56, para. 101.

[413] *Pulp Mills*, p. 79, para. 197, and *see* p. 56, para. 101. *See also*, *Bosnia Genocide*, p. 221, para. 430; *IUU Advisory Opinion*, p. 40, para. 129, citing to *Responsibilities in the Area*, p. 41, para. 110.

the relationship between their cost and their efficacy in reducing emissions.[414] Satisfying due diligence obligations in the circumstances requires States to adopt such measures.

311. The UNFCCC has identified "sufficient cost-effective opportunities to address the 2030 emissions gap".[415] The IPCC's Synthesis Report from the Sixth Assessment Cycle finds that "several mitigation options" are "technically viable", "increasingly cost effective" and "generally supported by the public". Indeed, in some regions and sectors, "maintaining emissions-intensive systems may [] be more expensive than transitioning to low emissions systems".[416]

312. The COP Global Stocktake Decision similarly finds that "feasible, effective and low-cost mitigation options are already available in all sectors to keep 1.5 °C within reach in this critical decade with the necessary cooperation on technologies and support".[417] The availability of these mitigation options speaks to whether States have met their due diligence obligation: if "feasible, effective, and low-cost mitigation options" are available, and States have not adopted those measures, this would indicate that they are not taking "all means at their disposal" to reduce their emissions.

313. As a second feature of due diligence, States must also act with requisite vigilance to "enforce" the measures to ensure their efficacy in practice. The enforcement of the measures includes exercising sufficient administrative control with respect to the operators engaging in the emission-generating activities that trigger the obligation, which includes adequate monitoring of the activities.

314. A failure to act with diligence in adopting and enforcing appropriate mitigation measures, as elaborated below, would constitute a breach of the customary obligation of prevention.

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[414] *See*, sub-section II.D.2.

[415] *See*, UNFCCC, "Technical dialogue of the first global stocktake" (2023) (available here), para. 14.

[416] IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Summary for Policymakers (available here), p. 11, A.4.2.

[417] UNFCCC COP, Draft Decision -/CMA.5, "Outcome of the first global stocktake" (2023) (available here), para. 16(c).

(2) Level of diligence must be appropriate and proportional to the risks of climate change

315. It is well accepted that due diligence is a "variable concept".[418] Specifically, the level of required due diligence varies based on:

316. *First*, the **greater the level of risk**, the greater the level of due diligence required to address it. This includes both the likelihood of the risk arising and the severity of the resulting harms; as one tribunal put it, "the standard of due diligence has to be more severe for riskier activities".[419]

317. *Second*, the **evolving knowledge about a particular risk**; additional knowledge (through scientific research) may highlight that the likelihood of a particular risk materialising is higher than previously thought (again including both likelihood of risk and severity of resulting harms); or it may reveal some previously unknown dimension of the risk. Conduct that is "considered sufficiently diligent at a certain moment may become not diligent enough", as the circumstances evolve.[420]

318. These elements are particularly pertinent in the context of climate change.

319. As a first point, Antigua and Barbuda notes that States' obligation to act diligently in the context of climate change arose a considerable time ago, because the harmful impacts of anthropogenic emissions on the climate system have been known for some time. From the time when States first became aware of the risk that anthropogenic GHG emissions might cause significant harm to the climate system, they were under an obligation to take diligent action to prevent such harm, in light of the degree of knowledge and risk, the level of their emissions, and the means at their disposal.

320. Human understanding of the harms of anthropogenic GHG emissions continues to grow. Knowledge emerging this very year indicates that the risks to the environment and humans from climate change are even worse than expected.[421] The Earth is warming faster, and the consequences are more severe, than previously anticipated.

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[418] *See*, *Responsibilities in the Area*, p. 43, para. 117.

[419] *See*, footnote 418, *above*.

[420] *See*, footnote 418, *above*.

[421] *See*, sub-section II.C.1 and Figure 5, *above*.

321. Indeed, today, knowledge as to the rate and consequences of global warming is considerably more developed than it was in 2015, when the Paris Agreement was finalised. For example: the most recent data post-dating the IPCC's initial Sixth Assessment shows that the 1.5°C RCB is significantly smaller than previously assessed; indeed, the remaining carbon budget is now vanishingly small.[422] That is, the most recent data shows that the 1.5°C RCB from the beginning of 2024 is *almost half* of the 1.5°C RCB from the beginning of 2020, as previously estimated by the IPCC.[423] Further, even at current levels of warming, the adverse effects of climate change are worse than expected.

322. Knowledge is also increasing as to the range of available, cost-effective mitigation measures which have become "technically viable" in the years since 2015.[424]

323. Given the latest information, the level of diligence required today exceeds the already-high level of due diligence that might have been acceptable in 2015 (and previously). As the window of opportunity to prevent catastrophic harm narrows, the level of due diligence required increases.

324. It is also highly pertinent that the threat posed by climate change is unprecedented in human history and, as robust internationally accepted science shows, has long passed from theoretical to real. The risks – to biodiversity, ecosystems, and habitats; to human culture and ways of life; and to the very continued existence of some SIDS – are literally existential. Under some worst-case scenarios, factoring in irreversible tipping points and scientific uncertainty, including uncertainty as to the ceiling of possible warming, the continuation of life on earth as we know it is at stake.[425]

325. No previous tribunal has been called on to articulate the conduct required in response to a risk of the nature, severity and urgency of that presented, today, by climate change. The level of due diligence demanded of States must match the scale of the crisis.

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[422] Pierre Friedlingstein *et al.*, "Global Carbon Budget 2023" in *Earth System Science Data*, 15(12), 5 December 2023 (available here), p. 5304.

[423] *See*, sub-section II.B.4, paras. 44-46, *above*.

[424] *See*, IPCC, Sixth Assessment Report, 2023, *Synthesis Report* (Working Groups I, II and III), Full Report (available here), p. 10; *see also*, UNFCCC COP, Draft Decision -/CMA.5, "Outcome of the first global stocktake" (2023) (available here), para. 30.

[425] *See*, sub-section II.C.1, *above*.

326. In that respect, it is axiomatic that, under the customary obligation of prevention, in determining how to formulate a target for emissions reductions, a State cannot settle for reductions that it knows, with scientific certainty, would still lead to significant harm. The duty of each State is to take all measures necessary to *prevent* harm.

327. As a result, States cannot simply formulate a target by reference to the Paris Agreement goal of limiting global warming to 1.5°C, because warming to this extent will, as the IPCC has found with very high probability, entail significant harm.[426] States must, therefore, employ all of the means at their disposal and do their utmost to cut emissions to a level that will minimise global warming, taking into account the most recent data. Antigua and Barbuda elaborates further on these obligations in the next sub-section.

(3) The level of due diligence is differentiated between and among States

328. The obligation to act with due diligence to prevent significant environmental harm is qualified, under customary international law, by the capabilities of the State. States must take *all means at their disposal* (*exercise best possible efforts, do the utmost*). Thus, the due diligence obligation is qualified by what is possible for each State, *i.e.*, by its capabilities. In this regard, the parties to the Paris Agreement have acknowledged that "feasible, effective and low-cost mitigation options" are available to States.[427]

329. In practice, developed States – which have higher capabilities – must engage in more demanding conduct than developing States to fulfil their due diligence obligations.

330. This differentiation in terms of the required conduct is in line with the principle of fairness, equity and CBDR-RC, which applies in the context of climate change.

331. Although Antigua and Barbuda considers that the Paris Agreement temperature goal does not go far enough to prevent significant harm, it has been used by the IPCC to establish scientifically-based standards for mitigation action by States. The IPCC's work is, therefore, useful in clarifying the extent of a State's obligations to prevent the adverse impacts of climate change.

[426] *See*, sub-sections II.C.2 and II.C.3.

[427] UNFCCC COP, Draft Decision -/CMA.5, "Outcome of the first global stocktake" (2023) (available here), para. 16(c).

332. As explained above, in 2021, the IPCC established a minimum emission reduction pathway to hold global warming to 1.5°C, with no or limited overshoot. Under this pathway, given the 1.5°C RCB, States must collectively reduce emissions by at least 43 percent by 2030, 60 percent by 2035, 69 percent by 2040, 84 percent by 2050, compared with 2019 levels; reaching net zero CO2 emissions by early 2050; and net zero GHG emissions by early 2070 ("**collective targets aligned with the IPCC 1.5°C pathway**"). The most recent data shows that, to keep global warming to 1.5°C, States, collectively, have to reduce their emissions by considerably more than the collective targets aligned with the IPCC 1.5°C pathway.[428]

333. In light of the IPCC's scientific work, while taking account of the most recent scientific evidence on the RCB, and without prejudice to States' historic obligations, States must now take diligent action to formulate and implement an emissions reduction plan that makes a sufficient national contribution to reducing collective emissions in order to limit global warming, at a minimum, to 1.5°C.

334. In line with their greater capabilities to reduce emissions, their greater current and historic emissions, and in keeping with the principle of fairness, equity and CBDR-RC, developed countries must take the lead in reducing emissions, with broader, deeper and faster reductions than developing countries.

335. As explained above, this means that developed countries must reduce their emissions by considerably more than the collective targets aligned with the IPCC 1.5°C pathway. These targets are *collective* targets, *i.e.*, for all States collectively. To ensure that each State emits its equitable share of the 1.5°C RCB, each developed State has to reduce its emissions by more than the collective targets, in order to allow developing States to reduce their emissions by less. Otherwise, the required diligent conduct is not differentiated appropriately between and among States, contrary to the obligation of prevention, and fairness, equity and CBDR-RC.

336. In formulating and implementing an emissions reduction pathway, States must also act with diligence to ensure that they plan to exploit, and end up exploiting, no more than an equitable share of the 1.5°C RCB. As already noted, this RCB functions like a shared

[428] *See*, Pierre Friedlingstein *et al.*, "Global Carbon Budget 2023", *Earth System Science Data*, 15(12), 5 December 2023 (available here), p. 5304. *See also*, sub-section II.B.4, para. 45, *above*.

global resource that can be exploited by States through economic activities to further sustainable development, and eradicate poverty, and must be divided equitably among States.

337. States violate the customary obligation of prevention if they fail to take diligent action to formulate and implement an emissions reduction plan that makes a sufficient and equitable national contribution to reducing collective emissions in order to limit global warming, at a minimum, to 1.5°C.

(4) Summary of substantive obligations

338. From the time when States first became aware of the risk that anthropogenic GHG emissions might cause significant harm to the climate system, they were under an obligation to take diligent action to prevent such harm, in light of the degree of knowledge and risk, the level of their emissions, and the means at their disposal. To the extent a State has failed to do so, the State has violated the customary international law obligation of prevention.

339. Looking forward, for the reasons explained above, a developed State fails to respect the customary obligation of prevention if the State does not do its utmost, using all the means at its disposal, to reduce its emissions by considerably more than the collective targets aligned with the IPCC 1.5°C pathway. Specifically, a developed State must do its utmost, using all the means at its disposal, to reduce its emissions by *considerably more* than 43 percent by 2030, 60 percent by 2035, 69 percent by 2040, and 84 percent by 2050, compared with 2019 levels, and achieve net zero CO2 emissions *well before* early 2050 and net zero GHG emissions *well before* early 2070.

340. A developed State must reduce its emissions by considerably more than the collective targets aligned with the IPCC 1.5°C pathway for, at least, three reasons:

(a) The first reason is that a State must reduce its emissions taking into account its **equitable share of the 1.5°C RCB**, in order to respect the principle of fairness, equity, and CBDR-RC. The need to apportion the collective targets aligned with the IPCC 1.5°C pathway in light of each State's equitable share, implies that each developed State has to reduce

its emissions by more than the collective targets, in order to allow developing States to reduce their emissions by less.

(b) The second reason is that, when setting its emission reduction targets, a State must take into account the **most recent scientific evidence**, reflecting the most recent knowledge about, among others, the RCB. The most recent data shows that the 1.5°C RCB, available from the beginning of 2024, is *almost half* of the IPCC's 1.5°C RCB, available from the beginning of 2020.[429] With a vanishing 1.5°C RCB, States must accelerate their mitigation efforts to keep global warming to 1.5°C.

(c) The third reason is that, when setting its emission reduction targets, a State must take into account that anthropogenic emissions cause **significant environmental harm at levels below the 1.5°C temperature increase**. The collective targets aligned with the IPCC 1.5°C pathway seek to hold global warming to 1.5°C. When setting its emission reduction targets, a State must take into account that significant harm occurs at lower temperature increases, in particular to vulnerable developing States, such as Antigua and Barbuda and other SIDS.[430]

341. For these reasons, individually and collectively, a developed State must set emission reduction targets that are considerably lower than the collective targets aligned with the IPCC 1.5°C pathway. If a developed State fails to do so, the State violates the prevention obligation.

342. For a developing State, the emission reduction targets must be determined in light of the same considerations ((a), (b), (c), above). To emit its equitable share, a developing State may be permitted to set emission reduction targets that are less demanding than the collective targets aligned with the IPCC 1.5°C pathway, depending on each developing State's past and present emissions, level of development and capabilities for tackling climate change.

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[429] Pierre Friedlingstein *et al.*, "Global Carbon Budget 2023", *Earth System Science Data*, 15(12), 5 December 2023 (available here), p. 5304.

[430] *See*, sub-section II.C.2, para. 50.

iii. Procedural obligations

343. As Antigua and Barbuda has explained, States have an obligation to cooperate, especially through notification and consultation with potentially affected States. States who are "potentially affected" are those States whose territory may be harmed by activities occurring in the jurisdiction of the original State.

344. In the context of climate change, *all States* are potentially affected. Thus, within the global community of States, each State bears an obligation to cooperate with others. In practice, this means the customary obligation of cooperation can only be discharged through appropriate bodies fit for that purpose, namely bodies with close to universal membership, dedicated to coordinating the global response to climate change. Today, the primary such bodies are established under the UNFCCC.

345. In assessing what precise conduct is required under the obligation to cooperate – including, for example, how to assess the adequacy of consultations – regard must be had to the overarching purpose of the obligation, *i.e.*, the prevention of environmental harm.

346. In the context of climate change, Antigua and Barbuda has explained that, to act with diligence in the prevention of harm, States must equitably divide the 1.5°C RCB amongst themselves. This has consequences for States' cooperative efforts; specifically, they must cooperate to ensure that, in setting emissions reduction targets to minimise the impact of climate change, the 1.5°C RCB is indeed divided equitably.

c. Obligations arising under international human rights law

347. As Antigua and Barbuda has explained above, the impact of climate change on human rights is profound and uncontested; it is "potentially the greatest threat to human rights in the twenty-first century".[431]

348. The impacts of climate change, as established by the IPCC, directly and unambiguously impinge adversely upon individuals' human rights, including the rights to life, health, adequate food and water, adequate housing and self-determination. States are, therefore, under an obligation to respect, promote and satisfy these and other human

[431] *See*, Mary Robinson, "Why climate change is a threat to human rights", *TED Women*, May 2015 (available here).

rights against the actual and threatened impacts of climate change. Antigua and Barbuda explains in turn the scope and substance of these human rights obligations.

i. The scope of human rights obligations

349. Human rights treaties have differing scopes of territorial application. Some human rights treaties, like the ICESCR, leave open their scope of territorial application, whereas others, such as the ICCPR, explicitly limit the scope of application to individuals within the territory (or otherwise under the jurisdiction).

350. For treaties that leave open the scope of territorial application, the UN Committee on Economic, Social, and Cultural Rights ("**CESCR**") has explained that, under the ICESCR, "States parties are required to respect, protect and fulfil all human rights *for all*. They owe such duties not only to their own populations, but also to populations *outside their territories*, in accordance with Articles 55 and 56 of the Charter of the United Nations."[432]

351. For human right treaties that limit the scope of territorial application to the parties' own territory or jurisdiction, State parties have obligations to protect those human rights of populations *inside* their territory.[433] However, their obligations do not stop here, in case activities on their territory cause environmental harm outside their territory.

352. The Inter-American Court of Human Rights ("**IACHR**") explained that persons *outside* the territory of the State of origin – that is the State where the polluting activity takes place – "*are under the jurisdiction of the State of origin*", if there is "a causal link" between the polluting activity on its territory and the infringement of human rights of the persons outside its territory.[434] The State of origin is obliged to respect and to ensure

[432] UN Committee on Economic, Social and Cultural Rights, "Climate change and the International Covenant on Economic, Social and Cultural Rights", UN Doc. E/C.12/2018/1, 31 October 2018 (available here), para. 5 (emphasis added), *citing* General comment No. 24, *State obligations under the International Covenant on Economic, Social and Cultural Rights in the context of business activities*, para. 27.

[433] *Legal Consequences of the Construction of a Wall in the Occupied Palestinian Territory*, *Advisory Opinion*, *I.C.J. Reports 2004* (hereinafter "***Wall Advisory Opinion***"), pp. 178-180, paras. 108-111.

[434] *IACHR Advisory Opinion*, para. 101 (emphasis added); *see also*, Committee on the Rights of the Child, *Sacchi v. Argentina et al.*, 10 August 2021, pp. 10-12, paras. 10.5-10.7. The decisions in the *Sacchi* case were handed down in separate documents for each State party; for ease of reference, the paragraph references provided in this Written Statement are to *Sacchi v. Argentina* (UN Doc. CRC/C/88/D/105/2019); the cited paragraphs are identical across the decisions provided for other State parties.

the human rights of these persons *outside* their territory, because these persons fall within its jurisdiction.[435]

353. The IACHR reasoned that "it is the State in whose territory or under whose jurisdiction the activities were carried out that has the effective control over [the activities] and is in a position to prevent [these activities] from causing transboundary harm that impacts the enjoyment of human rights of persons outside its territory."[436] The IACHR continued that "[t]he potential victims of the negative consequences of such activities are *under the jurisdiction of the State of origin* for the purposes of the possible responsibility of that State for failing to comply with its obligation to prevent transboundary damage."[437]

354. These findings are particularly pertinent in the context of climate change. Climate change does not respect national boundaries. Emissions occurring as a result of activities in one State may very well adversely impact the enjoyment of human rights of persons outside its territory. Indeed, "climate change has an adverse effect over the enjoyment of rights by individuals both within as well as beyond the territory of the State party."[438]

355. States are under an obligation to protect the human rights of persons outside their territory, if emissions from activities on their territory have a causal impact on the enjoyment of these persons' human rights.

ii. The substance of human rights obligations

356. Given the extensive actual and threatened impacts of climate change on the enjoyment of human rights, States are under an obligation to adopt mitigation measures in order to fulfil their obligations under human rights treaties.

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[435] *See also, IACHR Advisory Opinion*, para. 104(c).

[436] *IACHR Advisory Opinion*, para. 102. The IACHR also explained that a State "*should not act in a way that hinders*" other States that are party to the same treaty from complying with their human rights obligations, with regard to their populations. The IACHR found that this obligation follows from the *pacta sunt servanda* principle, which requires the parties to a treaty obligation to apply it "in a reasonable way and in such a manner that its purpose can be realized". *See, IACHR Advisory Opinion*, paras. 94, 101 and 102.

[437] *IACHR Advisory Opinion*, para. 102 (emphasis added).

[438] Committee on the Rights of the Child, *Sacchi v. Argentina et al.*, 10 August 2021, para. 10.9.

357. Human rights bodies, and domestic courts, have clarified important aspects of a State's human rights obligations in relation to mitigation action to address climate change.

358. That is, to respect their obligations under human rights law in relation to mitigation, a State must adopt effective mitigation measures: (1) reflecting its highest possible ambition and the precautionary principle; (2) based on the best available science; and (3) based on fairness, equity and CBDR-RC. Antigua and Barbuda discusses each obligation in turn.

(1) To respect its human rights obligations, a State must adopt effective mitigation measures, reflecting its highest possible ambition and the precautionary principle

359. As the Human Rights Council's special procedure mandate-holders explained, human rights treaties require States "to adopt the mitigation measures necessary to reduce global emissions so as to hold the increase in global temperature below levels that would cause widespread harm to the enjoyment of human rights."[439]

360. Other human rights treaty bodies have confirmed that States have obligations under human rights treaties to adopt robust mitigation measures. Specifically, in a joint statement, five UN human rights bodies[440] explained that, "[i]n order for States to comply with their human rights obligations, and to realise the objectives of the Paris Agreement, they ***must adopt and implement policies aimed at reducing emissions***, which reflect ***the highest possible ambition***."[441]

361. The CESCR noted, in 2018, that the "[NDCs] that have been announced so far are insufficient to meet what scientists tell us is required to avoid the most severe impacts of climate change".[442] As a result, "[i]n order to act consistently with their human rights obligations, NDCs should be revised to better reflect the '*highest possible ambition*'

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[439] Open Letter from UN Special Procedures Mandate-Holders, "*A New Climate Change Agreement Must Include Human Rights Protection for All*", 17 October 2014 (available here), p. 3 (emphasis added).

[440] These bodies are: the Committee on the Elimination of Discrimination against Women; the Committee on Economic, Social and Cultural Rights; the Committee on the Protection of the Rights of All Migrant Workers and Members of their Families; the Committee on the Rights of the Child; and, the Committee on the Rights of Persons with Disabilities. These are collectively referred to below as "***CEDAW et al.***"

[441] CEDAW, *et al.*, Joint Statement on "Human Rights and Climate Change" (16 September 2019) (available here), para. 2.

[442] UN Committee on Economic, Social and Cultural Rights, "Climate change and the International Covenant on Economic, Social and Cultural Rights", E/C.12/2018/1, 31 October 2018 (available here), para. 6.

referred to in the Paris Agreement".[443] As Human Rights Committee Member, Gentian Zyberi, explained in his concurring opinion in *Billy et al. v. Australia* (2022), States are required "to set their national climate mitigation targets at the level of their *highest possible ambition* and to pursue *effective domestic mitigation measures* with the aim of achieving those targets."[444]

362. These statements make clear that, to respect their human rights obligations, States "must adopt and implement" mitigation measures reflecting "the highest possible ambition"; and, if they have not yet done so, States must strengthen their NDCs to meet their human rights obligations.

363. States must also take into account the precautionary principle, which warrants more far-reaching mitigation measures. The IACHR has clarified that, in order to protect the right to life and to personal integrity, even in the absence of scientific certainty, States are required to take "effective" measures to prevent severe and irreversible damage, according to the precautionary approach.[445]

364. The Dutch Supreme Court, in *Urgenda*, applied this reasoning in the context of the serious and irreversible damage caused by climate change. The Court observed that, even with global warming at levels *below* 1.5°C or 2°C, dangerous climate change may occur. The precautionary principle, therefore, implies that "more far-reaching measures should be taken to reduce greenhouse gas emissions, rather than less far-reaching measures."[446]

365. Similar to the customary obligation of prevention (see Section III.B.1, above), the positive obligations on a State to "protect" and "fulfill" human rights imposes "a due diligence standard" on States,[447] requiring diligent conduct in addressing the actual and potential impact of climate change on the human rights of the population.

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[443] *See*, footnote 442, *above*.

[444] Human Rights Committee, *Billy et al. v. Australia*, 21 July 2022, Individual opinion of Committee member Gentian Zyberi (concurring), para. 3 (emphasis added).

[445] *IACHR Advisory Opinion*, para. 180.

[446] Supreme Court of the Netherlands, *Urgenda Foundation v. State of the Netherlands*, 13 January 2020, para. 7.2.10.

[447] *See, e.g.*, Human Rights Committee, *Billy et al. v. Australia*, 21 July 2022, para. 3.

366. Some courts have taken the position that States must respect the principle of prevention, under customary law, in order to fulfil their human rights obligations in the context of climate change.[448] Other courts have examined whether a State has acted with appropriate diligence in adopting climate change mitigation measures given the State's human rights or related fundamental rights obligations, without analysing this question through the prism of the customary obligation of prevention.[449] Irrespective of the approach, courts have confirmed that, to respect their human rights obligations, States must exercise due diligence in adopting and implementing effective mitigation action.[450]

367. Domestic courts and human rights bodies in developed countries have already condemned certain States for their failure to adopt effective mitigation action, thereby violating their human rights and/or fundamental rights obligations.[451] They did so both with regard to insufficient mitigation action in the past; and insufficient mitigation commitments for the future.

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[448] *IACHR Advisory Opinion*, para. 133, 141-174 (the obligation of prevention, entails a duty, among other, to (a) *regulate* the activity, taking into account the existing level of risk, in a way that reduces any threat to the rights of life and to personal integrity; (b) *supervise and monitor* the activity; (c) *require and approve an EIA*; (d) *prepare a contingency plan*; and (e) *mitigate* if environmental damage occurs, based on the best available scientific data and technology). *See also*, *Ogoni*, para. 52 (finding that to comply with the right to health and to a healthy environment under Article 24 of the African Charter, States must "*take reasonable and other measures to prevent pollution and ecological degradation, to promote conservation, and to secure an ecologically sustainable development and use of natural resources*"); *see also* Constitutional Court of Colombia, *Center for Social Justice Studies et al. v. Presidency of the Republic et al*., 10 November 2016 (available here, unofficial English translation available here), para. 7.34.

[449] Supreme Court of the Netherlands, *Urgenda Foundation v. State of the Netherlands*, 13 January 2020, para. 5.7.1, stating that "*it is in the opinion of the Supreme Court, that, under Articles 2 and 8 ECHR, the Netherlands is obliged to do 'its part' in order to prevent dangerous climate change, even if it is a global problem*"); and Supreme Federal Court of Brazil, Vote of Minister Cármen Lúcia, *PSB et al. v. Brazil*, 6 April 2022 (available here), para. 8.

[450] *See*, *e.g.*, Human Rights Committee, *Billy et al. v. Australia*, 21 July 2022, para. 5 ("States should act with due diligence based on the best science when taking mitigation … action.").

[451] *See*, *e.g.*, Supreme Court of the Netherlands, *Urgenda Foundation v. State of the Netherlands*, 13 January 2020; *see also*, Convention on the Rights of the Child, *General comment No. 26, Children's rights and the environment, with a special focus on climate change*, 22 August 2023, CRC/C/GC/26, para. 98; Human Rights Committee, *Billy et al. v. Australia*, 21 July 2022, para. 8.3 (*see also*, Individual opinion of Committee member Duncan Laki Muhumuza (dissenting), paras. 6-7); *see also*, German Constitutional Court, *Neubauer et al. v. Germany*, 24 March 2021, paras. 183, 243 and 266; Brussels Court of Appeal, *VZW Klimaatzaak v. Kingdom of Belgium & Others*, 30 November 2023, paras. 237-238; Korean National Human Rights Commission, *Opinion on the climate crisis and human rights*, 2023 (unofficial English translation available here), p. 23; and Administrative Court of Paris, *Notre Affaire a Tous and Others v. France*, 14 September 2021, pp. 31-32, Article 2 (available here, unofficial English translation available here).

368. For example, the Dutch Supreme Court in the *Urgenda* case found that the Netherlands had failed to adopt sufficiently deep emission reduction measures before the end of 2020.[452]

369. The German Constitutional Court in *Neubauer et al. v. Germany* found that Germany's climate laws governing national climate targets and the annual emission amounts allowed until 2030 are incompatible with fundamental rights insofar as they lack sufficient specifications for further emission reductions from 2031 onwards.[453]

370. South Korea's National Human Rights Commission found that the Korean government had failed to set sufficient mitigation reduction targets for 2030 and faulted the government for not setting any mitigation target beyond 2030. The Commission concluded that "considering the proportionality of the burden of GHG reduction for current and future generations and the responsibility of Korea as a developed country, the government should set additional GHG reduction targets."[454]

371. Most recently, in *Klimaatzaak v. Belgium*, the Brussels Court of Appeal found that Belgium violated its human rights obligations by failing to adopt sufficient mitigation action.[455] Looking backward, for the period 2013-2020, Belgium had failed to adopt sufficiently deep emission reduction measures. Looking forward, for the period to 2030, to meet its human rights obligations, Belgium must take mitigation action to reduce its emissions by 55 percent (compared to 1990 levels) by 2030.

[452] Supreme Court of the Netherlands, *Urgenda Foundation v. State of the Netherlands*, 13 January 2020, para. 8.3.5.

[453] Bundesverfassungsgericht, "Constitutional Complaints against the Federal Climate Change Act Partially Successful,", 29 April 2021 (available here); *see also*, German Constitutional Court, *Neubauer et al. v. Germany*, 24 March 2021, p. 6.

[454] *See*, National Human Rights Commission (Korea), *Opinion on the climate crisis and human rights*, 2023 (unofficial English translation available here), p. 23.

[455] *See*, Brussels Court of Appeal, *VZW Klimaatzaak v. Kingdom of Belgium & Others*, 30 November 2023, para. 237.

(2) To respect its human rights obligations, a State must adopt effective mitigation measures on the basis of the best available science

372. The CESCR has explained that, to respect their human rights obligations, States must set the level of ambition "*on the basis of the best scientific evidence available*".[456] In the words of the Human Rights Committee member, Gentian Zyberi, in *Billy et al. v. Australia* (2022), "States should act with due diligence based on the *best science* when taking mitigation … action."[457]

373. In this regard, the IPCC's work "makes it clear that to avoid the risk of irreversible and large-scale systemic impacts, *urgent and decisive climate action* is required".[458] The most recent scientific evidence, including from the IPCC, underscores even more the need for urgent and decisive mitigation action.[459] As several UN human rights bodies explained in a joint statement, "adverse impacts on human rights are *already occurring at 1°C of warming* and every additional increase in temperatures *will further undermine the realization of rights*."[460]

374. It follows that, to assess whether mitigation action is sufficient to respect a State's human rights obligations, the mitigation action must be assessed in light of temperature targets informed by the best, most recent science (such as the latest IPCC reports); and not just by the temperature target set out in the Paris Agreement.

375. It follows that, at a minimum, the 1.5°C temperature target must now replace the 2.0°C temperature target, when States define their mitigation action in a manner consistent their human rights obligations.

376. Thus, in *Klimaatzaak v. Belgium*, the Brussels Court of Appeal explained that "le rapport spécial du GIEC de 2018 a confirmé qu'il fallait dorénavant abandonner

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[456] UN Committee on Economic, Social and Cultural Rights, "Climate change and the International Covenant on Economic, Social and Cultural Rights", UN Doc. E/C.12/2018/1, 31 October 2018, para. 5. *See also*, Human Rights Committee, *Billy et al. v. Australia*, 21 July 2022, para. 5.

[457] *See*, *e.g.*, Human Rights Committee, *Billy et al. v. Australia*, 21 July 2022, para. 5.

[458] CEDAW, *et al.*, Joint Statement on "Human Rights and Climate Change", 16 September 2019 (available here), emphasis added.

[459] *See*, sub-section II.B.4, *above*.

[460] CEDAW, *et al.*, Joint Statement on "Human Rights and Climate Change", 16 September 2019 (available here) (emphasis added). *See also*, Brussels Court of Appeal, *VZW Klimaatzaak v. Kingdom of Belgium & Others*, 30 November 2023, para. 164.

l'objectif de 2°C pour celui de 1,5° C" (*unofficial translation*: "The IPCC's 2018 Special Report confirmed that the 2°C target must now be replaced by the 1.5°C target").[461]

377. The Finnish Supreme Administrative Court likewise ruled that "[b]ased on the best scientific evidence, climate change is a matter of human destiny, threatening the livelihoods of current and future generations on Earth unless urgent and effective action is taken to limit emissions and conserve and enhance carbon sinks. Therefore, postponing action will shift responsibility to the future and make it more difficult to achieve the 1.5°C maximum temperature increase target of the Paris Agreement."[462]

(3) To respect its human rights obligations, a State must adopt effective mitigation measures, based on fairness, equity and CBDR-RC

378. To respect its human rights obligations, a State cannot excuse its own mitigation inaction on the basis that other States might not take sufficient emission reduction action of their own; instead, each State must do "its part".

379. The Dutch Supreme Court in the *Urgenda* case said that "every reduction means that more room remains in the carbon budget", and "no reduction is negligible".[463] The German Constitutional Court *Neubauer et al. v. Germany* held that "[t]he fact that no state can resolve the problems of climate change on its own due to the global nature of the climate and global warming does not invalidate the national obligation to take climate action."[464] The Brussels Court of Appeal in *Klimaatzaak v. Belgium* concurred with this view.[465]

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[461] *See*, Brussels Court of Appeal, *VZW Klimaatzaak v. Kingdom of Belgium & Others*, 30 November 2023, para. 30.

[462] *See*, Finnish Supreme Administrative Court, *Finnish Association for Nature Conservation and Greenpeace v. Finland*, 2023 (available here, unofficial English translation available here), p. 21, para. 66.

[463] Supreme Court of the Netherlands, *Urgenda Foundation v. State of the Netherlands*, 13 January 2020, paras. 5.7.7 and 5.7.8.

[464] German Constitutional Court, *Neubauer et al. v. Germany*, 24 March 2021; *see also*, Committee on the Rights of the Child, *Sacchi v. Argentina et al.*, 10 August 2021 para. 10.1

[465] Brussels Court of Appeal, *VZW Klimaatzaak v. Kingdom of Belgium & Others*, 30 November 2023, para. 160.

380. The Dutch Supreme Court in the *Urgenda* case found that each State party to a human rights treaty should do "*its part*" in order to prevent dangerous climate change.[466] Referring to the principles of the UNFCCC, including fairness, equity and CBDR-RC, the Court held that each State "has an obligation to take the necessary measures in accordance with *its specific responsibilities and possibilities*."[467] Consistent with the obligations under the climate change regime and customary international law, each State must, therefore, determine "its part" – its equitable share – and this "part" is differentiated in light of States' different responsibilities and capabilities.[468]

381. Likewise, in *Sacchi et al. v. Argentina, Brazil, France, Germany and Turkey* (2021), the Committee on the Rights of the Child held that "[i]n accordance with the principle of common but differentiated responsibility, as reflected in the Paris Agreement, the Committee finds that the collective nature of the causation of climate change does not absolve the State party of its individual responsibility that may derive from the harm that the emissions originating within its territory may cause to children, whatever their location".[469]

382. In finding that the Korean government must set more ambitious mitigation targets, the South Korea's National Human Rights Commission also took into account "the responsibility of Korea as a developed country".[470]

383. Finally, in *Billy et al. v. Australia* (2022), the Human Rights Committee member, Gentian Zyberi, explained in a concurring opinion that:

> States should act with due diligence when taking mitigation and adaptation action, based on the best science. This is an *individual responsibility* of the State, ***relative to the risk at stake and its capacity to address it***. A ***higher standard of due diligence***

[466] Supreme Court of the Netherlands, *Urgenda Foundation v. State of the Netherlands*, 13 January 2020, paras. 5.7.1-5.7.9 (emphasis added).

[467] Supreme Court of the Netherlands, *Urgenda Foundation v. State of the Netherlands*, 13 January 2020, para. 5.7.3.

[468] Supreme Court of the Netherlands, *Urgenda Foundation v. State of the Netherlands*, 13 January 2020, para. 5.7.5; *see also*, National Human Rights Commission (Korea), *Opinion on the climate crisis and human rights*, 2023, p. 9 (unofficial English translation available here).

[469] *See also*, Committee on the Rights of the Child, *Sacchi v. Argentina et al.*, 10 August 2021, para. 10.10 (emphasis added).

[470] *See*, National Human Rights Commission (Korea), *Opinion on the climate crisis and human rights*, 2023, p. 23 (unofficial English translation available here).

> applies in respect of those States with significant total emissions or very high per capita emissions (whether these are past or current emissions), given the ***greater burden*** that their emissions place on the global climate system, as well to States with ***higher capacities*** to take high ambitious mitigation action.[471]

384. The Committee Member found that "[t]his higher standard applies to the State party in this case [*i.e.,* Australia]".[472]

d. Obligations arising under the UNCLOS

385. Article 192 of the UNCLOS provides, generally, that "States have the obligation to protect and preserve the marine environment".[473] Article 194 more specifically provides:

> States shall take, individually or jointly as appropriate, all measures consistent with this Convention that are necessary to prevent, reduce and control pollution of the marine environment from any source, using for this purpose the best practical means at their disposal and in accordance with their capabilities, and they shall endeavour to harmonize their policies in this connection.[474]

386. These terms establish a due diligence obligation on States to do their utmost, using all the means at their disposal, to reduce emissions sufficient to keep long-term temperatures at a level that would prevent, reduce and control pollution of the marine environment.

i. Anthropogenic GHG emissions constitute pollution of the marine environment

387. The first issue under Article 194 of the UNCLOS is whether anthropogenic emissions involve "pollution of the marine environment", which is defined in Article 1(4) of the UNCLOS as:

> … the introduction by man, directly or indirectly, of substances or energy into the marine environment, including estuaries, which results or is likely to result in such deleterious effects as harm to living resources and marine life, hazards to human

[471] Human Rights Committee, *Billy et al. v. Australia*, 2022, para. 5 (emphasis added).

[472] Human Rights Committee, *Billy et al. v. Australia*, 2022, para. 5.

[473] *See generally*, *Responsibilities in the Area*.

[474] Emphasis added.

> health, hindrance to marine activities, including fishing and other legitimate uses of the sea, impairment of quality for use of sea water and reduction of amenities.

388. As Antigua and Barbuda has explained in Section 0 above, anthropogenic GHG emissions cause both carbon dioxide and heat to be absorbed into the ocean, with extensive harmful effects.[475] Under the definition in Article 1(4), therefore, anthropogenic GHG emissions are a source of pollution of the marine environment.

389. Specifically, the term "substances or energy" covers both carbon dioxide (a "substance") and heat (thermal "energy").[476] When carbon dioxide and heat from anthropogenic emissions are absorbed into the ocean, they are "introduc[ed]" "directly or indirectly" into the marine environment by man.[477] They result in extensive "deleterious effects". The absorption of carbon dioxide results in ocean acidification;[478] the absorption of heat results in higher ocean temperatures and sea level rise.[479] In each instance, these cause, at minimum, "harm to living resources and marine life", "hazards to human health" and "hindrance to marine activities".[480]

390. Indeed, the environmental impacts of anthropogenic GHG emissions are felt acutely by the oceans. The oceans play a key role in the Earths' climate system, and two key drivers of harm from climate change – sea level rise and ocean acidification – have a special impact on marine habitats and ecosystems, and on related human activities like fishing and coastal infrastructure.

391. In this respect, the UNCLOS is the primary international legal regime which deals specifically with obligations relating to pollution of the marine environment and its consequential harms.

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[475] *See*, Section II, *above*.

[476] *See*, Oxford English Dictionary, "substance, n." (available here); *see also*, Oxford English Dictionary, "energy, n." (available here).

[477] *See*, sub-section II.C.1.

[478] *See*, sub-section II.C.1.

[479] *See*, sub-section II.C.1.

[480] *See*, sub-section II.C.2 and II.C.3; *see also*, UNCLOS, Article 193(a).

ii. States must reduce GHG emissions, to the fullest extent possible, as soon as possible, in order to prevent, reduce and control marine pollution

392. Article 194 requires States to adopt measures necessary to "prevent, reduce and control" pollution to the marine environment.

393. The three verbs in Article 194 – prevent, reduce, control – each have their own meaning, and apply cumulatively. The verb "prevent" means to stop or hinder marine pollution; the verb "reduce" means to diminish or lower those pollution levels; and the verb "control" means to manage the pollution.[481]

394. An UNCLOS Party cannot choose to comply with the least demanding of these three verbs, namely, taking measures to "control" marine pollution. Yet, under the Paris Agreement, States have agreed to do just this. The Paris Agreement calls for States to pursue efforts to limit warming to 1.5°C.[482] The agreement to achieve this temperature goal foresees considerable continued emissions, albeit at a lower rate, which will lead to considerably increased marine pollution. Under the Paris Agreement, States have, therefore, sought to "control" marine pollution, but not to "reduce" its accumulated levels in the ocean or "prevent" further pollution.

395. Article 194(1) requires States to go further, pursuing effective emission reduction measures that will "prevent" marine pollution from occurring and will "reduce" the accumulated levels of marine pollution.

396. As noted above, Article 194(1) establishes a "due diligence" obligation, meaning States do not face strict liability for their failure to "prevent" and "reduce" marine pollution. However, States are responsible for taking all available means at their disposal to achieve these outcomes. The obligation in Article 194(1) cannot be satisfied simply with a degree of "control" over pollution.

397. In that regard, Article 194(1) obliges States to adopt the measures "necessary" to prevent, reduce and control marine pollution. With respect to climate change, the necessary measures are well known: they involve rapid, deep and sustained emission

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[481] *See*, Oxford English Dictionary, "prevent, v." (available here); Oxford English Dictionary, "reduce, v." (available here); and Oxford English Dictionary, "control, v." (available here).

[482] Paris Agreement, Article 2.1(a).

reductions. As set forth above, the IPCC has evaluated the available measures to achieve such reductions, including their efficacy in terms of both cost and emission reductions.[483] States must, therefore, do their utmost to adopt and enforce these measures, with a view to preventing marine pollution.

398. Other provisions of the UNCLOS add further content to the character of the due diligence obligations under Article 194(1), specifying the types of measures that States must adopt. In the specific case of pollution from land-based sources, Article 207(1) and (2) provides that States "shall adopt *laws* and *regulations*" to prevent, reduce and control such pollution, as well as "other measures as may be necessary". Under Article 213, States "shall enforce" such laws and regulations in order to prevent, reduce and control marine pollution from land-based sources.

399. Under Article 207(5), States must adopt laws, regulations, measures and other legal instruments "designed to *minimize*, to the *fullest extent possible*, the release of" harmful substances from land-based sources, "especially those which are *persistent*".[484]

400. This provision confirms a central aspect of Antigua and Barbuda's arguments: States cannot choose to comply with the least demanding of the three verbs in Article 194(1), by taking measures that merely seek to "control" marine pollution. Rather, at all times, they must deploy measures to "minimize" the release of persistently harmful substances, which includes GHG emissions. The verb "minimize" means that GHG emissions must be reduced to their smallest possible quantity. The text of Article 207(4) also uses the superlative "fullest" to underscore the considerable extent of this obligation to minimise the release of persistently harmful substances.

401. As with the customary obligation of prevention and the Paris Agreement, the due diligence obligation in Article 194(1) is differentiated between and among the UNCLOS Parties, consistent with the principle of fairness, equity and CBDR-RC that applies in the context of climate change. This is because Parties must act using "the best practicable means at their disposal and in accordance with their capabilities". These terms recognise that the conduct required to act with diligence depends on what is practically available, and within the capabilities of a State. This phrase means that

[483] *See*, sub-section II.D.2, *above*.

[484] UNCLOS, Article 207.5 (emphasis added).

the obligation in Article 194(1) applies asymmetrically: States with the greater "means" and "capabilities" – *i.e.*, developed States – bear the heavier burden.

402. Finally, Article 197 provides that "States shall cooperate on a global basis", echoing and developing the customary international law obligation of cooperation. Specifically, they must cooperate in "formulating and elaborating international rules, standards and recommended practices and procedures consistent with this Convention", including as required in parallel under Article 207(4).

403. As explained above, the duty to cooperate bears particular weight in the context of climate change, since acting with due diligence requires States to divide equitably the available carbon budget amongst themselves. States must cooperate to ensure that the *collective* level of emissions reductions is sufficient to ensure that continued emissions by States, as equitably divided among them, stay within the available carbon budget.

e. Obligations arising under the international trade law regime

404. As addressed above, States are under an obligation to deploy all the means at their disposal to achieve rapid, deep and sustained GHG emissions reductions sufficient to prevent activities within their jurisdiction or control causing significant environmental harm, in a manner consistent with the principles of fairness, equity and CBDR-RC. In doing so, States are granted discretion, with certain boundaries, as to the specific mitigation measures they pursue. Such measures may include, among others: border charges and restrictions, internal taxes, regulations, production standards and subsidies.

405. These unilateral trade-related measures raise concerns because one State may seek to use its own import policies to reduce emissions in a developing State, even though the Paris Agreement would allow the developing State to decide its own nationally determined contribution to reducing emissions, in light of its common but differentiated responsibilities and respective capabilities, considered in the light of its own national circumstances. At the same time, such unilateral measures can also prejudice the development interests of developing exporting States, with consequential effects on social development and even on the resources available to tackle climate change.

406. These unilateral trade-related climate measures are legal hybrids: they implicate areas of international law relating to the environment generally, and to climate specifically –

as addressed above – and they also implicate international law related to trade, most notably under the WTO covered agreements.[485]

407. In considering such measures, it is appropriate to take account of all relevant parts of international law. The WTO Appellate Body considers that WTO law "is not to be read in clinical isolation from public international law".[486] This position is consistent with the presumption in international law that different parts of international law should, as far as possible, be interpreted and applied in a coherent and consistent manner.[487] In the words of the ILC, "[i]t is a generally accepted principle that when several norms bear on a single issue they should, to the extent possible, be interpreted so as to give rise to a single set of compatible obligations."[488] This principle of systemic integration avoids fragmentation, and gives full effect to all relevant aspects of international law, in a coherent and effective manner.

408. At the most recent WTO Ministerial Conference (Abu Dhabi, February 2024), a large group of developing WTO Members echoed the need to take into account all relevant parts of international law. In a Ministerial Declaration, this group of countries noted that:

> WTO law is not to be read in clinical isolation from public international law. Trade-related environmental measures and policies, due to their hybrid nature, must simultaneously respond to a multiple set of principles and parameters recognized by international environmental law and international trade law, including equity and Common but Differentiated Responsibilities and Respective Capabilities.[489]

[485] *See*, TESS Expert Report, *Principles of International Law Relevant for Consideration in the Design and Implementation of Trade-Related Climate Measures and Policies*, September 2023 (available here).

[486] WTO Appellate Body Report, *US – Gasoline*, p. 17.

[487] *See*, TESS Expert Report, *Principles of International Law Relevant for Consideration in the Design and Implementation of Trade-Related Climate Measures and Policies*, September 2023 (available here).

[488] ILC, *Report on Fragmentation of International Law*, p. 8. *See*, footnote 354, *above*.

[489] "Ministerial Declaration on the Contribution of the Multilateral Trading System to Tackle Environmental Challenges", Communication from Argentina, Bangladesh, Barbados, Plurilateral State of Bolivia, Brazil, Cabo Verde, Colombia, Ecuador, Egypt, Honduras, Indonesia, Kazakhstan, Panama, Paraguay, Peru, South Africa, Uruguay, Bolivarian Republic of Venezuela, and the African Group, (WT/MIN(24)/28), 29 February 2024, para. 10 (available here).

409. This group of countries, further, "[e]mphasize[d] that it is only through mutual supportiveness and harmonized application of international instruments such as MEAs and WTO Agreements that sustainable development can be meaningfully achieved".[490]

410. With respect to the international trade law bearing on unilateral trade-related climate measures, a State's measures must, in principle, respect that State's obligations under the WTO covered agreements. They must, for example, not discriminate on the basis of origin; entail customs duties or charges in excess of permissible levels; or amount to a quantitative restriction.[491]

411. However, if a trade-related climate measure violates a WTO obligation, the State may be entitled to invoke an exception under the WTO agreements. For example, Article XX of the GATT 1994 sets forth a general exception that may justify measures that violate the GATT 1994, because the measure pursues some non-trade interest (like climate change mitigation).[492]

412. To enjoy an exception, a measure must meet the legal conditions set out in the exception. In past WTO cases, these conditions have been applied to ensure that other parts of international law bearing on a measure are taken into account in assessing whether a measure that violates WTO obligations is justified by a non-trade interest.[493] In other words, the conditions have served to ensure coherence and consistency within public international law, avoiding fragmentation and the clinical isolation of WTO law.

413. *First*, a measure must pursue one of the closed list of "legitimate" non-trade objectives enumerated in the paragraphs of Article XX of the GATT 1994. With respect to climate change, two of the paragraphs are most relevant: paragraph (b) (covering measures "necessary for the protection of human, animal or plant life or health"); and paragraph (g) (covering measures "related to the conservation of exhaustible natural resources").

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[490] *See*, footnote 489, *above*.

[491] *See*, Article I of the GATT 1994 (most favoured nation principle); Article II of the GATT 1994 (customs duties or charges in excess) and Article XI of the GATT 1994 (quantitative restrictions).

[492] Certain other WTO covered agreements have equivalent "exception" provisions, *e.g.*, Article XIV of the General Agreement on Trade in Services.

[493] *See*, footnote 496, *below*.

414. *Second*, a measure must satisfy the conditions in the *chapeau* to Article XX: it may not constitute a means of "arbitrary or unjustifiable discrimination", or a "disguised restriction on international trade". These same terms appear in a number of multilateral environmental treaties, including Article 3.5 of the UNFCCC ("measures taken to combat climate change, including unilateral ones, should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade").[494] The use of these terms across international law relating to trade and the environment, including climate change, indicates a desire for coherence and consistency.

415. The terms "arbitrary or unjustifiable discrimination" and "disguised restriction on trade" relate to how a measure is *applied* in practice, calling for consideration of a broad range of factors related to the measure's application.[495] These factors may include provisions from binding or non-binding international legal instruments, beyond international trade.[496]

416. With respect to a trade-related climate measure, Antigua and Barbuda highlights two factors that are relevant in assessing whether the measure entails arbitrary or unjustifiable discrimination or a disguised restriction on trade.

417. The first factor is that States must seek a cooperative solution, treating other States as sovereign equals, before resorting to unilateral trade-restrictive climate measures. This well-established requirement to pursue meaningful international cooperation flows from the good faith character of the exception. In the case of climate change,

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[494] Similarly, Principle 12 of the Rio Convention states that "Trade policy measures for environmental purposes should not constitute a means of arbitrary or unjustifiable discrimination or a disguised restriction on international trade."

[495] Appellate Body Report, *EC – Seals*, para. 5.302

[496] In *US - Shrimp*, for example, the Appellate Body took into account provisions of treaties, and several soft law instruments of international environmental law, including Principle 12 of the Rio Declaration and Agenda 21. Appellate Body Report, *US - Shrimp*, paras. 168 and 169. *See also*, Appellate Body Report, *US - Shrimp (Art. 21.5)*, para. 124. In *EC - Seals*, in interpreting Article 2.1 of the TBT (where some of the analysis was considered to apply to Article XX of the GATT as well), the panel also referred to other international law instruments such as the UN Declaration on the Rights of Indigenous Peoples, the UN GA Resolution 61/295 (2007), ILO Convention 169, and the Charter of the Inuit Circumpolar Council.

cooperation is also a practical necessity to resolve an inherently transboundary problem.[497]

418. As the WTO Appellate Body explained, "the need for, and the appropriateness" of "concerted and cooperative efforts has been recognized in the WTO itself as well as in a significant number of other international instruments and declarations".[498] The Appellate Body referred to Principle 12 of the Rio Declaration, which states that "[u]nilateral actions to deal with environmental challenges outside the jurisdiction of the importing country should be avoided. Environmental measures addressing transboundary or global environmental problems should, as far as possible, be based on international consensus."[499]

419. When "serious, good faith efforts" at international cooperation are unsuccessful, and States take a unilateral measure, they cannot abandon efforts to find cooperative solutions. Rather, they must continue to engage in "ongoing serious, good faith efforts" to seek an agreed international solution.[500]

420. These requirements for continued cooperation are important to protect the integrity of other international processes that seek to address climate change, in particular under the UNFCCC and the Paris Agreement. If restrictive import policies could be used by a developed country to force climate action on developing countries, developed countries would have less incentive ether to work through the multilateral UNFCCC/Paris Agreement processes or to fulfil their commitments to assist developing countries in tackling climate change through financial support.

421. The second factor is the relationship between the unilateral trade-related climate measure and the international climate change regime. When a State's unilateral trade-related climate measure tackles climate change in a manner inconsistent with the

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[497] *Pulp Mills*, p. 51, para. 81 ("*[t]hese obligations are all the more vital when a shared resource is at issue, as in the case of the River Uruguay, which can only be protected through close and continuous co-operation between the riparian States*"), p. 67, para. 145 ("*[t]he Court notes, moreover, that the 1975 Statute is perfectly in keeping with the requirements of international law on the subject, since the mechanism for co-operation between States is governed by the principle of good faith*") and see also p. 49, para. 77. *See also*, Paris Agreement, Articles 7.6, 8.3, 8.4, 10.2, 10.6, 11.3 and 14.3; UNFCCC, ninth preambular paragraph, Articles 7.2(l) and 9.2(d); UNCLOS, Article 197; Rio Declaration, Principle 19 (regarding timely notification).

[498] Appellate Body Report, *US – Shrimp*, para. 168.

[499] Appellate Body Report, *US – Shrimp*, para. 168 (emphasis in the original).

[500] Panel Report, *US – Shrimp (Article 21.5)*, para. 6.1.

international climate change regime, it is a strong indicator that the measure entails arbitrary or unjustifiable discrimination or a disguised restriction on trade.

422. One of the "most important factors" to assess whether a measure entails arbitrary or unjustifiable discrimination is whether the discrimination "can be reconciled with, or is rationally related to, the policy objective".[501] If a measure is inconsistent with the international climate change regime, the measure's trade-restrictive impact cannot be "reconciled with" the climate objective. A State's decision to adopt trade restrictions without following the approach agreed in the international climate change regime compromises the State's climate-based justification. Indeed, such a unilateral measure would upset the balance struck in the international climate change regime, and thereby undermine that regime.

423. A prominent and important example of the potential tension between unilateral trade-related climate measures and the international climate change regime concerns the principle of fairness, equity and CBDR-RC. As set forth above, the parties to the UNFCCC have agreed that this principle "shall" "guide …" "their actions to achieve the objective of the Convention and to implement its provisions"; and the parties to the Paris Agreement have agreed that "this Agreement will be implemented to reflect equity and [CBDR-RC]".[502]

424. The inclusion of this principle is fundamental to the architecture and balance of the international climate change regime.[503] In the context of climate change action, the principle is also respected in other areas of international law, notably international human rights law.

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[501] Appellate Body Report, *EC – Seal Products*, para. 5.306.

[502] Article 3 of the UNFCCC; and Article 2.3 of the Paris Agreement; *see also*, UNFCCC, sixth preambular recital and Article 4; Paris Agreement, Articles 3, 4.1, 4.3, 4.4, and 4.5; and C. Voigt and F. Ferreira, "Differentiation in the Paris Agreement", 5(1-2) *Climate Law* (2016), pp. 58-74.

[503] *See*, *e.g.*, L. Rajamani, 'The principle of common but differentiated responsibilities and respective capabilities in the international climate change regime,' in R. Lyster and R. Verchick (eds), *Research Handbook on Climate Disaster Law: Barriers and Opportunities* (Edward Elgar, 2018), p. 49 (CBDR-RC is "deeply embedded in the climate regime" and "a fundamental part of the conceptual apparatus of the climate change regime such that it forms the basis for the interpretation of existing obligations and the elaboration of future international legal obligations within the climate change regime"); Philippe Cullet, "Differentiation" in L. Rajamani, J. Peel (eds.), *The Oxford Handbook of International Environmental Law*, 2nd edn. (Oxford University Press, 2021), p. 319; E. Hey and S. Paulini, "Common but Differentiated Responsibilities", in *Max Planck Encyclopaedias of International Law*, online edn., (Oxford University Press, 2021), para. 5.

425. In WTO law, the question whether a trade-related climate measure respects the principle of fairness, equity and CBDR-RC should be a relevant factor, as part of the assessment of arbitrary or unjustifiable discrimination.[504] It is well accepted under the *chapeau* of Article XX that arbitrary discrimination arises when an importing country fails to take into relevant differences in the situation of producing countries. In particular, an importing country must assess "the appropriateness of [a] regulatory program for the conditions prevailing in those exporting third countries".[505]

426. In that regard, the principle of fairness, equity and CBDR-RC recognises and addresses the fact that very different conditions prevail in developing countries, compared with developed countries, with respect to their responsibilities for climate change and their capabilities for tackling it. Indeed, as outlined above, through the principle of fairness, equity and CBDR-RC, the Paris Agreement expressly foresees that developed countries will take more ambitious climate action in light of their greater responsibilities and capabilities.

427. A unilateral trade-related climate measure that fails to account for the principle of fairness, equity and CBDR-RC agreed in the international climate change regime – and the fundamental differences the principle recognises and addresses – is a factor that indicates discrimination against developing countries that is both arbitrary and unjustifiable.

428. There is, in short, no justifiable basis for developed countries to violate their WTO obligations through measures with the stated objective to tackle climate change, when they do so in disregard for a fundamental feature of the agreed international climate change regime.

[504] *See*, TESS Expert Report, *Principles of International Law Relevant for Consideration in the Design and Implementation of Trade-Related Climate Measures and Policies*, September 2023 (available here).

[505] Appellate Body Report, *US – Shrimp*, paras. 164-165.

2. Obligations related to adaptation

a. Introduction: The need for, and limitations of, adaptation measures

429. In this Section, Antigua and Barbuda turns to obligations relating to adaptation to climate change. *i.e.*, "the process of adjustment to actual or expected climate change and its effects."[506]

430. As discussed in Section III.C.1 above, States are under an obligation to undertake rapid, deep and sustained reductions in GHG emissions to mitigate climate change, in a manner consistent with the principle of fairness, equity and CBDR-RC. However, GHG emissions have already led to an increase of, on average, between 1.1° C – 1.35°C post-industrial levels, which, in turn, has led to a series of adverse events and phenomena that are unfolding around the globe. These events and phenomena will keep occurring – indeed worsen – as GHG emissions continue, and atmospheric temperatures continue to rise.

431. Adaptation measures are how the world will minimise the harms of global warming that has occurred and continues to occur. Specifically, adaptation measures entail adjustments to human systems as well as to natural systems to ensure their resilience and survival in the face of climate change.[507] Adaptation actions include policy and social changes, as well as physical modification of the environment and construction of new infrastructure.

432. All States need to adopt adaptation measures, including and especially those States like Antigua and Barbuda that have virtually zero responsibility for causing climate change. In fact, despite having virtually zero responsibility, for SIDS, like Antigua and Barbuda, the urgency of adaptation is extremely acute.[508] These States have a unique vulnerability to climate change impacts due to their size and geographical location.[509]

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[506] IPCC, Fifth Assessment Report, 2014, *Synthesis Report* (Working Groups I, II and III), Glossary (available here), p. 118 (emphasis added).

[507] Paris Agreement, Article 7.2.

[508] On the urgency of adaptation, *see*, UNFCCC COP, Decision 1/CMA.3, "Glasgow Climate Pact" (2021) (available here), para. 6.

[509] *See*, sub-sections II.C.2 and II.C.3, *above*.

To give just one example, for Antigua and Barbuda, the impacts of climate change threaten economic activities that generate 80.4 percent of the country's GDP.[510]

433. Antigua and Barbuda has, therefore, been proactive in identifying, planning and implementing the adaptation actions which are within its own capabilities; and has been proactive in calling on other States to meet their obligations under international law to support adaptation actions in Antigua and Barbuda.

434. Antigua and Barbuda already identified critical adaptation needs in its first NDC of 2015,[511] and the list expanded further in its 2021 NDC update.[512] These activities range from increasing the capacity and resilience of threatened water supplies; protecting waterways from flooding; to a swathe of measures to respond to increased extreme weather events, including improving building standards to better withstand stronger and more frequent hurricanes and other infrastructure, improving access to and use of off-grid and back-up renewable energy sources; and building resilient emergency shelter facilities.

435. The indicative cost of implementing Antigua and Barbuda's mitigation and adaptation targets through to 2030 is estimated at between USD 1-1.7 billion, which represents between 65 percent and 110 percent of the country's GDP in 2021.[513] And beyond 2030, the adaptation costs are even expected to increase significantly over time.[514]

436. Evidently, a small and vulnerable developing economy like that of Antigua and Barbuda, which has contributed just 0.001 percent to the historic cumulative emissions, is not economically able to shoulder this responsibility alone and nor is it legally expected to do so. To this end, a key theme running through international adaptation

[510] Antigua and Barbuda, "Updated Nationally Determined Contribution for the period 2020-2030" (2021) (available here), p. 27.

[511] Antigua and Barbuda, "Intended Nationally Determined Contribution" (2015) (available here).

[512] Antigua and Barbuda, "Updated Nationally Determined Contribution for the period 2020-2030" (2021) (available here); Antigua and Barbuda, "Adaptation Communication: Antigua and Barbuda's submission to the UNFCCC" (2022) (available here), pp. 40-43.

[513] Antigua and Barbuda, "Updated Nationally Determined Contribution for the period 2020-2030" (2021) (available here), p. 23.

[514] *See*, footnote 513, *above*.

obligations is the need for adequate financing, especially for those SIDS with the most acute adaptation costs ahead of them.

437. Finally, adaptation measures are central to the objective of the UNFCCC, namely the prevention of dangerous anthropogenic interference with the climate system to enable adaptation to climate change. Yet, it is also crucial to recognise the inherent limits of adaptation measures. As a result of States' historical emissions, warming is already occurring at a pace and scale that cannot be entirely addressed through adaptation measures, leading inevitably to concrete harms (*i.e.*, "loss and damage").[515] Indeed, as Antigua and Barbuda has emphasised throughout this Written Statement, it has already suffered loss and damage as a result of climate change. This must be taken into account when considering factors – addressed below – such as what quantity of support (financial and other) is necessary to support States', especially developing States, individual responses to the climate crisis. Responsibilities arising from loss and damage that has already occurred is further addressed Section 0 of this Written Statement (*i.e.*, the *second* question posed to the Court).

438. Below, Antigua and Barbuda discusses, in turn, the adaptation obligations under the international climate change regime (sub-section (b)), and the UNCLOS (sub-section (b)).

b. Adaptation obligations under the international climate change regime

439. The international climate regime, particularly the Paris Agreement, sets out certain obligations for States in respect of adaptation. In this Section, Antigua and Barbuda focuses on the adaptation obligation arising under Article 7.9. The obligation on States to provide support to developing country Parties for adaptation measures, under Article 7.13, is discussed in sub-section III.B.3, below.

440. Article 7.9 of the Paris Agreement provides as follows:

> Each Party shall, as appropriate, engage in adaptation planning processes and the implementation of actions, including the development or enhancement of relevant plans, policies and/or contributions, which may include:

[515] *See*, sub-section II.C, para. 49, *above*.

> (a) The implementation of adaptation actions, undertakings and/or efforts;
>
> (b) The process to formulate and implement national adaptation plans;
>
> (c) The assessment of climate change impacts and vulnerability, with a view to formulating nationally determined prioritized actions, taking into account vulnerable people, places and ecosystems;
>
> (d) Monitoring and evaluating and learning from adaptation plans, policies, programmes and actions; and
>
> (e) Building the resilience of socioeconomic and ecological systems, including through economic diversification and sustainable management of natural resources.

441. These terms establish an obligation ("shall") to "engage in adaptation planning processes", and to implement "[adaptation] actions". However, unlike the mitigation obligation under Article 4.2, the adaption obligation under Article 7.9 is qualified by the terms "*as appropriate*". This is a critical difference between the mitigation obligation under Article 4.2, and the adaptation obligation under Article 7.9.

442. Based on the ordinary meaning of the term "as appropriate", States' obligation to take adaptation measures is contingent on what is suitable or proper for the circumstances. Thus, States are granted considerable discretion in how they go about their adaptation planning, and in the implementation of adaptation actions. Subparagraphs (a) through (e) of Article 7.9 provide a non-exhaustive list of how States may go about iteratively planning and implementing their adaptation actions. Under each step, it is for each State to identify its own adaptation needs, make plans to meet those needs, and implement the necessary measures.

443. The term "as appropriate" must be understood in light of the context to Article 7(9).

444. *First*, the term "as appropriate" qualifies the required adaptation actions in light of each Party's capacities; consistent with Article 2.2, which provides that the Agreement – including Article 7 – will be implemented to reflect equity and the principle of fairness, equity and CBDR-RC. The need to take into account each Parties' capacities is, specifically, reflected in Article 7.6, which recognises the "importance of support for and international cooperation on adaptation efforts", and of "taking into account the

needs of developing country Parties, especially those that a particularly vulnerable to the adverse effects of climate change".

445. For developing countries with high adaptation needs, like SIDS, the obligation is especially qualified by the receipt of adequate support for planning and implementing adaptation measures, per the terms of Article 7.13. Indeed, as explained below, Article 7.13 requires "continuous and enhanced international support" for developing Parties to implement, among others, paragraph 9. Unlike Article 7.9, the obligation to provide support under 7.13 is not qualified by the term "as appropriate".

446. *Second*, the adaptation obligation under Article 7.9 must also be understood, and implemented, in light of the *global* adaptation goal, in Article 2.1(b) and, expressed in more detail, in Article 7.1. Article 2.1(b) recognises that the Agreement aims to "strengthen the global response to climate change" by "enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change". Article 7.1 more specifically establishes this goal "with a view to contributing to sustainable development and ensuring an adequate adaptation response in the context of the temperature goal referred to in Article 2".

447. Pursuit of this global goal means that, in making individual adaptation plans and implementing them, States should be mindful of the interrelationships between different countries' adaptation efforts. States should, therefore, pursue their national adaptation measures in a cooperative manner, helping to ensure their adaptation actions achieve maximum effectiveness and efficiency.

c. Adaptation obligations under the UNCLOS

448. In this sub-section, Antigua and Barbuda first explains that Article 192 of the UNCLOS imposes a due diligence obligation on the Parties in respect of adaptation. Thereafter, Antigua and Barbuda explains that Article 192, read with Article 197, requires an asymmetric allocation of the burden of adaptation.

i. Article 192 imposes a due diligence obligation in respect of adaptation

449. Article 192 of the UNCLOS requires States parties to "protect and preserve the marine environment". As discussed above, this obligation requires States to safeguard the

marine environment from future harm, and to maintain or improve the present condition of the marine environment.[516]

450. As explained above, the obligation under Article 192 is one of due diligence, requiring States to do their utmost, using all the means at their disposal for this purpose.[517] To recall, as explained above, in the context of Article 194, "due diligence" is a "variable concept".[518] The variables determining the level of diligence "due" in a particular circumstance include:

- The level of threat to the marine environment: As the Seabed Disputes Chamber clarified, "[t]he standard of due diligence has to be more severe for the riskier activities".[519] That is, in dealing with circumstances entailing higher risks to the marine environment, a higher level of diligence is due.

- The level of knowledge of the risk: The level of diligence required varies as the body of available knowledge regarding a particular risk evolves. Additional knowledge about the level of risk or additional risk factors may result in the need to re-calibrate the level of diligence.

- The level of available technological knowledge: As technology evolves, States may have more solutions to a problem available to them, and may come under an obligation to deploy those means.

- Availability of means to address the risk: A due diligence obligation, requires States to do their "utmost" and deploy "all the means at [their] disposal" in its pursuit. Thus, the level of diligence varies with the extent of the means available to a State. The more means a State has at its disposal, the more demanding is the conduct required of it to meet the due diligence obligation.

451. In the case of climate change, a high level of diligence is required, since: (i) the risk involved is very high, possibly existential; (ii) the level of knowledge about the risk is very high, given extensive scientific knowledge about climate change and its effects; and (iii) the means to protect the marine environment from this threat are well-known. As such, States must deploy a high level of diligence.

452. As explained above, the adoption of adaptation measures are necessary to minimise harms to the environment (including the marine environment) resulting from global

[516] *South China Sea Arbitration*, para. 941.

[517] *See*, paras. 385-403, *above*.

[518] *See*, *Responsibilities in the Area*, p. 43, para. 117.

[519] *See*, *Responsibilities in the Area*, p. 43, para. 117.

warming. Without adequate adaptation measures, environmental harm from global warming is more severe. The due diligence obligation in Article 192 to "protect and preserve" the marine environment therefore encompasses an obligation on States to do the utmost, and use all means at their disposal, to take appropriate adaptation measures.

453. Importantly, this obligation is qualified according to what is *appropriate* for each individual State, depending on its capacity to take such adaptation measures, consistent with the principle of CBDR-RC as expressed in the international climate regime, and incorporated into Article 192 of the UNCLOS (as discussed further below). For developing States, this also includes what is *appropriate* in light of the adequacy of support provided by developed States for developing States' adaptation efforts.

454. The due diligence nature of the obligation under Article 192 has important consequences for the allocation of shared burdens under the obligation, as Antigua and Barbuda will explain below in Section IV. As discussed in the following sub-section, States with more extensive means at their disposal are required to carry a larger share of the burden of obligations than States with more limited means.

ii. The asymmetric nature of the obligation under Article 192, in respect of adaptation

455. The obligations under Article 192 are differentiated and asymmetric. That is, developed States must carry a larger share of the obligations imposed by Article 192, including by supporting adaptation actions in the territories of developing countries.

456. To recall, the general obligation in Article 192, to "protect and preserve the marine environment" is further elaborated in other provisions in Part XII of the UNCLOS. Among them is Article 197, which requires States parties to cooperate in the formulation of "international rules" and "standards" for the protection and preservation of the marine environment. Article 197 also requires States to abide by such international rules once they are formulated, lest the cooperative formulation of rules pursuant to Article 197 be rendered futile.

457. The international climate change regime represents such "international rules" and "standards", which have been formulated cooperatively. Thus, UNCLOS parties are obliged by Article 197 to abide by their commitments in the international climate change regime.

458. One of the key rules of the international climate change regime is the principle of fairness, equity and CBDR-RC, which is reflected in the text of the UNFCCC and the Paris Agreement. Based on this principle, among others, developed States have undertaken commitments within the international climate change regime to provide financing, technology, and capacity building assistance to the adaptation efforts of developing States. Articles 192 and 197 require developed States to make good on these commitments.

459. As such, the financing and support obligations in the international climate change regime, discussed above, in so far as they relate to adaptation measures concerning the marine environment, are incorporated as UNCLOS obligations through the operation of Article 197.

460. Indeed, the cost of adaptation faced by developing countries is such that they simply cannot implement the necessary adaptation measures unless developed countries deliver on their financing and support commitments – a point recognised in Articles 7.7 and 7.13 of the Paris Agreement. Given the due diligence nature of the obligation in Article 192, the obligation of the developing States to implement adaptation measures is a function of the "means" available to them. It is the fulfilment of the financing and support commitments by the developed States that will make the necessary means available to developing countries; in this sense, the obligation of developing countries to implement adaptation measures within their territory is contingent.

461. In sum, the UNCLOS creates the following specific obligations for States in respect of adaptation actions relating to the marine environment:

- All States are under an obligation to identify adaptation needs in their territories, prepare adaptation plans, and implement adaptation plans. For developing countries, this obligation is contingent on the receipt of support in line with the obligations listed below.

- All States are under an obligation to prepare and implement adaptation plans in a cooperative manner, to ensure that their adaptation plans are not mutually incompatible, collectively ineffective, or counterproductive.

- Developed States are under a specific obligation to provide continuing and enhanced support to developing countries in respect of adaptation. Such support should include financial assistance, technology development and transfer, and capacity building.

3. Obligations related to the provision of support

a. Introduction

462. Climate change mitigation and adaptation actions require significant financial and non-financial resources. Some of the countries least responsible for, and worst affected by, climate change are also the ones that face the highest resource needs for mitigation and adaptation. International law requires developed States to provide financial and non-financial support to developing States to support their mitigation and adaptation actions.

463. Below, Antigua and Barbuda discusses the obligations of States in relation to financial support, which arise, in particular, under the international climate regime and UNCLOS (sub-section (b)). Antigua and Barbuda then addresses obligations relating to other forms of support, in particular, support in the form of technology transfer, with obligations flowing from a variety of sources, including the international climate regime, obligations under the WTO Agreement, UNCLOS, and the CBD (sub-section (c)).

b. Financial support

464. The expected cost of developing countries' collective mitigation and adaptation measures through 2030 is approximately USD 5.8-5.9 trillion.[520] The expected cost of planned mitigation and adaption actions by Antigua and Barbuda alone, during that period, is approximately USD 1-1.7 billion.[521] This is a significant sum for the country, representing between 65 and 110 percent of its annual GDP.

465. Neither Antigua and Barbuda, nor other developing countries, can be expected to shoulder this burden alone. International law does not expect them to do so. As explained in the analysis below, developed States are under a specific obligation to provide financial assistance to developing States for their mitigation and adaptation efforts.

[520] UNFCCC Standing Committee on Finance, "First Report on the Determination of the Needs of Developing Country Parties 2021", p. 7 (available here).

[521] Antigua and Barbuda, "Updated Nationally Determined Contribution for the period 2020-2030" (2021) (available here), p. 23.

i. Obligations under the international climate change regime

466. Among the cornerstone principles of the international climate change regime is the principle of fairness, equity and CBDR-RC.[522] As one specific manifestation of this principle, the Paris Agreement sets out extensive financing obligations for developed States to help meet the pressing and uniquely important needs of developing States. In explaining these obligations, Antigua and Barbuda addresses the *existence and nature* of the financing obligations; their *extent* (*i.e.*, how much financing the obligation requires); how financing should be *allocated* between recipients; and *transparency* obligations with respect to financing.

(1) Existence and nature of the financing obligation

467. Article 9.1 of the Paris Agreement provides as follows:

> Developed country Parties shall provide financial resources to assist developing country Parties with respect to both mitigation and adaptation in continuation of their existing obligations under the Convention.

468. In using the words "shall provide", the Paris Agreement sets out an obligation to provide financial resources, and not merely to attempt, aspire, or promise to provide them. This is further confirmed by Articles 4.5 and 7.13 of the Paris Agreement, which require that "support" under Article 9 – of which financial resources are an essential part – "shall be provided" to developing countries for their implementation of mitigation and adaptation actions respectively. The Paris Agreement is also unambiguous in assigning this obligation to developed country Parties.

469. The obligation under Article 9.1 requires developed countries to provide financial support for both mitigation and adaptation needs of developing States. Article 4.5 further emphasises the obligation to provide mitigation financing. Article 4.5 reads as follows:

> Support shall be provided to developing country Parties for the implementation of this Article, in accordance with Articles 9, 10 and 11, recognizing that enhanced support for developing country Parties will allow for higher ambition in their actions.

[522] *See*, sub-section III.A.2, *above*.

470. The aim of this financing obligation is to enable developing countries to implement their obligations under Article 4. Developing countries are required, like developed countries, to maintain nationally determined contributions in climate mitigation reflecting their "highest possible ambition".[523] This ambition of developing countries depends on their respective national circumstances, and can only be "higher" over time depending on the financial support provided by developed countries.

471. Similarly, Article 7.13 further emphasises the obligation to provide adaptation financing, given the urgency of such financing for developing countries. Article 7.13 provides that:

> Continuous and enhanced international support shall be provided to developing country Parties for the implementation of paragraphs 7, 9, 10 and 11 of this Article, in accordance with the provisions of Article 9, 10 and 11.

472. Article 7.13 establishes a mandatory obligation ("shall") on Parties to the Paris Agreement to provide "continuous and enhanced international support" to "developing country Parties". The purpose of financial support under this provision is the implementation of, among others, Article 7.9. Article 7.9 requires Parties to the Paris Agreement to plan and adopt adaptation measures "as appropriate" to the circumstances (which include, among others, their respective capacities and availability of financial support from developed States). To this end, Article 7.13 requires support for adaptation action to be "continuous" and "enhanced", *i.e.*, it must be uninterrupted or unbroken, and of a heightened or intensified degree. [524]

(2) Extent of the financing obligation

473. Article 9.1 does not explicitly specify the quantum of financing that must be provided. However, Article 9.1 does identify the purpose for which financing is to be provided: "to assist developing country Parties with respect to both mitigation and adaptation".

474. Article 4.5, in the context of mitigation obligations under the Paris Agreement, requires that financing under Article 9 "shall be provided to developing country Parties *for the*

[523] Paris Agreement, Article 4.3.

[524] *See*, Oxford English Dictionary, "continuous, adj." (available here); Oxford English Dictionary, "enhance, v." (available here).

implementation of this Article". Similarly, Article 7.13 of the Paris Agreement provides that "[c]ontinuous and enhanced international support *shall be provided* to developing country Parties *for the implementation*" of their adaptation obligations under Article 7. The word "for" is used to express a purpose and must be understood to mean "in order to obtain or secure" something, a thing "at stake" or "risked".[525] Both provisions, in using the conjunction "for", confirm that financing provided under the Agreement must be fit to serve a particular purpose – meeting the mitigation and adaptation needs of developing countries.

475. The financing provided under Article 9.1 must be of such a quantum that that it can, in fact, meet this objective. As discussed, in the pre-2030 period, the mitigation and adaptation needs of developing countries are expected to cost around USD 5.9 trillion.[526]

476. Another indication of the quantitative extent of the financing obligation is the use of the terms "enhanced" in Articles 4.5 and 7.13, and the requirement in Article 9.3 that developed countries take the lead in mobilising climate finance, representing "a progression beyond previous efforts". The term "enhanced" (which means "raise[d] in degree", "increased"[527]) and the words "progression beyond previous efforts" indicate a comparative relationship between the *status quo* of current financing, and the quantum of financing required under Article 9.1. The required financing is higher than financing provided in the *status quo* or the immediate past. That is, developed countries must continue to increase the extent of financing, until such financing is sufficient for its purpose – *i.e.*, to meet the mitigation and adaptation needs of developing countries.

477. While falling short of meeting this financing obligation in full, States have agreed on certain minimum financing targets, as a contribution towards partial fulfilment of the obligation. Under the Copenhagen Accord,[528] developed country parties to the UNFCCC committed to "*mobilizing* jointly USD 100 billion dollars a year by 2020"

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[525] *See*, Oxford English Dictionary, "for, prep." (available here).

[526] UNFCCC Standing Committee on Finance, "First Report on the Determination of the Needs of Developing Country Parties" (available here), p. 7.

[527] *See*, Oxford English Dictionary, "enhance, v." (available here).

[528] The Copenhagen Accord was a UNFCCC COP proposal, which was subsequently adopted as UNFCCC COP, Decision 2/CP.15, "Copenhagen Accord" (2009) (available here), p. 4.

for climate financing of developing countries.[529] Parties to the Paris Agreement reaffirmed and extended this commitment through 2025.[530]

478. In the same decision, the parties agreed to establish by 2025 a new "collective quantified goal" ("**NCQG**"), where the USD 100 billion per year will represent a floor, and not a ceiling for the requirement of collective mobilisation of climate finance. Most recently, the parties emphasised the importance of advancing the negotiations on the NCQG in the course of 2024, taking into consideration "the exigent need to support implementation" of current NDCs and national adaptation plans.[531]

479. The achievement by developed countries of mobilising the USD 100 billion floor annually would go some way towards compliance with the financing obligations in the Paris Agreement, even though not exhausting the obligations. However, it has been noted "with deep regret" that developed countries have consistently failed to meet even this floor for the financing obligation.[532] According to a report published in preparation of the COP Global Stocktake Decision, the real value of financing provided in 2020 was estimated at a mere USD 21-24.5 billion, although formally reported at USD 83.3 billion.[533]

480. This failure to meet the commitments of the Copenhagen Accord contrasts sharply with the financial support of USD 5 trillion that countries around the world collectively deployed in 2020 as fossil fuel subsidies.[534] That is, in a ***single year***, countries provided

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[529] UNFCCC COP, Decision 2/CP.15, "Copenhagen Accord" (2009) (available here), para. 8. The Green Climate Fund ("**GCF**") was established to moderate a significant portion of these funds.

[530] UNFCCC COP, Decision 1/CP.21, "Adoption of the Paris Agreement", UN Doc. FCCC/CP/2015/10/Add. 1, 12 December 2015 (available here) (hereinafter "**UNFCCC COP, Decision 1/CP.21, "Adoption of the Paris Agreement" (2015)**"), para. 53. It further highlighted that this mobilisation should take place in the context of meaningful mitigation actions and transparency on implementation, and in light of the needs and priorities of developing countries.

[531] UNFCCC COP, Draft Decision -/CMA.5, "New collective quantified goal on climate finance", UN Doc. FCCC/PA/CMA/2023/L.10, 12 December 2023 (available here), para. 26.

[532] *See*, UNFCCC COP, Decision 1/CMA.3, "Glasgow Climate Pact" (2021), para. 44 (available here).

[533] UNFCCC, "Views on the elements for the consideration of outputs component of the first global stocktake: Synthesis report by the secretariat" (available here), para. 173.

[534] *See*, IMF Working paper, "IMF Fossil Fuel Subsidies Data: 2023 Update" (available here). The total amount of global subsidies in fossil fuels has gradually increased the past two years, reaching USD 6 trillion in 2021 and USD 7.5 trillion in 2022.

around 85 percent of the *total* mitigation and adaptation costs of *all* countries for the period *until 2030*, as fossil fuel subsidies.

481. These subsidies undermine the impact of climate financing provided, as their amount significantly outweighs, in absolute terms, the amount of climate financing. For this reason, the COP Global Stocktake Decision called on parties to the Paris Agreement to contribute in "phasing out inefficient fossil fuel subsidies that do not address energy poverty or just transitions".[535] Furthermore, fossil fuel subsidies constitute backwards steps for the parties of the Paris Agreement, in their journey to fulfil their adaptation and mitigation commitments. This is because such subsidies incentivise the ongoing use of fossil fuels (and thus further emissions) by rendering them artificially competitive with renewable sources of energy, locking in fossil fuel dependency and making the clean energy transition more difficult and costly.

482. Therefore, the provision of massive fossil fuel subsidies significantly detracts from the achievement of the objectives of the Paris Agreement, and significantly increases the amount of financial resources needed to meet the Paris Agreement mitigation and adaptation commitments. In continuing to provide massive fossil fuel subsidies, yet failing to increase climate finance commensurately, States devote resources incentivising the ongoing use of fossil fuels, when these resources could be used to reduce the shortfall in climate finance and to accelerate a just transition. This undermines the obligations under the Paris Agreement.

483. Finally, it should be emphasised that the extent of financing discussed in this section is specifically as regards to support for *mitigation* and *adaptation*, and is not exhaustive as to the total financial burdens of States in response to the climate crisis *writ large*. Most notably, as explained above,[536] as a result of States' historical emissions, warming is already occurring at a pace and scale that cannot be entirely addressed by adaptation measures; even with robust adaptation efforts, harms (*i.e.*, loss and damage) are already, and will continue to, occur, including for Antigua and Barbuda specifically. These

[535] UNFCCC COP, Draft Decision -/CMA.5, "Outcome of the first global stocktake" (2023) (available here), para. 28(h).

[536] *See*, sub-section III.B.2, para. 437, *above*.

harms may implicate State responsibility to provide payments beyond those for mitigation and adaptation specifically.

(3) Allocation of finances made available pursuant to the obligation

484. Any financial support made available by the developed countries in the discharge of their obligations under the climate regime must be allocated among the eligible recipients. The Paris Agreement sets out certain principles that guide such allocation.

485. Under Article 9.4 of the Paris Agreement, financing should take into account the specific "strategies", "needs and priorities" of developing countries. Among developing countries, special attention must be given to those that are "particularly vulnerable to the adverse effects of climate change and have significant capacity constraints", such as least-developed countries and SIDS.[537] Financing should be allocated in light of these considerations and with the aim to achieve a balance between adaptation and mitigation.

486. When allocating financing for mitigation, Article 4 provides useful context, recognising that developing countries "will take longer" to reach peak emissions. All parties are required to undertake mitigation action reflecting their "highest possible ambition", which, for developing countries, will depend on the financial support received.

487. Similarly, in apportioning financial support for adaptation, Article 7.2 provides meaningful context by recognising the "urgent and immediate needs of those developing country Parties that are particularly vulnerable to the adverse effects of climate change". Article 7.4 further recognises that "greater adaptation needs can involve greater adaptation costs".

488. These provisions, along with the cornerstone principle of fairness, equity and CBDR-RC, require SIDS and other uniquely vulnerable countries to enjoy priority in the allocation of climate financing. This is and should remain the case when assessing the allocation of climate financing in the multilateral system established under the UNFCCC and Paris Agreement regime. This prioritisation is particularly important in

[537] *See*, Paris Agreement, Articles 9.4 and 10.6; *see also*, UNFCCC, Article 4.4, which requires developed countries to "assist the developing country Parties that are particularly vulnerable to the adverse effects of climate change in meeting costs of adaptation to those adverse effects".

the allocation of adaptation financing – while SIDS have made, and continue to make a minimal contribution to GHG emissions, they face a disproportionate share of urgent adaptation needs and, thus, urgent adaptation costs. They should, therefore, receive a larger share of support.

489. In this context, Antigua and Barbuda emphasises that "strategies", "needs and priorities" of a developing country recipient must be taken into account holistically: eligible recipients should not be deprived of access to financing through the use of artificial criteria. Antigua and Barbuda is concerned over the emerging practice of using such artificial criteria when allocating so-called "climate financing" through bilateral channels, or, in certain circumstances, development financing. This includes, for example, Gross National Income ("**GNI**") per capita, the metric typically used for the allocation of financing for developing countries, but one which is not multilaterally agreed as appropriately calibrated for allocating financing for climate change-related needs.[538]

490. Antigua and Barbuda maintains that these artificial and arbitrary criteria should not be used in a manner that circumvents the obligation of States to provide support. Certain SIDS (including Antigua and Barbuda) are classified as high income countries because of their relatively high GNI per-capita, even though this outcome is largely an artifact of their micro-population. As a result, certain SIDS, including Antigua and Barbuda, are ineligible for many concessional financing instruments provided by *e.g.,* World Bank, the Asian Development Bank and the African Development Bank.[539]

491. The reality for States vulnerable to climate change is far more complex than a GNI per-capita metric can account for.[540] The metric fails entirely to account for factors such as, among others, income disparity, inequality or country-specific vulnerabilities.[541] Nor does it take into consideration the real-word costs of mitigation and, most importantly

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[538] United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, "High Level Plan on the Development of a Multi-Dimensional Vulnerability Index", September 2023 (available here), p. 51.

[539] UNFCCC, Assessment and Overview of Climate Finance Flows: Antigua and Barbuda 2014-2017: Methods to assess climate finance (available here), pp. 26-27.

[540] United Nations Office of the High Representative for the Least Developed Countries, Landlocked Developing Countries and Small Island Developing States, "High Level Plan on the Development of a Multi-Dimensional Vulnerability Index" (available here), p.13.

[541] *See*, footnote 540, *above*.

for such countries, adaptation measures. It reveals nothing about the ability of a micro-population to meet the substantial financial costs of its mitigation and adaptation measures. For instance, it fails to take into account that the limited scale of investment in high-income and micro-population SIDS results in their limited capacity to repay any loans that form part of climate financing, compared to larger countries with economies of scale. The "high income" label cannot be used as a device by developed countries to avoid their obligations to provide much-needed climate finance to the most vulnerable SIDS.

492. At the same time, there is ample information available to assist in the appropriate allocation of resources. For one, developing countries' own NDC communications shed light on their "needs and priorities", identifying specific financing needs at the individual project level, and special vulnerabilities due to geographical circumstances. They also communicate what share of the cost they can carry and the capacity constraints.

493. There are also external sources and scientific tools available to determine appropriate allocations. For example, the UN is in the course of developing a "Multidimensional Vulnerability Index" ("**MVI**"), a metric dedicated to assessing developing countries' vulnerabilities to climate change.[542] Preliminary scores are already available, assigned based on countries' structural vulnerability and lack of resilience. The MVI rationale accounts for the small historic carbon footprint of the countries – recognising that all SIDS, together, are responsible for only 0.2 percent of the global GHG emissions. Thus, Antigua and Barbuda maintains, that there are different metrics, such as the MVI, with an assessment method that duly takes into account the special circumstances of SIDS. Such metrics are aligned to a greater degree with the allocation principles already enshrined in the Paris Agreement obligations on provision of financial support.

494. As shown above, the Paris Agreement provides – through its transparency framework, including the NDC communications – an avenue through which developing countries make public their financing needs and priorities; this avenue, coupled with public and scientific sources, allow an equitable basis for apportioning the available climate

[542] *See*, UN, "Final Report of the High Level Panel on the Development of a Multidimensional Vulnerability Index", February 2024 (available here).

finance. For any allocation to be equitable, and consistent with the Paris Agreement, SIDS must be preferred, due to their special and unique vulnerabilities. Artificial and misleading methods of allocation, based on partial information, cannot be used to deprive eligible SIDS of much needed financing.

(4) Transparency obligations

495. Article 9.5 of the Paris Agreement provides that developed country parties "shall biennially communicate indicative quantitative and qualitative information" in relation to the fulfilment of their financing obligations. Importantly, developed country parties are required to communicate the projected levels of public financial resources that they intend to provide to developing country parties ("*ex ante*" transparency).

496. Furthermore, under Article 9.7 of the Paris Agreement, they must also communicate information on the financial support already provided to developing country Parties biennially ("*ex post*" transparency).

497. These transparency obligations aim to enhance predictability and clarity of financing provided by developed countries in discharge of their obligations under the Paris Agreement.[543] If fulfilled, the transparency obligations allow monitoring and verification of compliance with the financing obligations.

498. In 2018, through a COP Decision, the parties to the Paris Agreement collectively requested developed countries to submit their first biennial report in 2020, specifying a list of information to be included.[544] Among other things, this list requests information on how financial support "effectively addresses" the needs and priorities of developing country Parties, and specifically of SIDS and other particularly vulnerable countries. In their first reports in 2020, many Parties disclosed difficulties in accurately reporting "effective" financial support: national circumstances might obstruct the planning or the actual disbursement of projected financing.[545] In the second round of reporting, in

[543] UNFCCC COP, Decision 12/CMA.1, "Identification of the information to be provided by Parties in accordance with Article 9, paragraph 5, of the Paris Agreement", UN Doc. FCCC/PA/CMA/2018/3/Add.1, 15 December 2018 (available here).

[544] *See*, footnote 543, *above*, para. 4.

[545] UNFCCC COP, Synthesis Report, "First biennial communications in accordance with Article 9, paragraph 5, of the Paris Agreement", UN Doc. FCCC/PA/CMA/2021/3, 20 September 2021 (available here).

2023, only 5 out of the 35 reporting countries submitted "*ex post*" financing information.

ii. Obligations under the UNCLOS

499. In Section III.B.1, Antigua and Barbuda discussed (i) the general obligation for States, under Article 192 of the UNCLOS to protect and preserve the marine environment, and (ii) its specific expression in Article 194, requiring States to prevent, control and reduce pollution of the marine environment.[546] In that Section, Antigua and Barbuda recalled the existential threat posed by anthropogenic GHG emissions to the marine environment, and explained that they engage the obligations of States under Articles 192, 194 and related UNCLOS provisions.

500. In particular, as discussed above,[547] Article 192 of the UNCLOS, read with Article 197, requires States to cooperate in the establishment of international rules and standards to protect and preserve the marine environment, and to abide by such rules and standards once established. In that Section, Antigua and Barbuda also explained that the international climate change regime represents such international rules and standards with which Articles 192 and 197 of the UNCLOS require compliance. The financing obligations discussed in this section, being an integral part of the international climate change regime, share that characteristic. As such, Article 192, read with Article 197, of the UNCLOS establish an additional and concurrent obligation on UNCLOS parties to abide by the financing obligations of the international climate regime, discussed in the preceding sections.

iii. Obligations under the CBD

501. States are also under an obligation to provide financial support for the mitigation and adaptation needs of developing countries under the CBD. Antigua and Barbuda has discussed above the important interaction between biodiversity and climate change, and the particular significance of biodiversity in SIDS.[548] Parties to the CBD are required to undertake measures for the conservation and sustainable use of biological diversity.

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[546] *See*, paras. 385-403, *above*.

[547] *See*, paras. 385-403, *above*.

[548] *See*, sub-section II.C.2, *above*.

In this context, CBD parties undertake actions relating to climate change adaptation, and recognise the need to coordinate action with UNFCCC Parties.[549]

502. The very first Article of the CBD identifies "appropriate funding" as one of the means through which the objectives of the CBD are to be pursued. Article 20(2) of the CBD requires developed country Parties to provide "new and additional financial resources" to developing countries to meet the cost of implementing their obligations under the CBD. Once again, the provision of such financing is mandatory ("shall") and is not discharged solely through an intention, effort, or promise to provide such finance. The use of the words "new" and "additional" require an increase in the quantum of financing, compared to the status quo.

503. Article 20(4) recognises that "[t]he extent to which developing country Parties will effectively implement their commitments under this Convention will depend on the effective implementation by developed country Parties of their commitments under this Convention related to financial resources and transfer of technology". That is, in addition to requiring developed countries to provide financial support, the CBD recognises that the adherence to this obligation by developed countries is a precondition for developing countries meeting their own obligations.

504. Finally, Article 20(7) requires that in providing such financing, "special situation of developing countries, including those that are most environmentally vulnerable" must be considered. Once again, this provision requires that the countries which are most vulnerable, such as SIDS, should receive a larger share of any financial support. Furthermore, Article 20(7) would require a consideration of *actual* circumstances of the vulnerable countries, and would not permit the exclusion of eligible SIDS based on artificial criteria like GNI per capita (as discussed above).

iv. Summary of financing obligations

505. In light of the above discussion, Antigua and Barbuda identifies the following specific obligations of States in respect of financing, under the international climate change regime, UNCLOS, and CBD:

[549] Recommendation of the CBD Subsidiary Body on Scientific, Technical and Technological Advice, CBD/SBSTTA/25/L.9, October 2023 (available here), p. 2.

- *First*, developed States are under a specific obligation to provide support in the form of climate finance to developing countries, in order to aid developing countries' in effectively implementing their responses to climate change.

- *Second*, developed States are under a specific obligation to ensure that the financing is continuously increased until it is quantitatively sufficient to meet the mitigation and adaptation needs of developing countries. Developed States are under a specific obligation to immediately deliver at least the USD 100 billion per year floor set out in the Copenhagen Accord.

- *Third*, States are under a specific obligation to ensure that the allocation of any financial support takes fully into account the needs and priorities, and unique vulnerabilities, of the potential recipients. In any such allocation, SIDS and other particularly vulnerable States must receive preference. This is particularly true for adaptation financing, given the urgent adaptation needs faced by SIDS and other particularly vulnerable developing countries.

- *Fourth*, developed States are under the specific obligation to communicate biennially various information on financial support they intend to provide and have provided to developing States.

c. Technology support

506. Meeting the urgent mitigation and adaptation needs of vulnerable developing countries requires the rapid development and deployment of novel technologies, in addition to financial resources. As such, developed States are under an obligation to take the lead in the development of such technologies, and assist developing countries to deploy these technologies in meeting their mitigation and adaptation needs, including through technology transfer. Specifically, Antigua and Barbuda identifies such obligations in several provisions of the international climate change regime, UNCLOS, the CBD, and law of the World Trade Organization, in this sub-section.

i. Obligations under the international climate change regime

507. In addition to the financing obligations identified above, the international climate change regime also requires developed countries to provide additional forms of support, particularly technology support, to developing countries. Furthermore, developed countries are encouraged to "enhance support for capacity-building actions in developing country Parties".[550] Capacity building should facilitate, among other things,

[550] Paris Agreement, Article 11.3.

technology development and access to climate finance by developing countries.[551] These forms of support are to be made available to meet the mitigation and adaptation needs of developing countries.

508. With respect to technology support, Article 10.2 of the Paris Agreement provides as follows:

> Parties, noting the importance of technology for the implementation of mitigation and adaptation actions under this Agreement and recognizing existing technology deployment and dissemination efforts, shall strengthen cooperative action on technology development and transfer.

509. In using the words "shall strengthen", the Paris Agreement sets out an obligation for all Parties to cooperate in technology development and transfer. Such cooperative action is required "for the implementation of mitigation and adaptation actions". Therefore, the extent of the required cooperation is informed by the aim of this provision, which is to support the implementation of adaptation and mitigation measures by all Parties.[552]

510. Meeting the urgent mitigation and adaptation needs of vulnerable developing countries requires the rapid development and deployment of novel technologies, in addition to financial resources. As such, technology support, in the form of cooperation for technology development and transfer, is particularly important for developing countries. Articles 4.5 and 7.13 of the Paris Agreement, by reference to Article 10, require developed countries to provide technology support specifically for the implementation of mitigation and adaptation obligations by developing countries. Technology support must be, like financial support, continuous and enhanced.

511. Furthermore, Article 10.6 of the Paris Agreement recognises that support, including financial support "shall be provided" to developing countries to enable them to participate in the technology cooperation envisaged by Article 10. That is, in addition to the general financing obligations discussed above, Article 10.6 requires financial support specifically in order to strengthen technology cooperation under Article 10.2.

[551] Paris Agreement, Article 11.1.

[552] *See also*, Paris Agreement, Article 10.4.

The two types of independent support envisaged under the Paris Agreement, financial and technology, are thus complementary.[553]

512. Article 10.3 the Paris Agreement establishes a Technology Mechanism for implementation of the obligations. The parties to the Paris Agreement recently expressed their concern for the lack of financial support for the work of this mechanism and called for increased transparency on the progress of this mechanism's efforts.[554] The 2023-2027 programme of the Technology Mechanism aims to accelerate the deployment of transformative climate technologies that are urgently required to tackle climate change.[555]

513. In sum, developed Parties are under an obligation to provide technology support to developing countries to meet their mitigation and adaptation needs. For the same reasons discussed in relation to financial support, the extent of such support must be continuously increased in comparison to the status quo, until it is sufficient to meet the mitigation and adaptation needs of developing countries. Finally, any available support must be allocated equitably such that SIDS and other particularly vulnerable developing countries are prioritised. As discussed above in the context of allocation of financial support, artificial criteria based on partial information, like GNI per-capita, should not be used to deprive deserving SIDS of much needed assistance.

ii. Obligations under UNCLOS

514. As discussed above, anthropogenic GHG emissions and their existential threat to the marine environment engage obligations of States under Articles 192, 194 and related provisions of the UNCLOS.[556] In particular, as discussed in relation to the financing obligations above, Article 192 read with Article 197 require UNCLOS Parties to abide by the commitments they have undertaken in the international climate change regime. Since the obligations concerning technology support, discussed above, are an integral part of the international climate change regime, UNCLOS Parties are under a separate

[553] *See also*, Green Climate Fund, "GCF in Brief: Support for Technology", 4 December 2018 (available here).

[554] *See*, UNFCCC COP, Draft Decision -/CMA.5, "Enhancing climate technology development and transfer to support implementation of the Paris Agreement", UN Doc. FCCC/SB/2023, 6 December 2023 (available here).

[555] Joint Work Programme of the UNFCCC Technology Mechanism for 2023–2027, "Accelerating Climate Action through Technology Development and Transfer" (available here).

[556] *See*, paras. 385-403, *above*.

and concurrent obligation under Article 192, read with Article 197, of the UNCLOS to abide by those obligations.

515. Further, Part XII of the UNCLOS, which provides obligations for protection and preservation of the marine environment, includes Section 3 dedicated to technical assistance for developing States. Of particular note, Article 202(a) from Section 3 of Part XII provides that:

> States shall … promote programmes of scientific, educational, technical and other assistance to developing States for the protection and preservation of the marine environment and the prevention, reduction and control of marine pollution.

516. Thus, the "assistance" to be provided under UNCLOS is for a dedicated purpose: the fulfilment of developing States' substantive obligations under UNCLOS Articles 192 (which sets forth a general obligation in respect of protection and preservation of the marine environment) and 194 (which sets forth obligations in respect of prevention, reduction and control of pollution). Article 202 further specifies that the "assistance" provided "shall" take specific forms outlined in subparagraphs (i) through (v), including (among others): training, supplying equipment and facilities, and capacity building.

517. Other Parts of the UNCLOS contain specific obligations relating to technology transfers. Article 242(2) under Part XIII of the UNCLOS ("Marine Scientific Research") requires sharing of "information necessary to prevent and control damage … to the marine environment". Article 244(2) requires UNCLOS parties to "actively promote the flow of scientific data and information and the transfer of knowledge resulting from marine scientific research, especially to developing States…".

iii. Obligations under the CBD

518. Relevant technology support obligations also arise under the CBD. Antigua and Barbuda has discussed the important interaction between biodiversity and climate change, and the particular significance of biodiversity in SIDS.[557] Parties to the CBD are required to undertake measures for the conservation and sustainable use of biological diversity. In this context, CBD Parties undertake actions relating to climate

[557] *See*, sub-section II.C.2, *above*.

change adaptation, and recognise the need to coordinate action with UNFCCC parties.[558]

519. The CBD, in its very first Article refers to "appropriate transfer of relevant technologies" as a means for pursuing the CBD's objectives, and in Article 16(1) states that access to technology is an "essential element[] for the attainment of the objectives of [the] Convention". Article 16(2) provides as follows:

> Access to and transfer of technology referred to in paragraph 1 above to developing countries shall be provided and/or facilitated under fair and most favourable terms, including on concessional and preferential terms where mutually agreed, and, where necessary, in accordance with the financial mechanism….

520. Accordingly, under Article 16, CBD parties are required ("shall") to provide and/or facilitate access to and transfers of technology to developing countries, under fair and most favourable terms. This obligation shall be discharged through appropriate legislative, administrative or policy measures on behalf of CBD Parties, including through mobilisation of the private sector in their territories. Parties are also required to cooperate in order to ensure that intellectual property rights protected under national and international law do not run counter to the CBD objectives and the obligation to provide technology transfers.[559]

iv. Obligations under the WTO regime

521. Technology support obligations owed by developed States, and relevant for climate change mitigation and adaption actions, arise under other international law regimes, including international trade law.

522. To recall, the WTO Agreement on Trade Related Intellectual Property Rights ("**TRIPS Agreement**") requires States to protect certain forms of intellectual property rights.[560] The preamble to the TRIPS Agreement recalls the "developmental and technological objectives" underlying the policy of protecting intellectual property rights, and

[558] Convention on Biodiversity, Subsidiary Body on Scientific, Technical and Technological Advice, "Biodiversity and climate change: Draft recommendation submitted by the Chair", UNEP Doc. CBD/SBSTTA/25/L.9 (available here), p. 2.

[559] *See*, Convention on Biodiversity, Articles 16(2)-16(5).

[560] *See*, TRIPS Agreement, Articles 1.1, 9, 10, 14, 15, 22, 23, 25, 27, 35 and 39.

recognises the "the special needs of the least-developed country Members". Article 7 of the TRIPS Agreement requires that the protection of intellectual property rights "should contribute", *inter alia*, to "transfer and dissemination of technology" in a manner "conducive to social and economic welfare".

523. In line with these objectives, Article 66.2 of the TRIPS Agreement provides as follows:

> Developed country Members shall provide incentives to enterprises and institutions in their territories for the purpose of promoting and encouraging technology transfer to least-developed country Members in order to enable them to create a sound and viable technological base.

524. The TRIPS Agreement takes a different approach, compared to the Paris Agreement, with respect to the obligations of developed States in relation to technology support. While the focus of the Paris Agreement is direct support by developed countries to certain developing countries, the TRIPS Agreement requires developed countries to take action to incentivise private action. In particular, Article 66.2 requires developed countries to provide incentives to encourage technology transfers by their own institutions and enterprises to LDCs. This requirement must be understood in light of the objectives of the TRIPS Agreement, which aims to contribute in the transfer of technology "in a manner conducive to social and economic welfare".

525. Further, while the approaches are different, they are complementary; States may simultaneously provide direct support themselves, *and* incentivise the provision of support by private actors. In this regard, as Antigua and Barbuda has explained, WTO law is not to be "read in clinical isolation from public international law".[561] Here, therefore, the way that the technology transfer obligations under the Paris Agreement have been interpreted and applied, including through States' real-world practice, could, in principle, be relevant to how States implement their obligations under Article 66.2 of the TRIPS Agreement.

526. Climate change and its impact are undoubtedly matters of "social and economic welfare". As discussed in Section 0 of this Written Statement, climate change threatens life, livelihood, the enjoyment of the most basic human rights, and the very existence

[561] Appellate Body Report, *US – Gasoline*, p. 17.

of peoples and their ways of life in many parts of the world. Thus, the ability of LDCs to respond to climate change, through adaptation and mitigation measures, certainly constitute matters of social and economic welfare, through a national and international lens. Accordingly, developed countries are required to incentivise their institutions and enterprises towards the transfer of climate-related technologies to LDCs. Indeed, the reports submitted to the WTO Council for the TRIPS Agreement reveal that environment and climate change is one of the three most important areas of incentives for technology transfer, provided under Article 66.2.[562]

v. Summary of technology transfer obligations

527. In light of the above discussion, Antigua and Barbuda identifies the following specific obligations of States in respect of technology support, under the international climate change regime, the UNCLOS, WTO law, and the CBD:

- *First*, developed States are under a specific obligation to provide technology support to mitigation and adaptation needs of developing countries. Such support should include, *inter alia*, the creation of incentives for private institutions to transfer technology to developing countries for their mitigation and adaptation needs.

- *Second*, developed States are under a specific obligation to ensure that the technology support is continuously increased until it is sufficient to meet the mitigation and adaptation needs of developing countries.

- *Third*, States are under a specific obligation to ensure that the allocation of any technology support takes fully into account the needs and priorities, and unique vulnerabilities, of the potential recipients. In any such allocation, SIDS and other particularly vulnerable States must receive preference.

[562] WTO Economic Research and Statistics Division, "Reflection on the Implementation of Decision on Implementation of Article 66.2 of the TRIPS Agreement: Incentive for Technology Transfer to Least-Developed Countries" (available here), p. 8.

IV. QUESTION (B): LEGAL CONSEQUENCES

A. Introduction

528. The second question asked of the Court is:

> (b) What are the legal consequences under these obligations for States where they, by their acts and omissions, have caused significant harm to the climate system and other parts of the environment, with respect to:
>
> (i) States, including, in particular, small island developing States, which due to their geographical circumstances and level of development, are injured or specially affected by or are particularly vulnerable to the adverse effects of climate change?
>
> (ii) Peoples and individuals of the present and future generations affected by the adverse effects of climate change?

529. The second question calls for a straightforward exposition of the customary international law rules of State responsibility. The legal consequences for States where they have caused significant harm to the climate system and other parts of the environment (*i.e.*, "loss and damage") in breach of their obligations are that: (i) they will be responsible for such breaches and (ii) they will be obliged to make full reparation for the harm caused by them. These principles are of particular significance for those States – such as Antigua and Barbuda – that have made a negligible contribution to the climate crisis, but suffer a disproportionate level of the resulting loss and damage.

530. There is nothing special about harm to the climate system or other parts of the environment caused by GHG emissions as regards the *establishment* of State responsibility, the general *content* of that responsibility, or the *invocation* of such responsibility by States and other parties so entitled under relevant treaty regimes. As a UN treaty body has recognised, "[t]he collective nature of the causation of climate change does not absolve the State party of its individual responsibility that may derive from the harm that the emissions originating within its territory may cause".[563] While complexities arise in connection with how to apportion liability to make full reparation among a plurality of responsible States, that is a separate and subsequent question to

[563] Committee on the Rights of the Child, *Sacchi v. Argentina et al.*, 10 August 2021, para. 10.10, s*ee also*, para. 545 below.

the operation of the core principles of the law of State responsibility: the establishment, general content and invocation of responsibility.

531. This Section of the Written Statement identifies the law governing legal consequences (**sub-section IV.B**), and then sets out the general principles governing the establishment, content and invocation of State responsibility (**sub-section IV.C**). These principles are then applied in the context of climate change caused by anthropogenic GHG emissions, focusing on breaches of the obligations identified in the preceding sub-sections (**sub-section IV.D**).

B. The law governing legal consequences

532. The legal consequences of a breach of an international obligation are governed by the customary international law rules on State responsibility. These rules are codified in the ILC Articles on the Responsibility of States for Internationally Wrongful Acts ("**Articles on State Responsibility**").[564]

533. There are no *lex specialis* secondary rules governing the consequences of a breach of the obligations addressed in **Section III** that would operate to displace the rules codified in the ILC's Articles on State Responsibility.[565] None of the treaties surveyed in **Section III** contain any such rules. In particular, the UNFCCC and the Paris Agreement contain no provisions dealing with the consequences of a breach of obligations contained in those treaties,[566] and the COP Decision adopting the Paris Agreement expressly excludes questions of liability and compensation in respect of loss and damage.[567] Therefore, Antigua and Barbuda submits, the only conclusion is that the

[564] ILC, Articles on Responsibility of States for Internationally Wrongful Acts with commentaries, *ILC Yearbook 2001*, vol. II, Part Two (hereinafter "**ILC, *Articles on State Responsibility***").

[565] ILC, Articles on State Responsibility, Article 55.

[566] The general provisions on compliance mechanisms (UNFCCC, Article 13; Paris Agreement, Article 15) and dispute resolution (UNFCCC, Article 14; Paris Agreement, Article 24) do not provide *lex specialis* secondary rules governing the consequences of breach.

[567] UNFCCC COP, Decision 1/CP.21, "Adoption of the Paris Agreement" (2015), para. 51 ("Article 8 of the Agreement does not involve or provide a basis for any liability or compensation"). Paris Agreement, Article 8(3) ("Parties should enhance understanding, action and support … with respect to loss and damage associated with the adverse effects of climate change"). The mandate of the Warsaw International Mechanism for Loss and Damage associated with Climate Change Impacts does not extend to questions of responsibility (*see* UNFCCC COP, Decision 2/CP.19, "Warsaw international mechanism for loss and damage associated with climate change impacts", UN Doc. FCCC/CP/2013/10/Add.1, 29 November 2013 (available here)).

customary rules of international law must apply, especially where a set of primary rules is established without secondary rules.

C. The legal consequences for responsible States

1. The establishment of State responsibility

534. Pursuant to the cornerstone rules codified in Articles 1-2 of the Articles on State Responsibility, an internationally wrongful act for which a State will be responsible consists of an act or omission that (i) is attributable to the State and (ii) constitutes a breach of an international obligation of that State.[568]

535. As regards attribution, the cardinal rule is that a State is responsible only for its own wrongful conduct.[569] This includes the State's own actions and its own omissions, such as failing sufficiently to regulate the conduct of private emitters of GHG within its territory or subject to its jurisdiction.

536. As regards breach, a State breaches an obligation if it fails to conduct itself in conformity with what is required of it by that obligation.[570] Such a breach may be instantaneous, or may continue in time,[571] as will be the case where States are, for example, failing in their obligation of due diligence to prevent significant environmental harm caused by anthropogenic emissions. As a general matter and unless otherwise specified by the primary rule, the existence of damage is not required in order to establish a breach of an international obligation.[572] Damage is only relevant

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[568] ILC, *Articles on State Responsibility*, Articles 1-2 and 12. It is also necessary that there be no justification that precludes wrongfulness, *i.e.*, consent, self-defence, counter-measures and necessity (*see*, Articles 20-22 and 25). None of these is relevant in the context of emissions-related damage to the climate system and other parts of the environment.

[569] Former colonies are not responsible for wrongful acts involving historical emissions that emanated from their territories prior to their independence. The responsibility lies solely with the former colonial powers themselves. The relevant customary international law rule applicable in the context of decolonisation is that a formerly colonised State is not responsible for the internationally wrongful acts of its colonial predecessor: ILC, Second Report on succession of States in respect of State responsibility by Pavel Šturma, Special Rapporteur, UN Doc. A/CN.4/719, 6 April 2018, draft Articles 6 and 9(1)(c) and paras. 124 and 130; The Institute of International Law's 2015 Resolution on State Succession and State Responsibility (2015), Article 16. The only exception is where a formerly colonised State expressly consents to assume such responsibility (*e.g.*, *Gabčíkovo-Nagymaros*, p. 81, para. 151; *see also*, James Crawford, *State Responsibility* (Cambridge University Press, 2013), pp. 446-447).

[570] ILC, *Articles on State Responsibility*, Article 12.

[571] ILC, *Articles on State Responsibility*, Article 14.

[572] *See*, Article 14(3) as regards a necessary condition for breach of an obligation to prevent: the occurrence of the event sought to be prevented. *See also*, *Bosnia Genocide*, pp. 221-222, para. 431 (but *see also*, p. 221, para. 430 as regards the absence of a requirement of causation between the breach and the occurrence of the

to the question of whether responsibility entails a duty to make reparations through restitution, compensation and/or satisfaction, as explained below.

2. The content of State responsibility

a. The duties of compliance, cessation and non-repetition

537. States are obliged to comply with all obligations binding on them, including those that they have breached or of which they are in continuing breach.[573]

538. States are also obliged to cease continuing wrongful conduct and return to a state of compliance with the obligation in question immediately or as rapidly as possible.[574] This duty of cessation – and the right of States to demand cessation of a continuing wrongful act, even in the absence of damage – is of crucial importance in protecting the environment in the face of continuing wrongs. This is particularly so in cases where the continuation of the breach compounds the damage occurring, as in the case with anthropogenic GHG emissions. A declaration that the responsible State has a duty to cease its continuing breach will also be the decisive remedy sought where the damage caused may not yet have been sustained and thus reparation is not yet available,[575] as may be the case with recent breaches involving GHG emissions.

539. Where the circumstances so require, responsible States are also obliged to offer appropriate assurances and guarantees of non-repetition.[576] Such measures are required where there is a need to safeguard against the continuation or repetition of wrongful acts because there is, for example, an indication of bad faith on the part of the

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event). As noted at paras. 298-303, and with reference to sub-section II.C *above*, this condition is already met as regards the general obligation of prevention because significant harm to the environment from GHG emissions is already occurring.

[573] *See*, the customary rule codified in the VCLT, Article 26 ("*Pacta sunt servanda*"); ILC, *Articles on State Responsibility*, Article 29 ("Continued duty of performance"); and *Wall Advisory Opinion*, p. 197, para. 149.

[574] ILC, *Articles on State Responsibility*, Article 30(a); *Wall Advisory Opinion*, p. 197, para. 150; *Military and Paramilitary Activities*, p. 149 (*dispositif*, para. 12); *United States Diplomatic and Consular Staff in Tehran, Judgment, I.C.J. Reports 1980*, pp. 44-45, para. 95 (*dispositif* paras. 1 and 3); *Haya de la Torre Case, Judgment, I.C.J. Reports 1951*, p. 82. *See also*, *Legal Consequences of the Separation of the Chagos Archipelago from Mauritius in 1965, Advisory Opinion, I.C.J. Reports 2019* (hereinafter "***Chagos Advisory Opinion***"), p. 44 (*dispositif* para. 4: "under an obligation to bring to an end its [continuing breach] as rapidly as possible").

[575] Other than perhaps a declaration of breach as satisfaction.

[576] ILC, *Articles on State Responsibility*, Article 30(b).

responsible State[577] or some other reason to believe that violations will continue or be repeated in the future.[578] Guarantees of non-repetition can include requiring specific preventive measures by the responsible State to avoid breaches in the future, such as the modification or repeal of legislation.[579]

b. The obligation to make full reparation for injury caused by internationally wrongful acts

540. It is a long-established and fundamental rule of international law that States are obliged to make "full reparation for the injury caused by an internationally wrongful act",[580] which "must, as far as possible, wipe out all the consequences of the illegal act and re-establish the situation which would, in all probability, have existed if that act had not been committed".[581] This duty to make full reparation arises automatically upon the breach of an international obligation (without need for any action on the part of an injured State).[582] As such, it continues and accumulates for so long as the State continues to be in breach of the obligation in question. The Court has repeatedly affirmed the obligation to make full reparation in cases involving environmental damage.[583]

541. Where a State is in breach an obligation, two conditions trigger the duty to make full reparation: (i) the existence of injury and (ii) a causal relationship between the wrongful act and the injury sustained.[584] These are addressed below.

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[577] *Pulp Mills*, p. 105, para. 278; *Certain Activities (Merits)*, p. 717, para. 141.

[578] ILC, *Articles on State Responsibility*, Article 30(b), commentary, paras. 9 and 11-12.

[579] ILC, *Articles on State Responsibility*, Article 30(b), commentary, paras. 12-13, and in particular footnote 447 noting that, in *Trail Smelter*, the tribunal specifically ordered measures to be adopted that were designed to "prevent future significant fumigations in the United States" (p. 1934), and citing to multiple decisions of human rights bodies to modify or repeal legislation.

[580] ILC, *Articles on State Responsibility*, Article 31; *Factory at Chorzów, Jurisdiction, Judgment No. 8, 1927, P.C.I.J., Series A, No. 9*, p. 21.

[581] *Factory at Chorzów, Merits, Judgment No. 13, 1928, P.C.I.J., Series A, No. 17*, p. 47; *see also, Certain Activities Carried Out by Nicaragua in the Border Area (Costa Rica v. Nicaragua), Compensation, Judgment, I.C.J. Reports 2018* (hereinafter "***Certain Activities (Compensation)***"), p. 25, para. 29. It is also necessary that there be no circumstance precluding responsibility (*i.e.*, force majeure and distress: ILC, *Articles on State Responsibility*, Articles 23-24) which are, in any event, not relevant as regards GHG emissions.

[582] ILC, *Articles on State Responsibility*, Article 31, commentary para. 4.

[583] *Certain Activities (Compensation)*, pp. 25-26, paras. 29-30 and p. 28, para. 41; *Armed Activities on the Territory of the Congo (Democratic Republic of the Congo v. Uganda), Reparations, Judgment, I.C.J. Reports 2022* (hereinafter "***Armed Activities (Reparations)***"), p. 122, para. 348.

[584] This type of causation is to be distinguished from causation that is required by the primary obligation.

i. Injury

542. As regards the existence of injury, as summarised in sub-sections II.B and II.C, the scientific evidence is undeniably clear that anthropogenic emissions leading to climate change are already causing severe, and in some cases, irreversible, harm to the environment, with equally severe consequences for human populations.[585] Further global warming up to 1.5°C is projected to cause "unavoidable increases in multiple climate hazards and present multiple risks to ecosystems and humans (*very high confidence*)".[586] The "risks and projected adverse impacts and related **losses** and damage from climate change will escalate with every increment of global warming" ("*very high confidence*").[587]

543. In respect of more specific injuries at issue in particular cases, the Court has repeatedly recognised that the absence of evidence of the precise extent of material damage will not necessarily preclude an obligation to make reparation.[588] If there are evidential challenges, an assessment of the existence and extent of the damage can be "within the range of possibilities indicated by the evidence" and "based on reasonable estimates" for which the Court can then award the appropriate reparation.[589]

544. The Court has applied this approach in respect of both environmental harm and harm to individuals in *Armed Activities*. In respect of environmental harm, the Court recognised that "wildlife is often subject to less social and technical monitoring than human beings or commercial goods" and, therefore, even though "the available evidence [was] not sufficient to determine a reasonably precise or even an approximate number of animal deaths", there was "a significant amount of damage to fauna" for which Uganda was liable to make reparations.[590] Similarly, as regards harm to individuals, "while the available evidence [was] not sufficient to determine a

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[585] *See*, sub-sections II.B and II.C, *above*; *see also*, IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II), Summary for Policymakers (available here), para. B.1.

[586] IPCC, Sixth Assessment Report, 2022, *Impacts, Adaptation and Vulnerability* (Working Group II) Summary for Policymakers (available here). *See also*, sub-sections II.B and II.C, *above*.

[587] IPCC, Sixth Assessment Report, 2023, *Synthesis Report*, Summary for Policymakers (available here), p. 15.

[588] *Armed Activities (Reparations)*, pp. 51-52, para. 106 and p. 125, para. 360; *Certain Activities (Compensation)*, pp. 26-27, para. 35.

[589] *Armed Activities (Reparations)*, p. 57, para. 126 (and *see also*, p. 56, para. 124, acknowledging that the standard of proof may be lower in the reparations phase than in the establishment of responsibility phase).

[590] *Armed Activities (Reparations)*, p. 125, para. 359.

reasonably precise or even an approximate number of civilian lives lost that [were] attributable to Uganda, it [was] nevertheless possible to identify a range of possibilities with respect of the number of such civilian lives lost" for which Uganda was liable to make reparations.[591]

ii. Causation

545. As regards the causal relationship between the wrongful conduct and the injury sustained, the standard of causation required by the Court is that of a "sufficiently direct and certain casual nexus between the wrongful act … and the injury suffered".[592] It is important to note, however, that "the causal nexus required may vary depending on the primary rule violated and the nature and extent of the injury".[593]

546. As a matter of general causation, the science is undeniably clear: anthropogenic GHG emissions cause global warming which in turn causes the specific types of harm to the environment and human populations identified in Section 0. The IPCC has even established the factual causative link between States' failure to act diligently to prevent significant harm to the global climate system and particular types of harm that have resulted therefrom.

547. Specific causation between the wrongful act and the particular injury suffered in a given situation will have to be assessed on a case-by-case basis. In this context, the Court has acknowledged, as regards environmental damage, that "the state of science regarding

[591] *Armed Activities (Reparations)*, p. 71, para. 166. *See also*, p. 76, para. 181 as regards injuries to individuals ("impossible to determine, even approximately, the number of persons injured as to whom Uganda owes reparation. The Court can only find that a significant number of such injures occurred and that local patterns can be detected"), and p. 88, para. 223 as regards displacement ("does not establish a sufficiently certain number of displaced persons for whom compensation could be awarded separately. The evidence does, however, indicate a range of possibilities resulting from substantiated estimates. The Court is convinced that Uganda owes reparation in relation to a significant number of displaced persons").

[592] *Armed Activities (Reparations)*, p. 48, para. 93 (and cases cited therein).

[593] *Armed Activities (Reparations)*, p. 48, para. 93. In *Armed Activities*, for example, the Court considered that Uganda had failed in its "duty of vigilance" to prevent violations of human rights and humanitarian law in occupied Ituri and, accordingly, adopted a presumption of causation between any injuries suffered in Ituri and Uganda's breaches: "it is for Uganda to establish, in this phase of the proceedings, that a particular injury alleged by the DRC in Ituri was not caused by Uganda's failure to meet its obligations as an occupying power. In the absence of evidence to that effect, it may be concluded that Uganda owes reparation in relation to such injury" (pp. 44-45, para. 78 and *see also*, pp. 48-49, para. 95).

the casual link between the wrongful act and the damage may be uncertain" but that will not preclude the existence of a duty to make reparation.[594]

548. The Court has also expressly recognised that damage can arise from several concurrent causes, including the conduct of more than one actor,[595] but "the fact that damage was the result of concurrent causes is *not* sufficient to exempt [a responsible State] from any obligation to make reparations."[596] This approach grounds a State's duty to make reparation in its contribution to the injury suffered. Such an approach is consistent with the long-standing view of international courts and tribunals, including in *Trail Smelter* (where the injury was only partially caused by air pollution originating at the relevant smelter)[597] and *Corfu Channel* (where the injury to British ships was caused both by the laying of the mines by a third State and Albania's failure to warn of their presence).[598] The approach is also consistent with the view of the ILC, and applies even where the concurrent causes are other natural events or lawful activities.[599]

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[594] *Certain Activities (Compensation)*, p. 26, para. 34; *Armed Activities (Reparations)*, pp. 122-123, para. 349. *See also*, the lack of certainty and reliance on circumstantial evidence in *Corfu Channel*, pp. 19 and 22-23. *See also*, *Trail Smelter*, p. 1925 ("[t]he difference between probable yield in the absence of any fumigation and actual crop yield … is necessarily a somewhat uncertain amount, incapable of absolute proof").

[595] *Armed Activities (Reparations)*, p. 48, para. 94 and pp. 122-123, para. 349; *Certain Activities (Compensation)*, p. 26, para. 34.

[596] *Armed Activities (Reparations)*, p. 49, para. 97 (emphasis added).

[597] *Trail Smelter*, pp. 1923-1924.

[598] *Corfu Channel*, pp. 17-18 and 22-23.

[599] ILC, *Articles on State Responsibility*, Article 31, commentary paras. 12-13 (where, "in such cases, the injury in question was effectively caused by a combination of factors, only one of which is to be ascribed to the responsible State, international practice and the decisions of tribunals do not support the reduction or attenuation of reparation for concurrent causes, except in cases of contributory fault. In the *Corfu Channel* case, for example, the United Kingdom recovered the full amount of its claim against Albania based on the latter's wrongful failure to warn of the mines even though Albania had not itself laid the mines. Such a result should follow *a fortiori* in cases where the concurrent cause is not the act of another State … but of private individuals, or some natural event such as a flood. … [U]nless some part of the injury can be shown to be severable in causal terms from that attributed to the responsible State, the latter is held responsible for all the consequences, not being too remote, of its wrongful conduct"). *See also*, footnote 471 to para. 12 of the commentary, explaining that this "is consistent with the way in which these issues are generally dealt with in national law." That a responsible State will be liable for all the consequences of its wrongful conduct that are not too remote captures what in some domestic systems is known as the "egg shell skull" rule or the rule that the tortfeasor takes its victim as it finds them. In the present context, it means that although the environment might already be fragile as a result of other factors, that does not reduce any liability to make reparation owed by a responsible State whose wrongful conduct triggered harm that might not have been so significant had the environment not been fragile.

549. The basis of the obligation to make reparation is, therefore the *existence*, not the *extent*, of contribution to the injury.[600] The *extent* of contribution is a subsequent question relevant to the apportionment or allocation of liability for compensation between responsible States. Indeed, the Court has recognised that principles exist for dealing with this subsequent step of apportioning liability to pay compensation between responsible States, as addressed below.

550. Although responsible States are bound to make reparation for injury caused by their *own* conduct, that does not exclude the liability of a State to make reparations in respect of harm caused by the conduct of private actors committed in its territory (or an area over which it exercises effective control). Where the State has failed in its obligation of due diligence to prevent such conduct by private actors, the harm caused by the State's own failure will be the same as the harm caused by the conduct of the private actors.[601] This was recognised by the Court in respect of both harm to the environment and to individuals in *Armed Activities*. In that case, the Court found that Uganda was internationally responsible for failing to comply with its due diligence obligations as an occupying Power in Ituri[602] in respect of (i) "*all acts* of looting, plundering or exploitation of natural resources in the occupied territory, which includes damage to wildlife";[603] and (ii) harm to individuals including loss of life, physical injuries and displacement.[604] The Court held that Uganda owed reparations for such damage, even

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[600] In this connection, suggestions have been made that victim States should not bear the burden of proving which State caused which particular damage for the purposes of apportionment, and that a reversal of the burden of proof is appropriate. *See, e.g.*, Verheyen, *Climate Change Damage and International Law* (Martinus Nijhoff, 2005), pp. 255-256.

[601] This is an example of the broader rule that States must act diligently not to allow their territory (or territory subject to their effective control) to be used for the commission of acts contrary to the rights of other States. *See*, *Corfu Channel*, in which Albania was held to be responsible "for the explosions which occurred … in Albanian waters, and for the damage and loss of human life that resulted therefrom" in circumstances where Albania did not lay the mines but where it had, at a minimum, failed to warn nearby British ships of the presence of the mines (*see*, pp. 22-23 and 36).

[602] The relevant obligation breached was contained in the Regulations Respecting the Laws and Customs of War on Land annexed to the Fourth Hague Convention of 18 October 1907, Article 43, which obliges occupying powers to "take all the measures in [their] power to restore, and ensure, as far as possible, public order and safety".

[603] *Armed Activities (Reparations)*, p. 125, para. 359 (emphasis added).

[604] *Armed Activities (Reparations)*, pp. 64-65, para. 149 (loss of life); p. 73, para. 173 (injuries to persons); p. 85, para. 214 (displacement) and p. 89, para. 226 (general conclusion). *See also*, footnote 601 *above* as regards the finding in *Corfu Channel* as regards loss of human life.

where the relevant acts were carried out by private persons or armed groups other the Ugandan armed forces.[605]

551. This is significant in respect of anthropogenic GHG emissions, which are largely emitted by private actors rather than the State itself. In circumstances where a State fails to meet its obligations of due diligence in adequately regulating private actor emissions, it will be liable to make *full* reparation for the harm caused by such emissions.

c. Forms of reparation

552. Full reparation for injury caused by an internationally wrongful act takes the form of one or a combination of (i) restitution, (ii) compensation in respect of damage that cannot be made good by restitution and (iii) satisfaction in respect of injury that cannot be made good by either restitution or compensation.[606] The particular form of reparation will depend on the injury suffered and the nature of the wrongful act which caused it.[607]

i. Restitution

553. Restitution – that is, re-establishing the situation which existed before the wrongful act was committed – is the primary form of reparation required of the responsible State.[608] Where, however, restitution is materially impossible or a burden out of all proportion to the benefit deriving from it, then compensation and/or satisfaction will be the appropriate forms of reparation.[609]

554. In the vast majority of cases involving significant environmental harm, restitution in any meaningful sense is likely to be materially impossible owing to the very nature of

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[605] *See*, in particular, *Armed Activities (Reparations)*, pp. 64-65, para. 149 (loss of life); p. 73, para. 173 (injuries to persons); p. 85, para. 214 (displacement), pp. 125-126, paras. 359 and 361-362 (damage to wildlife). *See* similarly, pp. 121-123, paras. 345-350 (biodiversity and habitat loss through deforestation, but ultimately finding no evidence had been provided to assess damage). On Uganda's liability to make reparation for "all [relevant] acts" in the occupied territory, *see*, pp. 44-45, paras. 78-79 and p. 104, para. 275.

[606] ILC, *Articles on State Responsibility*, Articles 34-37.

[607] *Pulp Mills*, p. 104, para. 274; *Avena and Other Mexican Nationals (Mexico v. United States of America), Judgment, I.C.J. Reports 2004 (I)*, p. 59, para. 119.

[608] ILC, *Articles on State Responsibility*, Article 35.

[609] ILC, *Articles on State Responsibility*, Article 35; *Pulp Mills*, pp. 103-104, para. 273, and cases cited therein.

often irreversible environmental damage.[610] Moreover, any active restoration efforts to rehabilitate particular areas of the environment to their former condition that are possible are best undertaken by the State having sovereignty over the area where the harm occurred, rather than by the responsible State.[611] These are reasons militating in favour of compensation rather than restitution in cases of environmental harm.

ii. Compensation

555. The two key types of damage that will result from the harms identified in sub-section II.C are damage to the environment and damage to human populations.

556. The Court has confirmed that environmental damage is compensable under international law, and that compensation will be due for both:[612]

(a) damage caused to the environment, in and of itself – which can include indemnification for the impairment or loss of environmental goods and services in the period prior to recovery[613] (including, for example, biodiversity loss[614] and damage to wildlife in the form of animal deaths[615]); and

(b) expenses incurred by an injured State as a consequence of such damage – which has, in one case involving the rehabilitation of protected wetlands, included payment for "active restoration measures" necessary to return the environment to its prior condition.[616]

557. In many situations involving climate-change induced damage, it will neither be possible for an affected environmental area or feature to naturally restore itself to its previous position, nor for "active restoration measures" achieve that result. In such cases, injured

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[610] *See, e.g., Gabčikovo-Nagymaros*, p. 78, para. 140 (recognising the "the often irreversible character of damage to the environment and of the limitations inherent in the very mechanism of reparation of this type of damage").

[611] *See, e.g., Certain Activities (Compensation)*, pp. 28-29, para. 43.

[612] *Certain Activities (Compensation)*, p. 28, para. 41. *See also, Armed Activities (Reparations)*, p. 122, para. 348. *See also*, ILC, *Articles on State Responsibility*, Article 36.

[613] *Certain Activities (Compensation)*, p. 28, para. 42 (and on "biodiversity services … in terms of habitat and nursery services" *see*, p. 35, paras. 70-71 and p. 36, para. 75).

[614] *Certain Activities (Compensation)*, p. 35, paras. 70-71 and p. 36, para. 75 ("biodiversity services … in terms of habitat and nursery services"); *Armed Activities (Reparations)*, pp. 121-123, paras. 345-350 ("damage done to biodiversity and the habitats of animal species" through deforestation, but ultimate finding that insufficient evidence had been submitted).

[615] *Armed Activities (Reparations)*, pp. 125-126, paras. 359-363.

[616] *Certain Activities (Compensation)*, pp. 28-29, para. 43.

States will be forced to undertake adaptation measures in order to manage and mitigate the effects of the damage caused by the responsible State/s.[617] Such adaptation costs fall squarely within the compensable category recognised by the Court of "expenses incurred by an injured State as a consequence of [] damage" caused to the environment by an internationally wrongful act.[618] Such adaptation costs are also a specific instance of the more general category, recognised by the ILC as being "well established", namely "incidental expenses" which "are compensable if they were reasonably incurred to repair damage and otherwise mitigate loss arising from the breach."[619]

558. It is therefore a straightforward application of international law principles on compensation that responsible States are obliged to compensate injured States for reasonably incurred adaptation measures.[620]

559. That responsible States should foot the bill for such adaptation measures is particularly important in respect of States such as Antigua and Barbuda, which have made no appreciable emissions contribute to climate change yet will require considerable and far-reaching adaptation measures. As noted above, the effects of climate change threatens economic activities that generate 80.4 percent of Antigua and Barbuda's GDP.[621] Adaptation measures to mitigate such macroeconomic harm would be recoverable,[622] and may include the cost incurred in offering financial incentives for the development of new income-generating industries and training to re-skill workers in new professions.

560. As regards quantification of environmental harm, the Court has recognised that "international law does not prescribe any specific method of valuation for the purposes

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[617] They may be obliged to do so by specific adaptation obligations (*see*, sub-section III.B.3, *above*) or in practice forced to do so in order to prevent non-recovery of compensation for damage that could have been mitigated: *Gabčíkovo-Nagymaros*, p. 55, para. 80; ILC, *Articles on State Responsibility*, commentary para. 11 to Article 31.

[618] *Certain Activities (Compensation)*, p. 28, para. 41. *See also, Armed Activities (Reparations)*, p. 122, para. 348.

[619] ILC, *Articles on State Responsibility*, commentary para. 34 to Article 36, and footnote 579, referring to jurisprudence from the UN Compensation Commission and the Iran-United States Claims Tribunal.

[620] This is in addition to the specific obligations to assist developing States to meet adaptation costs: *see*, sub-section III.B.3, *above*.

[621] *See*, para. 432, *above*.

[622] Macroeconomic harm to a State's economy may, in principle, also be independently compensable where the existence of the injury and sufficient causal nexus are established, as the Court appears to have accepted in *Armed Activities (Reparations)*, pp. 127-131, paras. 367-384.

of compensation for environmental damage" and that it will take into account methods that offer "a reasonable basis for valuation", having regard to the "specific circumstances and characteristics of each case".[623] This approach has a long pedigree, as recognised by the Court in *Certain Activities (Compensation)*, quoting *Trail Smelter* approvingly:

> Where the tort itself is of such a nature as to preclude the ascertainment of the amount of damages with certainty, it would be a perversion of fundamental principles of justice to deny all relief to the injured person, and thereby relieve the wrongdoer from making any amend for his acts. In such case, while the damages may not be determined by mere speculation or guess, it will be enough if the evidence show[s] the extent of the damages as a matter of just and reasonable inference, although the result be only approximate.[624]

561. Accordingly, the Court has in previous cases relied on estimates and approximations derived from reliable data and adopted approaches that have valued various types of environmental harm together in an overall or global manner.[625]

562. A similar approach has been taken to the quantification of harm to individuals – a long-established head of compensable damage.[626] This includes material injury, such as loss of personal property and professional earnings, and non-material (moral) injury, such as psychological harm, "distress, suffering … and changes of a non-pecuniary nature in the person's everyday life",[627] as well as interferences with home and private life.[628] Such heads of damage clearly encompasses the harm occasioned by, for example, being

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[623] *Certain Activities (Compensation)*, p. 31, para. 52. *See also, Armed Activities (Reparations)*, p. 106, para. 281 ("the Court will draw its conclusions on the basis of the evidence that it finds reliable in order to determine the damage caused by Uganda to Congolese natural resources and the compensation to be awarded").

[624] *Certain Activities (Compensation)*, p. 27, para. 35, quoting *Trail Smelter*, p. 1920.

[625] *Certain Activities (Compensation)*, pp. 37-39, paras. 78-87 (adopting an "overall valuation" approach); *Armed Activities (Reparations)*, p. 127, para. 366 (adopting a global sum for various forms of damage to natural resources, but *see also*, p. 127, para. 365 noting the "exceptional circumstances of the present case").

[626] The Court has awarded compensation for harm to individuals in *Corfu Channel*; *see also*, *Ahmadou Sadio Diallo (Republic of Guinea v. Democratic Republic of the Congo), Compensation, Judgment, I.C.J. Reports 2012 (I)* (hereinafter "***Diallo (Compensation)***"), pp. 333-344, paras. 18-57; and *Armed Activities (Reparations)*, pp. 137-138, para. 409(a)-(b).

[627] *Diallo (Compensation)*, p. 333, para. 18, quoting *Gutiérrez-Soler v. Colombia*, Judgment of 12 September 2005 (merits, reparations and costs), IACHR, Series C, No. 132, para. 82; *Armed Activities (Reparations)*, p. 70, para. 164.

[628] ILC, *Articles on State Responsibility*, commentary para. 16 to Article 36. Non-material injury to States (affronts to dignity for example) are usually dealt with by satisfaction.

permanently displaced or forced to leave one's way of life as a result of climate-change induced rising sea levels, extreme weather events, salination of water aquifers or decreased biodiversity on which coastal communities are dependent. The Court has repeatedly recognised that non-material (moral) injury can be established without specific evidence, and the quantification of compensation for such injury necessarily rests on equitable considerations.[629]

iii. Satisfaction

563. Where restitution and compensation do not fully remedy the harm suffered, satisfaction will be required. The possible scope of satisfaction is broad. It may consist of any "appropriate modality" and will vary depending on the circumstances of the case.[630] An important form of satisfaction is a declaration by a court or tribunal that a State is in breach of its obligations.[631] Such a declaration will be particularly important where the breach has occurred but material damage, for example to the climate system or other parts of the environment, or to humans, has not yet materialised and thus no right to compensation has yet arisen. In such cases, a declaratory judgment will be an invaluable tool for States, particularly SIDS, to encourage the responsible State to comply with its obligations and alter its behaviour. Other forms of satisfaction may include the creation of a fund to manage compensation payments in the interests of beneficiaries or for other purposes that are not strictly compensatory, or the award of symbolic damages for non-pecuniary injury.[632]

3. The invocation of State responsibility

564. The second question in the UN General Assembly's request asks the Court to identify "the legal consequences" for States where they have breached the obligations that are the subject of the first question, with respect to States, including, in particular, SIDS (sub-section(a)), and peoples and individuals of the present and future generations (sub-section (b)). Antigua and Barbuda first addresses the invocation of responsibility

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[629] *Diallo (Compensation*), pp. 333-335, paras. 18, 21 and 24; *Armed Activities (Reparations)*, p. 70, para. 124.

[630] ILC, *Articles on State Responsibility*, Article 37(2) and commentary para. 5.

[631] ILC, *Articles on State Responsibility*, Article 37, commentary para. 6; *Corfu Channel*, pp. 35-36.

[632] ILC, *Articles on State Responsibility*, Article 37(2) and commentary para. 5; *Armed Activities (Reparations)*, p. 133, para. 391.

towards States, and then turns to the invocation of responsibility towards peoples and individuals of the present and future generations.

a. Invocation of responsibility towards States

565. Below, Antigua and Barbuda provides an overview of the customary rules concerning the invocation of responsibility of a State towards other States (sub-section (i)). Next, Antigua and Barbuda elaborates on the customary rules that apply in circumstances, like climate change, where there is a plurality of responsible and injured States (sub-section (ii)).

i. Requirements for invocation of responsibility by a State

566. A State's responsibility can be invoked, (1) either by an injured State to whom obligations are owed, or (2) by a non-injured State on the basis of *erga omnes* or *erga omnes partes* character of the relevant obligations. Reparations can only be claimed by, or for the benefit of, injured State. Antigua and Barbuda discusses each type of potential invocation in turn.

(1) Invocation by an injured State

567. Article 42 of the Articles on State Responsibility identifies the circumstances under which *an injured State* may invoke State responsibility. Under this provision, the injured State may invoke the responsibility of another State, if (i) the obligation breached is owed to that State individually, or (ii) the obligation is owed to a broader group of States including the invoking State, and the breach specifically affects the invoking State.[633]

568. That is, the following conditions need to be met for an injured State to invoke responsibility: (i) an obligation being owed towards the invoking State (either individually or as part of a collective), (ii) the breach of that obligation, and (iii) the injury suffered by the invoking State being a result of that breach.

569. As discussed above, the norms relevant to these proceedings are owed to the international community as a whole or to a group of States including SIDS like Antigua and Barbuda. These include obligations under customary international law on the

[633] *See, Barcelona Traction, Light and Power Company, Limited, Judgment, I.C.J. Reports 1970* (hereinafter "***Barcelona Traction***"), p. 32, para. 33.

prevention of harm to the environment, obligations under human rights treaties, obligations under the UNCLOS, and obligations under the international climate change regime. In respect of global environmental harm resulting from these norms, all States are injured, although some are more injured or specially affected than others, such as Antigua and Barbuda, and other SIDS.[634] As such, SIDS like Antigua and Barbuda would be in a position, in the appropriate context, to invoke responsibility of other States in respect of these breaches. In this context, Antigua and Barbuda finds it apposite that the ILC illustrates the concepts of "injured" and "specially affected" States using the example of coastal States whose territory is affected by pollution of the marine environment.[635]

(2) Invocation by a non-injured State

570. Article 48 of the Articles on State Responsibility sets out certain circumstances in which responsibility may be invoked *other than by an injured State*.[636] These are instances where the obligation breached is owed to a group of States including the invoking State and is established for the protection of a *collective* interest (obligations *erga omnes partes*), or where the obligation breached is owed to international community as a whole (obligations *erga omnes*).[637] To be clear, a State invoking responsibility under Article 48 need not demonstrate that it suffered injury, or that is specially affected.[638] Moreover, the fact that a State or a group of States has been injured or is specially affected does not preclude another State from invoking responsibility under this Article.

571. In this context, the obligations discussed in Section III are of an *erga omnes partes* or *erga omnes* character. These include obligations under customary international law on the prevention of harm to the environment, obligations under human rights treaties,

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634 *See*, sub-section II.C, *above*.

635 ILC, *Articles on State Responsibility*, commentary on Articles 42 and 48.

636 On the Court's confirmation of the rule reflected in Article 48, *see Application of the Convention on the Prevention and Punishment of the Crime of Genocide (The Gambia v. Myanmar), Preliminary Objections, Judgment, I.C.J. Reports 2022* (hereinafter "***The Gambia v. Myanmar***"), pp. 515-518, paras. 106-114; *Questions relating to the Obligation to Prosecute or Extradite (Belgium v. Senegal), Judgment, I.C.J. Reports 2012 (II)* (hereinafter "***Belgium v. Senegal***"), pp. 449-450, paras. 68-70; *Barcelona Traction*, p. 32, para. 33. *See also* the absence of any question of standing in *Whaling in the Antarctic*.

637 *Belgium v. Senegal*, pp. 449-450, paras. 68-70; *The Gambia v. Myanmar*, pp. 515-518, paras. 108-114.

638 See, the Court's rejection of Myanmar's argument to this effect: *The Gambia v. Myanmar*, pp. 511-518, paras. 93-114. *See also*, *Belgium v. Senegal*, para. 104; *Reservations to the Convention on the Prevention and Punishment of the Crime of Genocide, I.C.J Reports 1951*, p. 23.

obligations under the UNCLOS, and obligations under the international climate change regime. Virtually all States can therefore invoke the responsibility of States for a breach of these obligations. Any reparations sought in such proceedings must, however, be for the benefit of injured States (which would include SIDS) alone.[639]

ii. A plurality of injured and responsible States

572. A State's right to invoke State responsibility, on the bases discussed in the previous sub-section, is not prejudiced in circumstances where there are multiple injured States, or multiple responsible States. The customary rules relating to multiple injured States and multiple responsible States are as follows:

(a) Article 46 of the Articles on State Responsibility addresses circumstances in which an internationally wrongful act injures multiple States. Under that Article, each injured State has an independent right to invoke the responsibility of the State engaging in the wrongful conduct.

(b) Article 47 sets out the rules for circumstances where multiple States are responsible for the same internationally wrongful act. Under that Article, responsibility may independently be invoked against each of them, subject to the rule against double recovery. Also, Article 47(2)(b) clarifies that invocation of responsibility of one responsible State is without prejudice to the right to have recourse against any other responsible State.

573. These rules are particularly relevant in the climate change context, since the conduct of multiple States has contributed to violations of the norms discussed in Section III above, and multiple States are injured by these violations. Reading Articles 46 and 47 together, any injured State or any group of injured States has the right to invoke the responsibility of any responsible State or any group of responsible States.

574. These rules confirm that the existence of a plurality of responsible and/or injured States does not negate either the existence of State responsibility or that the content of such responsibility includes a duty to make reparations. Rather, a plurality of responsible States is relevant to the issue of apportionment of quantum. In this context, the Court

[639] ILC, *Articles on State Responsibility*, Article 48(2)(b).

has expressly recognised that relevant principles exist to govern such apportionment. In *Armed Activities*, the Court stated:

> in certain situations in which multiple causes attributable to two or more actors have resulted in injury, a single actor may be required to make full reparations for the damage suffered … In other situations, in which the conduct of multiple actors has given rise to injury, responsibility for part of such injury should instead be allocated among those actors …[640]

575. The Court went on in that case to consider whether sufficient evidence had been adduced to enable it to apportion to Uganda a specific share of the damage caused by Ugandan and Rwandan armed forces (in circumstances where Rwanda was not before the Court). Where the limited evidence available did not allow such apportionment, that did not prevent the Court from awarding reparations: it found Uganda liable to make reparations on the basis of a total sum.[641] This is consistent with the principle that the duty to make reparations is based on the *existence*, and not the *extent*, of the contribution to the injury.

576. This principle is crucial in ensuring that victim States are not left without a remedy in situations involving a number of States that are concurrently responsible. It is of particular importance in the context of climate change, where responsible States may attempt to pass the blame as amongst themselves in an effort to evade responsibility, which the approach in *Armed Activities* confirms is impermissible.

577. Further, reparations are intended to wipe out the consequences of the breach to the fullest extent possible,[642] and "as far as possible, to benefit all those who suffered injury resulting from internationally wrongful acts".[643] To these ends, any reparations made available to a group of injured States collectively must be apportioned proportionate to the injury suffered. Further, as noted above, the fact that reparations have been

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[640] *Armed Activities (Reparation)*, pp. 49-50, para. 98.

[641] *See*, *Armed Activities (Reparation)*, p. 74, para. 177 and p. 76, para. 181 (injuries to persons); pp. 87-88, para. 221 (displacement), p. 96, para. 253 (damage to property). The Court had rejected a *Monetary Gold* objection by Uganda that Rwanda was an indispensable third party: *Armed Activities on the Territory of the Congo (Democratic Republic of the Congo v. Uganda), Judgment, I.C.J. Reports 2005*, pp. 236-238, paras. 198 and 203-204.

[642] *Chorzów Factory (Merits)*, p. 47.

[643] *Armed Activities (Reparation)*, p. 50, para. 102, citing *Diallo (Compensation)*, p. 344, para. 57.

provided to one injured State or one group of injured States does not preclude another injured State or group of injured States from pursuing reparations owed to them.

578. In the climate change context, there is an additional factor to consider in that the injury from climate change is universal – there are States which are both responsible and injured. Where the context demands, the rule in Article 39 of the Articles on State Responsibility concerning the contribution of the injured State to the injury should be applied. Under that rule, "[i]n the determination of reparation, account shall be taken of the contribution to the injury by wilful or negligent action or omission of the injured State or any person or entity in relation to whom reparation is sought".[644] This rule does no more than reflect the ordinarily principle that the responsible State shall make full reparation for the injury that flows from *its own* wrong; but where part of the damage flows from *the injured State's conduct*, that must be taken into account.[645] SIDS like Antigua and Barbuda, which have made negligible historical contribution to the injury from climate change, have not contributed to causing the environmental harm that they are and will continue to suffer. Nor have they violated any of the primary rules discussed in Section III, in this regard. Thus, where SIDS such as Antigua and Barbuda seek reparation as a result of internationally wrongful acts in the climate change context, the rule in Article 39 has no application.

b. The responsibility owed with respect to peoples and individuals of present and future generations

579. The second question also asks what legal consequences are owed with respect to peoples and individuals of the present and future generations adversely affected by climate change.

580. All people and individuals of present and future generations are beneficiaries of the obligations addressed in Section III, the goals of which are the protection of the environment and of human rights. As beneficiaries of these international obligations, peoples and individuals may have a legal entitlement to two things.

[644] ILC, *Articles on State Responsibility*, Article 39, and *see also*, commentary paras. 3-4 thereto; *LaGrand (Germany v. United States of America), Judgment, I.C.J. Reports 2001*, p. 487, para. 57 and p. 508, para. 116.

[645] ILC, *Articles on State Responsibility*, Article 39, commentary para. 2.

581. The *first* is an entitlement to invoke the responsibility of the responsible State through treaty-based mechanisms or domestic avenues that allow for peoples and/or individuals to bring such actions directly. Examples of such international mechanisms include the right of individual petition under relevant treaties.[646] Domestic avenues vary from State to State, but can allow individuals and/or peoples to challenge governmental decisions and actions that constitute breaches of international obligations addressed in Section III.[647] Such actions can include proceedings brought on behalf of future generations and/or may involve judicial reasoning that takes into account the interests of future generations.[648]

582. The *second* aspect of being a beneficiary of international obligations is, in principle, an entitlement to reparations. These may be claimed by the individuals and/or peoples directly through the mechanisms referred to in the preceding paragraph where those avenues so allow. Reparations may also be claimed on behalf of individuals and/or peoples in inter-State proceedings before international courts and tribunals. This is traditionally done in diplomatic protection cases where an action is commenced in respect of injury suffered by a State's nationals and where compensation is awarded for the benefit of the individuals and/or groups concerned.[649]

583. Reparations may also be claimed on behalf of beneficiaries in proceedings commenced by non-injured States in respect of violations of obligations *erga omnes* – including

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[646] *See*, *e.g.*, ICCPR, OP1; ICESCR, OP; CRC, OP (on a communications procedure); CEDAW, OP; CERD, Article 14; CPRD, OP; ACHR, Article 44; ECHR, Article 34; ACHPR, Article 55.

[647] *See*, *e.g.*, Supreme Court of the Netherlands, *Urgenda Foundation v. State of the Netherlands*, 13 January 2020.

[648] *See*, *e.g.*, German Constitutional Court, *Neubauer et al. v. Germany*, 24 March 2021 (the German Constitutional Court required Germany to increase its mitigation efforts for the benefit of future generations); *Waratah Coal Pty Ltd v. Youth Verdict Ltd & Ors (No. 6)* [2022] QLC 21 (intergenerational equity and the need to preserve the environment for future generations were key considerations in the decision of the Land Court of Queensland to deny an application for a coal mining lease (paras. 1588, 1589, 1593 and 1603)); Supreme Court of the Philippines, *Minors Oposa v. Secretary of the Department of Environmental & Natural Resources*, G.R. No. 101083, 33 ILM 173, 30 July 1993; Supreme Court of Colombia, Appeals Chamber, *Andrea Lozano Barragán and Others v. President of the Republic and Others (Future Generations v. Ministry of the Environment et al.)*, STC4360-2018 A, 5 April 2018 (ruling that deforestation and resulting temperature increases violated the rights of future generations). In *Neubauer* and *Future Generations*, the children plaintiffs were themselves considered to be members of future generations (*see Neubauer*, para. 109; *Future Generations*, p. 37) but the interests of future generations were also considered more broadly.

[649] *See*, *Armed Activities (Reparation)*, p. 50, para. 102 and p. 137, para. 408; *Cyprus v. Turkey*, *Judgment (Just Satisfaction)*, ECtHR App. No. 25781/94, 12 May 2014, para. 46 and dispositif paras. 4(c) and 5(c); *Georgia v. Russia (I)*, *Judgment (Just Satisfaction)*, ECtHR App. No. 13255/07, 31 January 2019, paras. 26 and 77, and dispositif para. 2(c).

those for the protection of human rights and the environment – as expressly recognised in Article 48 of the ILC's Articles on State Responsibility. That Article confirms that non-injured States can claim "the performance of the obligation of reparation … in the interest of … the beneficiaries of the obligation breached."[650] This rule has attained customary status, as evidenced by its invocation in a series of recent cases commenced by non-injured States.[651] Moreover, in one case involving mass harm to a large number of individuals and/or peoples, the Court has encouraged the distribution of sums awarded in a manner that allows "adopting measures for the benefit of the affected communities as a whole".[652]

584. Finally, while the procedural avenues for individuals and peoples to invoke responsibility are to date limited, the question of the availability of such procedural avenues in a particular circumstance is not to be confused with the question of *existence* of responsibility. "Every internationally wrongful act of a State entails the international responsibility of that State."[653] Where the breach causes harm, the responsible State will have an automatic obligation to make full reparation for such harm. This remains true whether or not procedural avenues are available for the invocation of that responsibility.

D. Application of the rules of State responsibility in the context of climate change

585. The second question in the UN General Assembly's request asks the Court to identify "the legal consequences" for States where they have breached the obligations that are

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[650] ILC, *Articles on State Responsibility*, Article 48(2)(b).

[651] *See*, *Application of the Convention against Torture and Other Cruel, Inhuman or Degrading Treatment or Punishment (Canada and the Netherlands v. Syrian Arab Republic)*, Joint Application Instituting Proceedings, 8 June 2023, para. 60(f) (requesting that the Court adjudge and declare that Syria must provide individual victims full reparation, including compensation and rehabilitation); *Application of the Convention on the Prevention and Punishment of the Crime of Genocide in the Gaza Strip (South Africa v. Israel)*, Application Instituting Proceedings, 29 December 2023, para. 111(2)(e) (requesting the Court to adjudge and declare Israel's obligation to make reparation to the Palestinian victims); *Application of the Convention on the Prevention and Punishment of the Crime of Genocide (The Gambia v. Myanmar)*, Application Instituting Proceedings, 11 November 2019, para. 112, fourth bullet (requesting the Court to adjudge and declare Myanmar's obligation to make reparation to the Rohingya). *See also, mutatis mutandis, Aerial Incident of 8 January 2020 (Canada, Sweden, Ukraine and United Kingdom v. Islamic Republic of Iran)*, Joint Application Instituting Proceedings, 4 July 2023, para. 41(c)(ii) (requesting an order for compensation for the victims and their families in circumstances where the victims were not all nationals of the Applicant States).

[652] *Armed Activities (Reparation)*, p. 137, para. 408.

[653] ILC, *Articles on State Responsibility*, Article 1.

the subject of the first question. As explained above, the customary international law of State responsibility will guide such an exercise. In this sub-section, Antigua and Barbuda applies the customary international law of State responsibility in the context of climate change, without prejudice to the case specific considerations that may arise in any given case where the Court is actually called upon to identify legal consequences for a particular State in relation to particular conduct.

586. The following discussion is organised by the list of obligations Antigua and Barbuda identified above, in discussing Question (a). For each obligation, Antigua and Barbuda explains (i) the type of conduct that would constitute a breach of the relevant obligation and trigger a State's responsibility; and (ii) the content of the responsibility, in terms of the obligations of compliance, cessation and non-repetition, and of full reparation.

587. In **sub-section IV.D.1** below, Antigua and Barbuda discusses legal consequences stemming from the violation of mitigation obligations (as identified in sub-section III.B.1, above). In **sub-section IV.D.2** below, Antigua and Barbuda then discusses the legal consequences of violation of adaptation obligations (as identified in sub-section III.B.2, above). Finally, in **sub-section IV.D.3** below, the legal consequences arising from violations of obligations concerning financial and technological support (as identified in sub-section III.B.3, above) are discussed.

588. Before turning to this discussion on legal consequences that arise from breach of individual obligations, Antigua and Barbuda reiterates certain factors that apply horizontally, in determining legal consequences arising from violation of any of these obligations related to climate change:

589. *First*, virtually all States have standing to invoke the responsibility of other States in relation to these obligations. They may do so either in their capacity as injured States, or as members of a collective to whom *erga omnes* or *erga omnes partes* obligations are owed. SIDS are well-placed to invoke responsibility on either basis. Reparations can be claimed directly by injured States for their own harm, or by non-injured States for the benefit of injured States or of the beneficiaries of the obligations breached.

590. *Second*, the plurality of responsible and injured States does not shield any of the responsible States from claims or to bar any eligible State from bringing claims. The basis of the obligation to make reparation for an internationally wrongful act is the

existence and not the extent of contribution to the injury. The responsibility of any State may be invoked without prejudice to the responsibility of other States.

591. *Third*, in apportioning responsibility among multiple responsible States, the most important *variable* is the respective shares of States to historical global GHG emissions in breach of the relevant obligations. In undertaking any such apportionment, Antigua and Barbuda reiterates that emissions from colonised territories during colonial periods are to be attributed to the colonial powers, not to the formerly colonised States.

592. *Fourth*, any reparations which are paid collectively should be apportioned among injured States in a fair and equitable manner. Any such apportionment should be proportionate to the extent of harm suffered or likely to be suffered by the injured States. In any such apportionment, uniquely vulnerable developing States – like SIDS – must be preferred.

1. Legal consequences of violation of mitigation obligations

593. In Section III, Antigua and Barbuda identified mitigation obligations under, respectively, the Paris Agreement, international customary law, human rights law, the UNCLOS and trade law.[654] Specifically, Antigua and Barbuda identified the following mitigation obligations under these sources of international law:

(a) The obligation of States Parties to the **Paris Agreement** to "*prepare, communicate* and *maintain* successive nationally determined contributions", under Article 4.2 of the Paris Agreement. This obligation includes:

(i) The obligation to *prepare* an NDC, as follows:

a) Using the best available scientific evidence;

b) Accelerating mitigation efforts through rapid, deep and sustained emission reductions, reflecting the "highest possible ambition". Given the 1.5°C RCB, this requires, in practice, that a State prepare an NDC to reduce, collectively, emissions by considerably more than 43 percent by 2030, 60 percent by 2035,

[654] The legal consequences of violation of obligations under trade law are not discussed in this sub-section, because the WTO dispute settlement system establishes specific rules on the matter. In general, a violation of WTO obligations brings a WTO Member under an obligation to achieve prospective compliance with the relevant obligation.

69 percent by 2040, and 84 percent by 2050, compared with 2019 levels, and achieve net zero CO2 emissions well before early 2050 and net zero GHG emissions well before early 2070;

c) Respecting the principle of fairness, equity and CBDR-RC. This requires, in practice, that each State prepare its NDC which reduces emissions according to its equitable share of the 1.5°C RCB;

d) Providing LDCs and SIDS special dispensation to prepare and communicate strategies, plans and actions that reflect their "special circumstances"; while other States must prepare an NDC that addresses this differentiation in favour of LDCs and SIDS;

e) Taking into account the outcome of the First Global Stocktake Decision. In light of this outcome, a State must prepare its NDC with an increased level of ambition, in order to meet the Paris temperature goal and prevent dangerous anthropogenic interference with the climate system.

(ii) The obligation to *communicate* an NDC, including an explanation covering the topics identified in COP Decision 4/CMA.1.

(iii) The obligation to *maintain* an NDC, *i.e.*, for a State to (i) take action to achieve its NDC, and that (ii) the action taken meets the threshold of diligence required, namely that it constitutes all means at its disposal to meet its NDC.

(b) The following obligations of States under **customary international law**:

(i) A due diligence obligation of prevention, to adopt rapid, deep and sustained emissions reduction measures sufficient to prevent significant environmental harm, consistent with fairness, equity and CBDR-RC. This obligation applies in relation to a State's past and future emissions.

a) From the time when States first became aware of the risk that anthropogenic GHG emissions might cause significant harm to the climate system, States were under an obligation to take

diligent action to prevent such harm, in light of the degree of knowledge and risk, the level of their emissions, and the means at their disposal.

b) Looking forward, each developed State must do its utmost, using all the means at its disposal, to reduce its emissions, taking into account its equitable share of the 1.5°C RCB, the most recent scientific evidence, and the fact that anthropogenic emissions cause significant environmental harm at levels below the 1.5°C temperature increase. This means that each developed State has to reduce its emissions by considerably more than the collective targets aligned with the IPCC 1.5°C pathway. Specifically, a developed State must do its utmost, using all the means at its disposal, to reduce its emissions by *considerably more* than 43 percent by 2030, 60 percent by 2035, 69 percent by 2040, and 84 percent by 2050, compared with 2019 levels, and achieve net zero CO2 emissions *well before* early 2050 and net zero GHG emissions *well before* early 2070. To emit its equitable share, a developing State may be permitted to set emission reduction targets that are less demanding than the collective targets aligned with the IPCC 1.5°C pathway, depending on each developing State's past and present emissions, level of development and capabilities for tackling climate change.

(ii) An obligation to cooperate, especially through notification and consultation with potentially affected States to ensure that, in setting emissions reduction targets to minimise the impact of climate change, the 1.5°C RCB is indeed divided equitably.

(c) The obligation of States parties to **human rights treaties** to adopt effective mitigation measures: (1) reflecting their highest possible ambition and the precautionary principle; (2) based on the best available science; and (3) based on principle of fairness, equity and CBDR-RC. This obligation is similar to the customary obligation of prevention, specified under (b)(i), above, in relation to the impact of climate change on human rights.

(d) The obligation of States parties to the **UNCLOS**, under Article 194, to do their utmost, using all the means at their disposal, to reduce emissions sufficient to keep long-term temperatures at a level that would prevent, reduce and control pollution of the marine environment. This obligation is similar to the customary obligation of prevention, specified under (b)(i), above, in relation to the impact of climate change on pollution of the marine environment. Further, UNCLOS Parties are also under an additional obligation to abide by their commitments under the Paris Agreement.

594. Of these, obligations (a)(iii), (b)(i), (c) and (d) require States to reduce their emissions. These are discussed together in sub-section (a) below as "Emission Reduction Obligations". The other obligations ((a)(i), (a)(ii), and (b)(ii)) are discussed in sub-section (b) below as "Other Obligations".

a. Legal Consequences Arising from Violation of Emission Reduction Obligations

595. Several of the obligations identified above ((a)(iii), (b)(i), (c) and (d), above) require States to reduce their anthropogenic GHG emissions. The obligations identified in (b)(i) above apply to all States, while the other obligations apply only to States that are party to the relevant treaties.

596. To be clear, these obligations concern not merely emissions arising from governmental activity, but the aggregate of ***all*** GHG emissions from the territory of a State. This includes emissions from private actors. The obligations of a State concerning emission reductions entail a primary obligation for the State to use its territorial and jurisdictional competences to regulate private conduct so as to achieve the requisite levels of emission reductions. Any conduct contrary to these emission reduction obligations would be on account of the State's failure to do so.[655] This failure, being the conduct of organs of the State, is attributable to the State.

597. Where these obligations are breached, they trigger the following legal consequences.

598. *First*, as these breaches are likely to constitute continuing breaches, the State would come under an obligation of **compliance, cessation and non-repetition**. To meet these

[655] *Armed Activities (Reparations)*, pp. 64-65, para. 149, p. 73, para. 173, p. 85, para. 214, pp. 125-126, paras. 359 and 361-362.

obligations, the State would need to cease further emissions and achieve a sufficient reduction of emissions, so as to be no longer in violation of its obligations. Further, the obligation of non-repetition requires the State to take measures to ensure that in the future, its emissions remain at levels where they do not constitute violations of the Emission Reduction Obligations.

599. *Second*, and equally important, the State would also be under an obligation to make **full reparations** for any injury caused by its breach of the Emission Reduction Obligations. These reparations may take different forms in different factual circumstances. These may include, for example:

(a) Bearing the *cost of restoration* of the ecosystems harmed by climate change where such restoration is possible, and where States within whose territories the restoration measures are to be carried out consent.

(b) Where climate change necessitates adaptation action in the territories of affected and vulnerable States or in areas beyond national jurisdiction, *paying for adaptation measures*.[656] This could include the costs of building climate resistant infrastructure like sea walls, the cost of any necessary physical modifications to the environment, or the cost of social adaptation to the environment. Further, where the necessary adaptation measures require the territorial State to reduce its exploitation of certain natural resources – for example, reducing permissible catch of a species of fish – to preserve that resource against climate change impacts, reparations would take the form of compensating the injured State for the reduced resources.

(c) Where *loss and damage* from climate change impact has already occurred and can no longer be avoided through adaptation measures, paying monetary compensation. This obligation would extend to all forms of loss and damage without limitation, and would include the loss of territory, loss of lives and

[656] *See*, *Certain Activities (Compensation)*, pp. 28-29, para. 43 ("The Court is therefore of the view that damage to the environment, and the consequent impairment or loss of the ability of the environment to provide goods and services, is compensable under international law. Such compensation may include indemnification for the impairment or loss of environmental goods and services in the period prior to recovery and payment for the restoration of the damaged environment."). *See also*, paras. 567-568, *above*.

livelihood, loss of biodiversity, loss of economic resources or opportunities, and social impacts.[657]

b. Legal Consequences Arising from Violation of Other Obligations

600. The other obligations identified above ((a)(i), (a)(ii), and (b)(ii)) do not require States to reduce their anthropogenic GHG emissions. Specifically, these obligations require States party to the Paris Agreement to "prepare" and "communicate" an NDCs ((a)(i), and (a)(ii), above), and all States to cooperate ((b)(ii), above).

601. *First*, States Parties to Paris Agreement must prepare and communicate an NDC. States would breach these obligations, and attract responsibility, if they fail to prepare and/or communicate an NDC or prepare and/or communicate one that is deficient in some manner. Deficiencies may arise on account of an NDC not being based on best available scientific evidence, not being sufficiently ambitious, not being progressive in comparison to a previous NDC, or not being equitable in the allocation of the remaining carbon budget (particularly, on account of failure to appropriately reflect the principle of CBDR-RC). Further, Parties to the Paris Agreement would breach the obligation in (a)(ii) above if they do not communicate on topics covered by the NDC, including topics identified in COP Decision 4/CMA.1.

602. In furtherance of the obligations of compliance, cessation and non-repetition, States would need to prepare and communicate an NDC or a suitably revised NDC, and ensure that appropriate NDCs are prepared and communicated in the future. For example, where a State has prepared and communicated an NDC which is inequitable on account of failure to properly reflect the principle of CBDR-RC, the State would need to prepare and communicate a suitably revised NDC consistent with its primary obligation in this regard, and ensure that its future NDCs are compliant. Similarly, a State breaching the obligation in (iii) above would be required to make the requisite communication.

603. Where the failure to prepare and communicate an NDC, or deficiencies in an NDC has also resulted in the State not having complied with its Emission Reduction Obligations, the legal consequences described in sub-section (a), above, would also be triggered.

[657] *See*, footnote 656 and paras. 567-576, *above*.

604. *Second*, where a State fails to cooperate, the obligation of cessation and compliance would require the State to cooperate appropriately in the future. Further, where the failure to cooperate has caused injury to another State or to areas beyond national jurisdiction, the obligation of full reparation – including compensation for any loss and damage – would apply.

2. Legal consequences of violation of adaptation obligations

605. To recall, Antigua and Barbuda identified the following adaptation obligations for States, in Section III.B.2:

(a) The obligation of State Parties to the Paris Agreement and the UNCLOS to take effective adaptation measures, where possible in light of the special circumstances of the territorial State, and where support and financing for adaptation is made available.

(b) The obligation to cooperate to ensure that adaptation measures are mutually compatible and reinforcing, and do not undermine each other.

(c) The obligation to ensure that adaptation measures adopted in the territory of one State do not cause transboundary harm to the territories of other States, or harm to the environment outside national jurisdictions.

606. The obligation in (a) above is conditional in nature, and is applicable where adaptation measures are feasible and appropriate in the special circumstances of the territorial State, and where the necessary support and financing is made available. Where these preconditions are met, and yet the territorial State does not undertake adaptation measures, it would be in breach of the obligation, and its responsibility would be engaged. The obligation of compliance and cessation, in this context, would require the territorial State to undertake the necessary and appropriate adaptation measures in line with the best available science, so long as the preconditions continue to be met.

607. The obligations in (b) and (c) require respectively that States do not undermine adaptation measures of other States, or cause transboundary harm, through their adaptation measures. Where a State causes such effects through its adaptation measures, its wrongful conduct would attract responsibility.

608. In these circumstances, the obligation of compliance and cessation would require the State to halt, reverse or modify its adaptation measure to avoid these effects. Where harm to another State or to areas beyond national jurisdiction has already materialised, the State would be under an obligation to make full reparations by paying for restoration of the environment where possible, or through financial compensation for any loss and damage.

609. That said, where such a breach is occasioned by the adaptation measures of a particularly vulnerable State, such as one of the SIDS, necessity may apply as a circumstance precluding wrongfulness. This will need to be considered on a case specific basis.

3. Legal consequences of violation of support obligations

610. To recall, Antigua and Barbuda identified the following support obligations for States, in Section III.B.3.

(a) The obligation of developed State Parties to the Paris Agreement, the UNCLOS, the CBD or the WTO Agreement to provide financial and technological support to mitigation and adaptation needs of developing countries. Technological support, in this context, should include, *inter alia*, the creation of incentives for private institutions to transfer technology to developing countries for their mitigation and adaptation needs.

(b) The obligation of developed State Parties to the Paris Agreement, the UNCLOS, the CBD or the WTO Agreement to ensure that the financial and technological support is continuously increased until it is sufficient to meet the mitigation and adaptation needs of developing countries. With respect to financial support, developed State Parties to the Paris Agreement or UNCLOS are under a specific obligation to immediately deliver at least the USD 100 billion per year floor set in the Copenhagen Accord.[658]

(c) The obligation of State Parties to the Paris Agreement, the UNCLOS, the CBD or the WTO Agreement to ensure that the allocation of any financial and technological support takes fully into account the needs and priorities, and

[658] *See*, sub-section III.B.3, paras. 473-483, *above*.

unique vulnerabilities, of the potential recipients. In any such allocation, SIDS and other particularly vulnerable States must receive preference.[659] This is particularly true for adaptation support, given the urgent adaptation needs faced by SIDS and other particularly vulnerable developing countries.

611. Developed States would be in breach of these obligations, attracting responsibility, if they fail to provide such financial and technology assistance, deliver such assistance at levels which are insufficient to meet the mitigation and adaptation needs of developing countries, fail to immediately deliver at least the USD 100 billion per year floor set out in the Copenhagen Accord, or fail to allocate assistance appropriately. Failures to allocate assistance properly would include any allocation which, on the basis of artificial criteria like GNI per-capita, deprives SIDS of much needed and well-deserved priority in the allocation of assistance.[660]

612. The obligation of compliance and cessation would require that developed States make up the shortfall in financial and technology support immediately, and reallocate support in a manner consistent with their obligations. The obligation of non-repetition would require them to take measures to ensure that they do not, in the future, fail to deliver sufficient financial and technological support or allocate it consistently with their obligations. While the obligation of compliance and cessation falls on each developed State, developed States may rely on existing institutional mechanisms or create new institutional frameworks to achieve compliance with this obligation.

613. Where a breach occurs on account of improper allocation of assistance (*e.g.,* because they are allocated on the basis of improper criteria like GNI per-capita), the responsible State would be under an obligation to revise any ongoing allocation, so as to cease the wrongful conduct. The responsible State would also be required to correct the past improper allocations retrospectively, as a form of restitution. Furthermore, the obligation of compliance and non-repetition would require the responsible State to correct its allocation criteria to ensure that future allocations are consistent with its international obligations.

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[659] *See*, sub-section III.B.3, paras. 484-494, *above*.

[660] *See*, sub-section III.B.3, paras. 484-494, *above*.

614. Where all or some of the requisite financial assistance is delivered with a delay, the obligation of full reparations would require that developed States compensate the recipients for the loss in time value of money, by way of appropriate interest.[661] This would also include circumstances where financial assistance was allocated improperly (*e.g.*, because they are allocated on the basis of improper criteria like GNI per-capita) and the allocations are revised subsequently as discussed above; the responsible States would be an under an obligation to compensate the recipient States for the loss in time value of money, for that portion of assistance which was previously denied to them on account of improper allocation.

615. Further, where the failure to deliver sufficient financial and technological support in a timely manner has resulted in the recipient having further enhanced costs of mitigation or adaptation, the developed States would be required to compensate the recipient for these additional costs. Moreover, where the failure to deliver sufficient financial and technological support in a timely manner has already caused irreparable loss and damage to the territory of another State or in areas beyond national jurisdiction, developed countries would be under an obligation to provide financial compensation for such loss and damage.

E. Conclusion

616. States will be responsible for breaches of their obligations outlined in Section III. The breach of those obligations automatically gives rise to immediate duties: (i) to cease any continuing wrongful conduct and comply with extant obligations; and (ii) where the breach has caused injury, to make full reparation for such harm. This is a straightforward application of the customary international law rules of State responsibility.

617. The fact that a plurality of States has contributed to causing harm does not detract from the conclusion that such States are responsible for their breaches and must make reparation for the harm caused thereby. Similarly, evidential uncertainty as to the

[661] *See*, ILC, *Articles on State Responsibility*, Article 38(1); *S.S. "Wimbledon", 1923, P.C.I.J., Series A, No. 1*, p. 30 (awarding post-judgment interest); *Armed Activities (Reparations)*, pp. 135-136, paras. 401-402 (awarding post-judgment interest, and recognising that "pre-judgment interest may be awarded if full reparation for injury caused by an internationally wrongful act so requires"). *See also*, *Diallo (Compensation)*, pp. 343-344, para. 56; *Certain Activities (Compensation)*, p. 58, paras. 154-155).

precise extent of injury occasioned in a particular case, or the specific causal link in play, will not preclude a finding of responsibility and a duty to make reparations.

618. Questions of how much compensation each responsible State is liable to pay is a question of apportionment, which arises subsequent to the establishment of responsibility. States can and should be found responsible for, and liable to make reparation in respect of, breaches of international law that contribute to anthropogenic GHG emissions which is causing significant harm to the climate system and other parts the environment.

619. The international community faces catastrophic consequences if meaningful action on climate change is not taken immediately. The regime of State responsibility has a vital role to play in facilitating authoritative declarations by international courts on the obligations and responsibilities of States which will undoubtedly have an influential role in modifying of State behaviour for the benefit of the planet as a whole.

Zachary Phillips

Agent of Antigua and Barbuda

CERTIFICATION

I have the honour to certify that the annex that accompanies this Written Statement is a true copy of the original document.

Zachary Phillips

Agent of Antigua and Barbuda

LIST OF ANNEXES TO THE WRITTEN STATEMENT

SCIENCE OF CLIMATE CHANGE AND THE CARIBBEAN: FINDINGS FROM THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC) SIXTH ASSESSMENT CYCLE (AR6)

Dr. Adelle Thomas, Climate Analytics, IPCC AR6 Lead Author, IPCC AR7 WGII Vice-Chair

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March 5, 2024

TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

This report provides an overview of the scientific consensus on the causes, impacts and risks of climate change for the Caribbean region as well as important scientific research gaps. Drawing from the most recent reports of the Intergovernmental Panel on Climate Change (IPCC), the report highlights historic responsibility for greenhouse gases (GHG) that drive climate change, observed climatic, biophysical and socio-economic impacts of climate change in the Caribbean and projected future risks of climate change, highlighting the importance of limiting global average warming to 1.5°C for the region.

This report draws directly from the seven reports produced in the Sixth Assessment Cycle of the IPCC. We have extracted main findings from the IPCC reports and text is directly quoted from the reports. This provides an objective overview of the scientific assessment of climate change causes, impacts, risks and research gaps that are relevant to the Caribbean.

The report highlights that human activities have unequivocally caused global warming. Emissions of greenhouse gases that have been tracked since 1850 show wide regional disparities, with small island developing states (SIDS) across the globe contributing approximately only 0.5% of historical cumulative emissions. These emissions have caused warming of the atmosphere of approximately 1.1°C, which has resulted in widespread and rapid changes to environments across the globe. However, SIDS, including the countries of the Caribbean, are disproportionately affected by current impacts and future risks of climate change.

In terms of current impacts, much of the Caribbean region shows statistically significant warming of the atmosphere and detectable decreasing trends in precipitation. The most severe drought in the region from 2013 to 2016 was strongly related to anthropogenic warming and increased the severity of the event by 17% and the spatial extent by 7%. Small Islands of the Caribbean have experienced negative changes to terrestrial, freshwater and ocean ecosystems with adverse implications for biodiversity. Negative impacts have been observed on many human systems, including water and food security, health and well-being, and cities, settlements and infrastructure. Tropical cyclones, storms, floods, droughts and coral reef damage are exacerbating existing vulnerabilities among the population and economies of the Caribbean.

For future risks, climate change poses significant challenges for the Caribbean, threatening sustainable development. Even if global warming is limited to 1.5°C, the compounding impacts of climate change are projected to contribute to the loss of critical natural and human systems, including threatening the habitability of some islands and coastal communities. Some impacts may be irreversible, such as the loss of coral reefs with significant consequences for the Caribbean including loss of coastal protection, biodiversity loss and impacts on critical livelihoods such as tourism and fisheries. Sea level rise (SLR) has been projected to impact the terrestrial biodiversity of low-lying islands and coastal regions via large habitat losses. Caribbean islands are among those projected to suffer the most habitat loss with projections of between 8.7% and 49.2% of its islands entirely submerged, respectively, from 1-m to 6-m SLR. Higher levels of global warming limit the options available for Caribbean countries to adapt to escalating risks posed by climate change.

Limiting global warming to a specific level requires transformational change to curb cumulative carbon dioxide emissions, reach net zero and also reduce emissions of other greenhouse gases. Future warming depends on past, current and future emissions. Current emissions as well as future emissions planned by countries and detailed in their submissions to the United Nations Framework Convention on Climate Change (UNFCCC) make it likely that

global warming will exceed 1.5°C this century. Surpassing 1.5°C is a critical threshold for SIDS, including in the Caribbean, with escalating impacts of climate change resulting in limits in the ability of people and nature to adapt.

The IPCC reports also highlight that there are regional disparities in data and scientific studies, with significant gaps in the Caribbean. Despite intensive study, many knowledge gaps remain in island-scale data availability, ecosystem services data, vulnerability, resilience and adaptation.

In summary, the science is very clear that Caribbean SIDS have made negligible contributions to the emissions that drive current and future climate change, that they are disproportionately affected by current impacts and future risks of climate change and that there are significant gaps in data and scientific studies that are needed to effectively assess and respond to climate change in the Caribbean.

2. OVERVIEW OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC)

Formed in 1988 by the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP), the IPCC is mandated with providing regular assessments of the scientific evidence of climate change, its current impacts and future risks, and strategies for adaptation and mitigation. Its core mission revolves around furnishing governments at all levels with scientifically robust insights essential for shaping climate policies. IPCC reports play a pivotal role as key points of reference during international climate negotiations at the United Nations Framework Convention on Climate Change (UNFCCC). The IPCC is an organization of governments that are members of the United Nations or WMO and currently has 195 members.

The IPCC produces assessment reports every five-seven years during assessment cycles. The most recent Sixth Assessment Cycle concluded in 2023 and produced seven reports:

- Global Warming of 1.5°C (2018)
- Climate Change and Land (2019)
- The Ocean and Cryosphere in a Changing Climate (2019)
- Climate Change 2021: The Physical Science Basis (2021)
- Climate Change 2022: Impacts, Adaptation and Vulnerability (2022)
- Climate Change 2022: Mitigation of Climate Change (2022)
- Synthesis Report: Climate Change 2023 (2023)

IPCC reports are produced with the highest level of scientific rigor. Hundreds of carefully selected scientists volunteer their time as IPCC authors to evaluate thousands of published scientific papers and provide comprehensive assessments of the literature. Reports are reviewed multiple times by experts and governments around the world in order to ensure an objective assessment that reflects diversity of views and expertise. The IPCC does not conduct its own research, rather it provides an assessment of the strength of scientific agreement in different areas. Confidence language is used to convey this assessment of the strength of different findings and ranges from *very high confidence* to *low confidence*, based on evaluation of underlying evidence and agreement.

Table1: Key abbreviations used in IPCC reports

CO_2	Carbon dioxide
$CO_{2\text{-eq}}$	Carbon dioxide equivalent
ENSO	El Niño-Southern Oscillation
ESL	Extreme sea level
ETC	Extratropical cyclone
FFI	Fossil-fuel combustion and industrial

GHG	Greenhouse gas
GMSL	Global mean sea level
IAS	Invasive alien species
JJA	June, July, August
NDC	Nationally Determined Contribution
SIDS	Small island developing states
SLR	Sea level rise
SST	Sea surface temperature
TC	Tropical cyclone

3. CAUSES OF CLIMATE CHANGE

HISTORICAL

Human activities, principally through emissions of greenhouse gases, have unequivocally caused global warming, with global surface temperature reaching 1.1°C above 1850–1900 in 2011–2020. Global greenhouse gas emissions have continued to increase over 2010–2019, with unequal historical and ongoing contributions arising from unsustainable energy use, land use and land-use change, lifestyles and patterns of consumption and production across regions, between and within countries, and between individuals (*high confidence*). Human-caused climate change is already affecting many weather and climate extremes in every region across the globe. This has led to widespread adverse impacts on food and water security, human health and on economies and society and related losses and damages to nature and people (*high confidence*). Vulnerable communities who have historically contributed the least to current climate change are disproportionately affected (*high confidence*).[1]

Total net anthropogenic GHG emissions have continued to rise during the period 2010–2019, as have cumulative net CO_2 emissions since 1850. Average annual GHG emissions during 2010–2019 were higher than in any previous decade, but the rate of growth between 2010 and 2019 was lower than that between 2000 and 2009. (*high confidence*)[2]

GHG emissions trends over 1990–2019 vary widely across regions and over time, and across different stages of development, as shown in Figure SPM.2. Average global per capita net anthropogenic GHG emissions increased from 7.7 to 7.8 tCO2-eq, ranging from 2.6 tCO2-eq to 19 tCO2-eq across regions. Least developed countries (LDCs) and **Small Island Developing States (SIDS) have much lower per capita emissions (1.7 tCO2-eq and 4.6 tCO2-eq, respectively) than the global average (6.9 tCO2-eq),** excluding CO2-LULUCF. (*high confidence*)[3]

Historical contributions to cumulative net anthropogenic CO2 emissions between 1850 and 2019 vary substantially across regions in terms of total magnitude, but also in terms of contributions to CO2-FFI (1650 ± 73 GtCO2-eq) and net CO2-LULUCF (760 ± 220 GtCO2-eq) emissions. **Globally, the major share of cumulative CO2-FFI emissions is concentrated in a few regions**, while cumulative CO2-LULUCF9 emissions are concentrated in other regions. **LDCs**

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[1] IPCC, 2023: Climate Change 2023: Synthesis Report. Contribution of Working Groups I, II and III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Core Writing Team, H. Lee and J. Romero (eds.)]. IPCC, Geneva, Switzerland, pp. 35-115, doi: 10.59327/IPCC/AR6-9789291691647. [**Synthesis Report**] 2.1

[2] IPCC, 2022: Summary for Policymakers [P.R. Shukla, J. Skea, A. Reisinger, R. Slade, R. Fradera, M. Pathak, A. Al Khourdajie, M. Belkacemi, R. van Diemen, A. Hasija, G. Lisboa, S. Luz, J. Malley, D. McCollum, S. Some, P. Vyas, (eds.)]. In: Climate Change 2022: Mitigation of Climate Change. Contribution of Working Group III to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [P.R. Shukla, J. Skea, R. Slade, A. Al Khourdajie, R. van Diemen, D. McCollum, M. Pathak, S. Some, P. Vyas, R. Fradera, M. Belkacemi, A. Hasija, G. Lisboa, S. Luz, J. Malley, (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA. doi: 10.1017/9781009157926.001. [**WGIII SPM**] B.1

[3] WGIII SPM B.3.1

contributed less than 0.4% of historical cumulative CO2-FFI emissions between 1850 and 2019, while SIDS contributed 0.5%. (*high confidence*)[4] [*See figures on pages 10-11]*

FUTURE

Limiting human-caused global warming to a specific level requires limiting cumulative CO2 emissions, reaching net zero or net negative CO2 emissions, along with strong reductions in other GHG emissions. Future additional warming will depend on future emissions, with total warming dominated by past and future cumulative CO_2 emissions.[5]

Global GHG emissions in 2030 associated with the implementation of NDCs announced prior to COP26 would make it likely that warming will exceed 1.5°C during the 21st century and would make it harder to limit warming below 2°C – if no additional commitments are made or actions taken.[6]

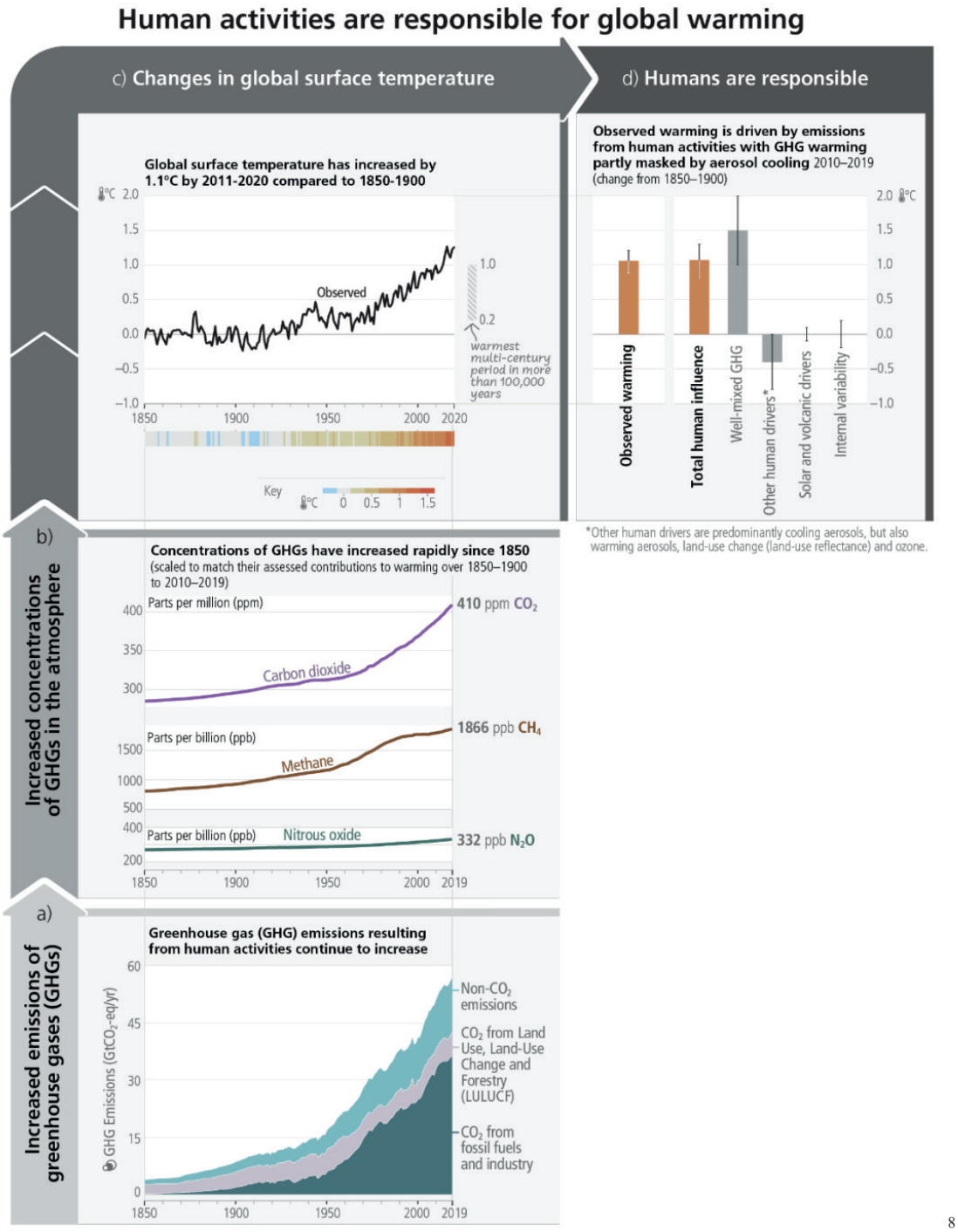
Global warming will continue to increase in the near term (2021–2040) mainly due to increased cumulative CO2 emissions in nearly all considered scenarios and pathways. In the near term, every region in the world is projected to face further increases in climate hazards (*medium to high confidence*, depending on region and hazard), increasing multiple risks to ecosystems and humans (*very high confidence*).[7]

[4] WGIII SPM B.3.2

[5] Synthesis Report Longer Report Cross Section Box.1

[6] Synthesis Report Longer Report Section 2.3.1

[7] Synthesis Report Longer Report Section 4.3



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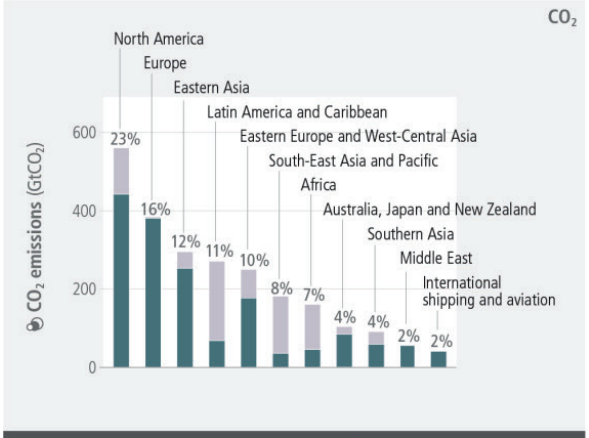
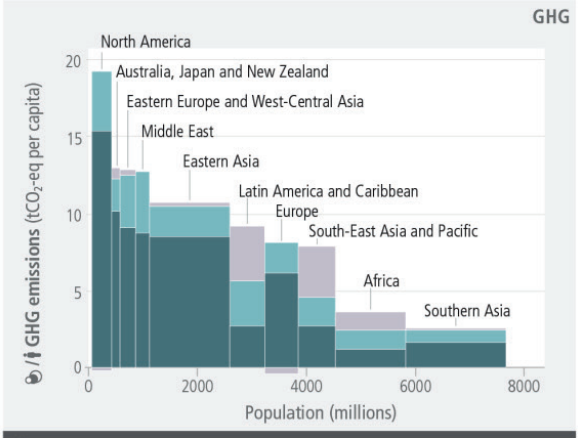
[8] Synthesis Report Figure 2.1: The causal chain from emissions to resulting warming of the climate system.

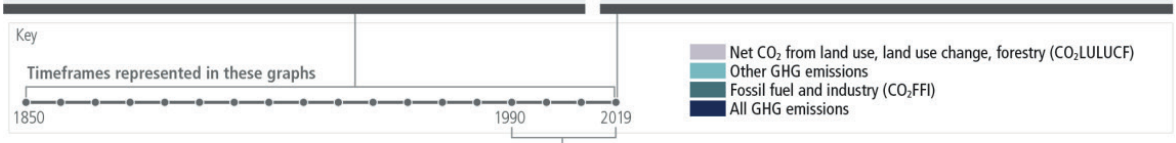
Emissions have grown in most regions but are distributed unevenly, both in the present day and cumulatively since 1850

a) **Historical cumulative net anthropogenic CO_2 emissions per region (1850–2019)**

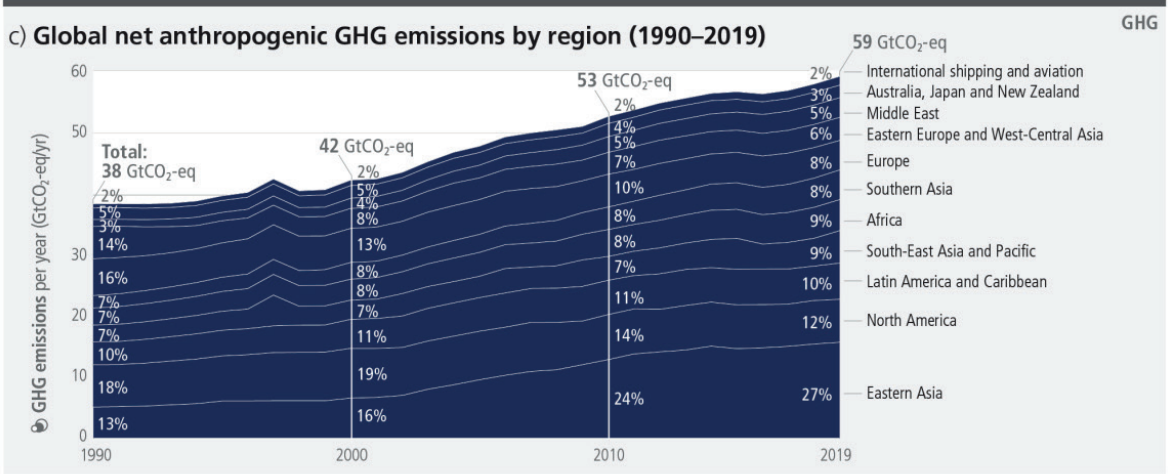


b) **Net anthropogenic GHG emissions per capita and for total population, per region (2019)**





c) **Global net anthropogenic GHG emissions by region (1990–2019)**



d) **Regional indicators (2019) and regional production vs consumption accounting (2018)**

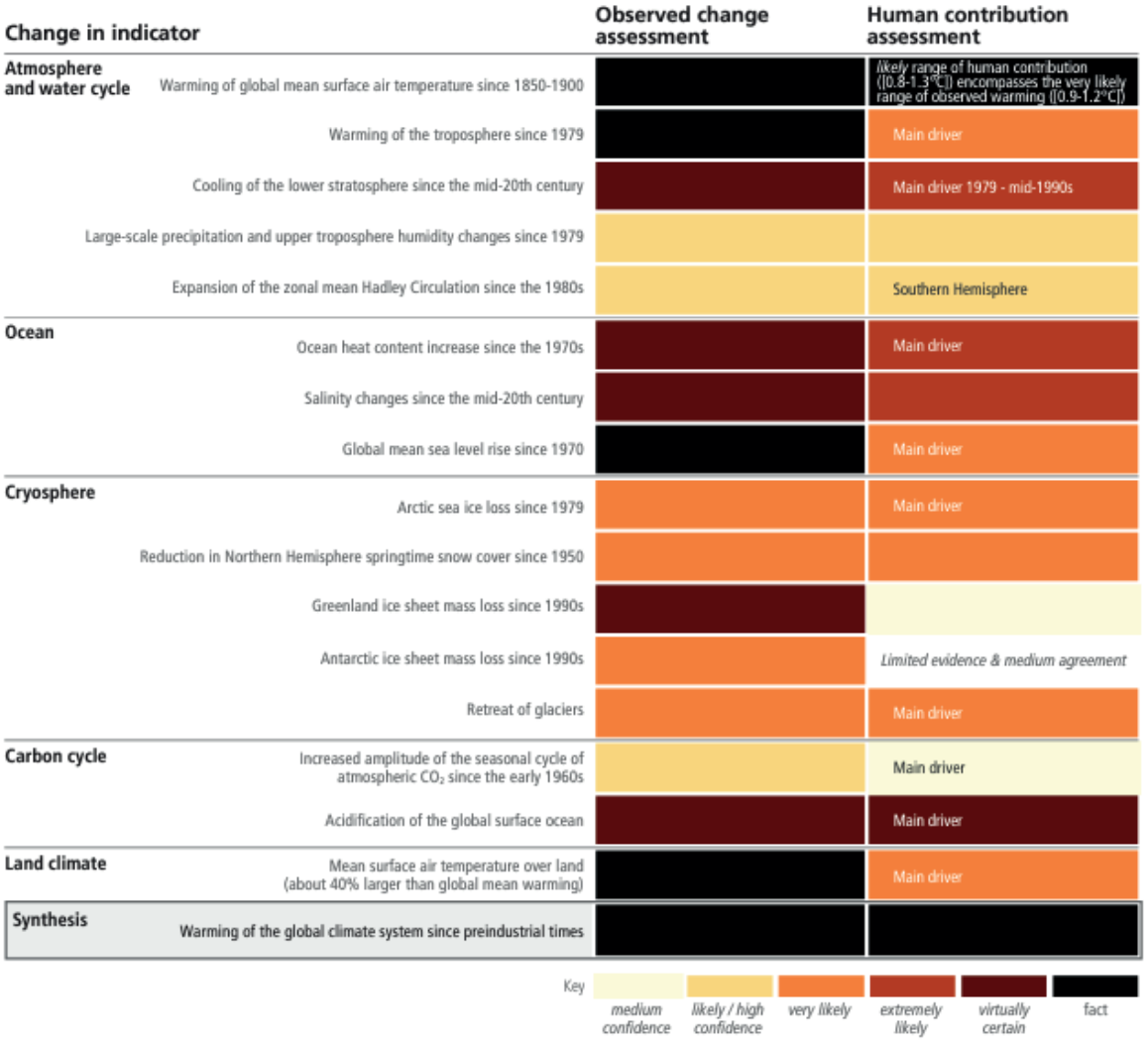
	Africa	Australia, Japan, New Zealand	Eastern Asia	Eastern Europe, West-Central Asia	Europe	Latin America and Caribbean	Middle East	North America	South-East Asia and Pacific	Southern Asia
Population (million persons, 2019)	1292	157	1471	291	620	646	252	366	674	1836
GDP per capita (USD1000$_{PPP}$ 2017 per person) [1]	5.0	43	17	20	43	15	20	61	12	6.2
Net GHG 2019 [2] (production basis)										
GHG emissions intensity (tCO_2-eq / USD1000$_{PPP}$ 2017)	0.78	0.30	0.62	0.64	0.18	0.61	0.64	0.31	0.65	0.42
GHG per capita (tCO_2-eq per person)	3.9	13	11	13	7.8	9.2	13	19	7.9	2.6
CO_2FFI, 2018, per person										
Production-based emissions (tCO_2FFI per person, based on 2018 data)	1.2	10	8.4	9.2	6.5	2.8	8.7	16	2.6	1.6
Consumption-based emissions (tCO_2FFI per person, based on 2018 data)	0.84	11	6.7	6.2	7.8	2.8	7.6	17	2.5	1.5

[1] GDP per capita in 2019 in USD2017 currency purchasing power basis.
[2] Includes CO_2FFI, CO_2LULUCF and Other GHGs, excluding international aviation and shipping.

The regional groupings used in this figure are for statistical purposes only and are described in WGIII Annex II, Part I.

4. OBSERVED IMPACTS IN THE CARIBBEAN

It is unequivocal that human influence has warmed the atmosphere, ocean and land. Widespread and rapid changes in the atmosphere, ocean, cryosphere and biosphere have occurred[10]



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[9] Synthesis Report Figure 2.2: Regional GHG emissions, and the regional proportion of total cumulative production-based CO2 emissions from 1850 to 2019

[10] Synthesis Report 2.1.2

[11] Synthesis Report Table 2.1: Assessment of observed changes in large-scale indicators of mean climate across climate system components, and their attribution to human influence

OBSERVED CHANGES TO CARIBBEAN CLIMATE

TEMPERATURE

Significant positive trends in temperature ranging from 0.15°C per decade (over the period 1953–2010) to 0.18°C per decade (over the period 1961–2011) are noted in the tropical western Pacific, where the significant increasing and decreasing trends in warm and cool extremes, respectively, are also spatially homogeneous (Jones et al., 2013; Whan et al., 2014; Wang et al., 2016). Similarly, **much of the Caribbean region showed statistically significant warming (at the 95% level) over the period 1901–2010** (P.D. Jones et al., 2016 b). **Observation records in the Caribbean region indicate a significant warming trend of 0.19°C per decade and 0.28°C per decade in daily maximum and minimum temperatures, respectively, with statistically significant increases (at the 5% level) in the number of warm days and warm nights during 1961–2010** (Taylor et al., 2012; Stephenson et al., 2014; Beharry et al., 2015).[12]

PRECIPITATION

A weather station-based annual precipitation trend analysis over 1901–2010 in the Caribbean region indicated some locations with detectable decreasing trends (Knutson and Zeng, 2018), **which were attributable in part to anthropogenic forcing.** These include southern Cuba, the northern Bahamas, and the Windward Islands, although significant trends were not found over the shorter periods of 1951–2010 and 1981–2010. **In the Caribbean islands, a dataset of the Palmer Drought Severity Index (PDSI) from 1950 to 2016 showed a clear drying trend in the region** (Herrera and Ault, 2017). **The 2013–2016 period showed the most severe drought during the period and was strongly related to anthropogenic warming, which would have increased the severity of the event by 17% and its spatial extent by 7%** (Herrera et al., 2018).

It is very likely that most Small Islands have warmed over the period of instrumental records. The clearest precipitation trend is a likely decrease in JJA[13] rainfall over the Caribbean since 1950. There is limited evidence and low agreement for the cause of the observed drying trend, whether it is mainly caused by decadal-scale internal variability or anthropogenic forcing, but it is likely that it will continue over coming decades.[14]

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[12] Gutiérrez, J.M., R.G. Jones, G.T. Narisma, L.M. Alves, M. Amjad, I.V. Gorodetskaya, M. Grose, N.A.B. Klutse, S. Krakovska, J. Li, D. Martínez-Castro, L.O. Mearns, S.H. Mernild, T. Ngo-Duc, B. van den Hurk, and J.-H. Yoon, 2021: Atlas. In Climate Change 2021: The Physical Science Basis. Contribution of Working Group I to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [Masson-Delmotte, V., P. Zhai, A. Pirani, S.L. Connors, C. Péan, S. Berger, N. Caud, Y. Chen, L. Goldfarb, M.I. Gomis, M. Huang, K. Leitzell, E. Lonnoy, J.B.R. Matthews, T.K. Maycock, T. Waterfield, O. Yelekçi, R. Yu, and B. Zhou (eds.)]. Cambridge University Press, Cambridge, United Kingdom and New York, NY, USA, pp. 1927–2058, doi:10.1017/9781009157896.021. [**WGI Atlas**].10.2

[13] JJA = June, July, August

[14] WGI Atlas Cross Chapter Box Atlas.2

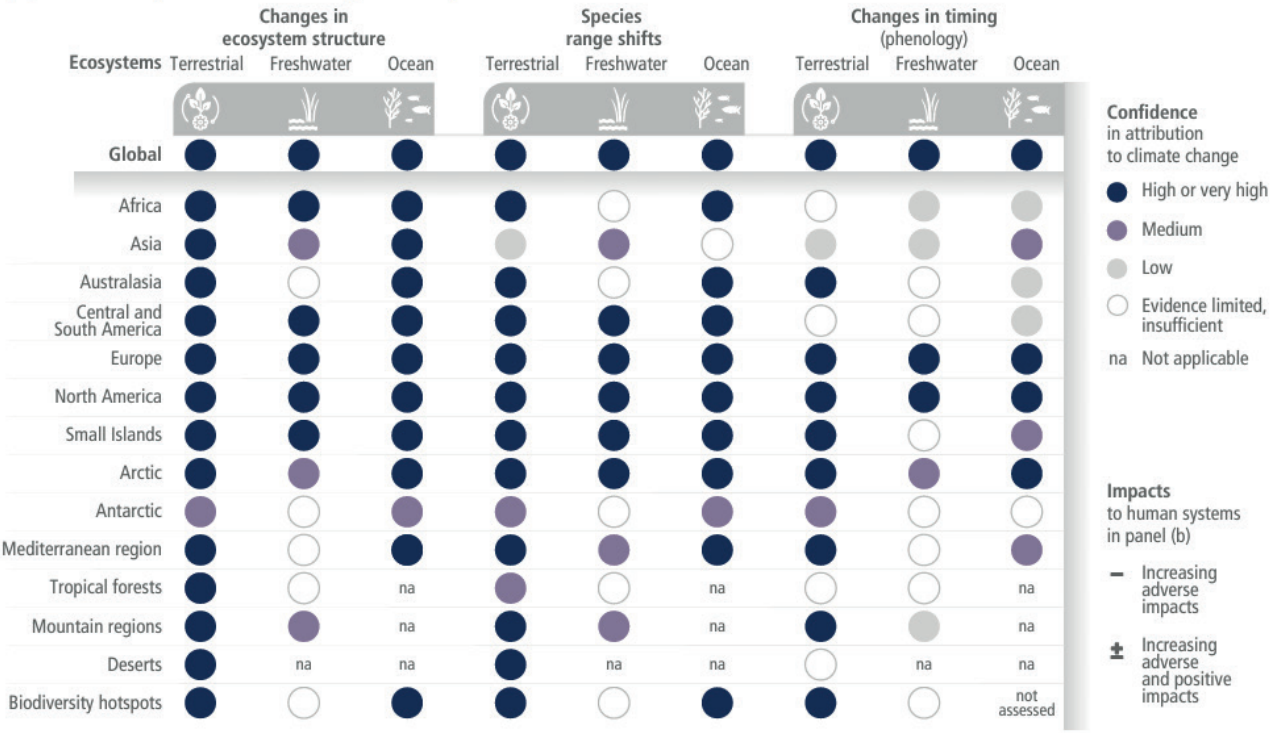
Region	Sub-region	Temperature	Rainfall	Other
Caribbean	Whole Caribbean	*High confidence* in increased frequency of hot extremes (Table 11.13)	*Low confidence* of increase in drought intensity during 1950–2016 and in the attribution of the 2013–2016 drought (Herrera and Ault, 2017; Herrera et al., 2018)	
	Jamaica, Cuba, Puerto Rico		*Low confidence* in declining JJA rainfall (CSGM, 2012) and a decreasing trend in Puerto Rico 1955–2009 (Méndez-Lázaro et al., 2014). Mixed trends 1980–2010 (Cavazos et al., 2020)	No attributable JJA rainfall trends 1951–2010 (Knutson and Zeng, 2018)
	Eastern Caribbean		*Low confidence* in an increase in periods of drought since 1999 (Van Meerbeeck, 2020)	*Medium confidence* in SLR of 1–2.5 mm yr^{-1} since 1950 (Van Meerbeeck, 2020)

[15]

OBSERVED BIOPHYSICAL IMPACTS

ECOSYSTEMS

(a) Observed impacts of climate change on ecosystems



[16]

[15] WGI Atlas Cross Chapter Box Atlas.2, Table 1. Summary of observed trends for Small Island regions.

[16] IPCC, 2022: Climate Change 2022: Impacts, Adaptation and Vulnerability. Contribution of Working Group II to the Sixth Assessment Report of the Intergovernmental Panel on Climate Change [H.-O. Pörtner, D.C. Roberts, M. Tignor, E.S. Poloczanska, K. Mintenbeck, A. Alegría, M. Craig, S. Langsdorf, S. Löschke, V. Möller, A. Okem, B. Rama (eds.)]. Cambridge University Press. Cambridge University Press, Cambridge, UK and New York, NY, USA,

BIODIVERSITY

Within the Mediterranean and Caribbean, significant losses to coastal wetlands—critical habitat for migratory birds—has already been observed, with further significant habitat losses, redistribution and changes in quality being projected across island systems such as the Bahamas (Caribbean) and Sardinia (Mediterranean) (Vogiatzakis et al., 2016; Wolcott et al., 2018).[17]

Since 2011, the Caribbean region has witnessed unprecedented influxes of the pelagic seaweed Sargassum. These extraordinary sargassum 'blooms' have resulted in mass deposition of seaweed on beaches throughout the Lesser Antilles, with damage to coastal habitats, mortality of seagrass beds and associated corals, as well as consequences for fisheries and tourism. This recent phenomenon has been linked to climate change as well as the possible influence of nutrients from Amazon River floods and/or Sahara dust.[18]

The spread of IAS is regarded as a significant transboundary threat to the health of biodiversity and ecosystems worldwide. The extent to which IAS (both animals and plants) successfully establish themselves at new locations in a changing climate will be dependent on many variables, but non-climate factors such as transmission pathways, suitability of the destination, ability to compete and adapt to new environments, and susceptibility to invasion of host ecosystems are deemed to be critical. Modelling studies have been used to project the future 'invisibility' of small island ecosystems subject to climate change and therefore to anticipate marine and terrestrial habitat degradation in the future. **Evidence suggests that hurricanes may have hastened the spread of highly invasive Indo-Pacific lionfish (Pterois volitans) throughout the Caribbean in recent years. Two IAS, the Common Green Iguana (Iguana iguana) and Cuban Treefrog (Osteopilus septentrionalis) were reported in the Caribbean island of Dominica, following the passage of TC Maria in 2017.**[19]

Rising sea temperatures are thought to increase the frequency of disease outbreaks affecting reef buildings. Of the range of bacterial, fungal and protozoan diseases known to affect stony corals, many have explicit links to temperature. **Global projections suggest that disease is as likely to cause coral mortality as bleaching in the coming decades at many localities, with effects occurring earlier at sites in the Caribbean compared to the Pacific and Indian oceans.** Model hindcasts suggest that climate-driven changes in SST as well as extreme heatwave events have all played a significant role in the spread of white-band disease throughout the Caribbean. Global food security is threatened by climate-related increases in crop pests and diseases. **Black Sigatoka disease of bananas has recently completed its invasion of Latin American and Caribbean banana-growing areas. Infection risk has increased by a median of 44.2% across the Caribbean since the 1960s, due to increasing canopy wetness and improving temperature conditions for the pathogen.**[20]

3056 pp., doi:10.1017/9781009325844. [**WGII]** Technical Summary Figure TS.3: Observed global and regional impacts on ecosystems and human systems attributed to climate change

[17] WGII Chapter 15 Section 15.3.3.3

[18] WGII Chapter 15 Table 15.5

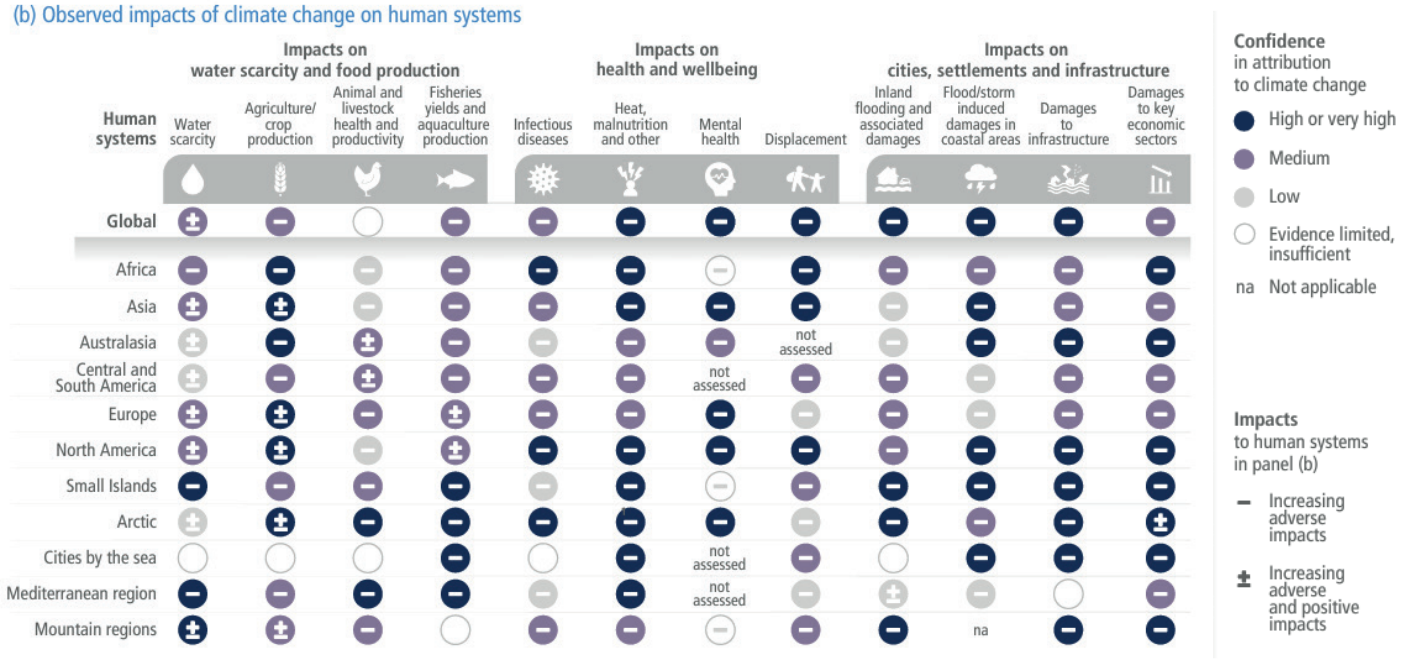
[19] WGII Chapter 15 Table 15.5

[20] WGII Chapter 15 Table 15.5

COASTAL EROSION

Despite important knowledge gaps on coastal erosion in high tropical islands, **recent studies confirmed increasing shoreline retreat and beach loss over the past decades, mainly due to TC and ETC waves and human disturbances (*high confidence*) (e.g., in the Caribbean region: Anguilla, Saint-Kitts, Nevis, Montserrat, Dominica and Grenada** (Cambers, 2009; Reguero et al., 2018)), and Pacific (Hawaii (Romine and Fletcher, 2013); Tubuai, French Polynesia (Salmon et al., 2019)) and Indian Oceans (Anjouan, Comoros (Ratter et al., 2016).[21]

OBSERVED SOCIO-ECONOMIC IMPACTS



[22]

FRESHWATER STRESS AND WATER SECURITY

Climate change impacts on freshwater systems frequently exacerbate existing pressure, especially in locations already experiencing water scarcity (Section 15.3.3.2 and Cross-Chapter Box INTERREG in Chapter 16; Schewe et al., 2014; Holding et al., 2016; Karnauskas et al., 2016), making water security a key risk (KR4 in Figure 15.5) in small islands. Small islands are usually environments where demand for resources related to socioeconomic factors

[21] WGII Chapter 15 Section 15.3.3.1.2

[22] WGII Technical Summary Figure TS.3 Observed global and regional impacts on ecosystems and human systems attributed to climate change

such as population growth, urbanisation and tourism already place increasing pressure on limited freshwater resources. In many small islands, water demand already exceeds supply. **For example, in the Caribbean, Barbados is utilising close to 100% of its available water resources and St. Lucia has a water supply deficit of approximately 35% (Cashman, 2014).**[23]

The Caribbean and Pacific regions have historically been affected by severe droughts (Peters, 2015; FAO, 2016; Barkey and Bailey, 2017; Paeniu et al., 2017; Trotman et al., 2017; Anshuka et al., 2018) **with significant physical impacts and negative socioeconomic outcomes.** Water quality is affected by drought as well as water availability. The El Niño related 2015–1016 drought in Vanuatu led to reliance on small amounts of contaminated water left at the bottom of household tanks (Iese et al., 2021a). The highest land disturbance percentages have coincided with major droughts in Cuba (de Beurs et al., 2019). **Drought has been shown to have an impact on rainwater harvesting in the Pacific (Quigley et al., 2016) and Caribbean (Aladenola et al., 2016), especially in rural areas where connections to centralised public water supply have been difficult. Increasing trends in drought are apparent in the Caribbean** (Herrera and Ault, 2017) although trends in the western Pacific are not statistically significant (McGree et al., 2016).[24]

Climate change has intensified the global hydrological cycle, causing several societal impacts, which are felt disproportionately by vulnerable people (*high confidence*). Human-induced climate change has affected physical aspects of water security through increasing water scarcity and exposing more people to water-related extreme events like floods and droughts, thereby exacerbating existing water-related vulnerabilities caused by other socioeconomic factors (*high confidence*). Many of these changes in water availability and water-related hazards can be directly attributed to anthropogenic climate change (*high confidence*). Water insecurity disproportionately impacts the poor, women, children, Indigenous Peoples and the elderly in low-income countries (*high confidence*) and specific marginal geographies (e.g., small island states and mountain regions). Water insecurity can contribute to social unrest in regions where inequality is high and water governance and institutions are weak (*medium confidence*).[25]

SUBMERGENCE AND FLOODING OF ISLANDS AND COASTAL AREAS

Recent studies confirmed that observed ESL events causing extensive flooding generally resulted from compound effects, including the combination of SLR (Section 3.2.2.2 and Cross-Chapter Box SLR in Chapter 3) with ETCs, TCs and tropical depressions (WGI AR6 Sections 11.7.1 and 11.7.2, Seneviratne, 2021), ENSO-related highwater levels associated with high or spring tide and/or local human disturbances amplifying impacts (*high confidence*).[26]

Despite important knowledge gaps on coastal erosion in high tropical islands, **recent studies confirmed increasing shoreline retreat and beach loss over the past decades, mainly due to TC and ETC waves and human**

[23] WGII Chapter 15 Section 15.3.4.3

[24] WGII Chapter 15 Section 15.3.4.3

[25] WGII Technical Summary TS.B.4.1

[26] WGII Chapter 15 Section 15.3.3.1.1

disturbances (*high confidence*) (e.g., in the Caribbean region: Anguilla, Saint-Kitts, Nevis, Montserrat, Dominica and Grenada (Cambers, 2009; Reguero et al., 2018))[27]

FOOD SECURITY

Climate change influences food and nutritional security through its effects on food availability, quality, access and distribution (Paterson and Lima, 2010; Thornton et al., 2014; FAO, 2016). **More than 815 million people were undernourished in 2016**, and 11% of the world's population has experienced recent decreases in food security, **with higher percentages in** Africa (20%), southern Asia (14.4%) and **the Caribbean (17.7%)** (FAO et al., 2017).[28]

Climate-related extremes have affected the productivity of all agricultural and fishery sectors, with negative consequences for food security and livelihoods (*high confidence*). The frequency of sudden food production losses has increased since at least the mid20th century on land and sea (medium evidence, high agreement). The impacts of climate-related extremes on food security, nutrition and livelihoods are particularly acute and severe for people living in sub-Saharan Africa, Asia, small islands, Central and South America and the Arctic and small-scale food producers globally (*high confidence*).[29]

TOURISM

Many small island economies are sustained by tourism and have invested heavily in associated infrastructure and capacity building (Cannonier and Burke, 2018). Some rural island communities have become dependent on tourism to the point that it would be difficult to revert to subsistence living (Lasso and Dahles, 2018). Coast-focused (beach-sea) tourism in island contexts is already being impacted by beach erosion, elevated high SST causing coral bleaching, and associated marine-biodiversity loss, as well as more intense TCs (Tapsuwan and Rongrongmuang, 2015; Parsons et al., 2018; Wabnitz et al., 2018)[30]

ECONOMIC IMPACTS

The extreme events occurring today, such as storms, tropical cyclones (TC), droughts, floods and marine heat waves (Herring et al., 2017), provide striking illustrations of the vulnerability of small island systems (*high confidence*) (Section 6.8.5, Box 4.2, Box 6.1). Societal dimensions can combine with climate changes, e.g., sea level

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[27] WGII Chapter 15 Section 15.3.3.1.2

[28] IPCC, 2018 Global Warming of 1.5°C. An IPCC Special Report on the impacts of global warming of 1.5°C above pre-industrial levels and related global greenhouse gas emission pathways, in the context of strengthening the global response to the threat of climate change, sustainable development, and efforts to eradicate poverty [Masson-Delmotte, V., P. Zhai, H.-O. Pörtner, D. Roberts, J. Skea, P.R. Shukla, A. Pirani, W. Moufouma-Okia, C. Péan, R. Pidcock, S. Connors, J.B.R. Matthews, Y. Chen, X. Zhou, M.I. Gomis, E. Lonnoy, T. Maycock, M. Tignor, and T. Waterfield (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3-24. https://doi.org/10.1017/9781009157940.001. [**SR 1.5C**], Cross-Chapter Box 6

[29] WGII Technical Summary TS.B.3.3

[30] WGII Chapter 15 Section 15.3.4.5

rise, to amplify the impact of TCs, storm surge and ocean acidification in small islands contributing to loss and damage (Moser and Hart, 2015; Noy and Edmonds, 2016). For example, Category 5 TC Pam devastated Vanuatu in 2015 with 449.4 million USD in losses for an economy with a GDP of 758 million USD (Government of Vanuatu, 2015; Handmer and Iveson, 2017). Kiribati, Papua New Guinea, Solomon Islands and Tuvalu were all impacted by the TC Pam system (IFRC, 2018). In 2016, TC Winston caused 43 deaths in Fiji and losses of more than one third of the GDP (Government of Fiji, 2016; Cox et al., 2018). **In 2017, Hurricanes Maria and Irma swept through 15 Caribbean countries, causing major damages and casualties across numerous islands. Rebuilding in three countries alone – Dominica, Barbuda and the British Virgin Islands – will cost an estimated 5 billion USD (UNDP, 2017). The Post-Disaster Needs Assessment for Dominica concluded that hurricane Maria resulted in total damages amounting to 226% of 2016 GDP (The Government of the Commonwealth of Dominica, 2017).**[31]

HEALTH

The transport of airborne Saharan dust across the Atlantic into the Caribbean has been intensively studied. In the West African Sahel, where drought has been persistent since the mid-1960s, analysis has shown that there have been remarkable changes in dust emissions since the late 1940s. Variability in Sahel dust emissions may be related not only to droughts, but also to changes in the North Atlantic Oscillation (NAO), North Atlantic SST and the Atlantic Multidecadal Oscillation (AMO). The frequency of dust storms has been on the rise during the last decade. Forecasts suggest that their incidence will increase further. **Transboundary movement of Saharan dust into the island regions of the Caribbean and the Mediterranean has been associated with human health problems including asthma cases in the Caribbean,** cardiovascular morbidity in Cyprus and pulmonary disease in the Cape Verde islands.[32]

CULTURAL LOSSES

The unquantifiable and highly localised cultural losses resulting from climate drivers are less researched and less acknowledged in policy than physical and economic losses (Karlsson and Hovelsrud, 2015; Thomas and Benjamin, 2018a**). In the Bahamas, prolonged displacement of the entire population of Ragged Island following Hurricane Irma (2017) highlighted the cultural losses that can result from climate-induced displacement from ancestral homelands.** Threats to identity, sense of place and community cohesion resulted from displacement, although all were important foundational features of the Islanders' self-initiated rehabilitation efforts and eventual return. Nonetheless, non-economic losses were not accounted for by policy addressing displacement (Thomas and Benjamin, 2018a). **In the case of Monkey River Village in Belize, coastal erosion is threatening the community's cemetery. Residents place significant spiritual and emotional value on the cemetery, which serves important community functions, and, thus, threats to it are perceived to be serious and necessary to be taken into account in any planned response** (Karlsson and Hovelsrud, 2015). **A similar situation exists on Carriacou in the West Indies where culturally and historically significant archaeological sites are being lost due to coastal**

[31] IPCC, 2019 IPCC Special Report on the Ocean and Cryosphere in a Changing Climate [H.-O. Pörtner, D.C. Roberts, V. Masson-Delmotte, P. Zhai, M. Tignor, E. Poloczanska, K. Mintenbeck, A. Alegría, M. Nicolai, A. Okem, J. Petzold, B. Rama, N.M. Weyer (eds.)]. Cambridge University Press, Cambridge, UK and New York, NY, USA, pp. 3–35. https://doi.org/10.1017/9781009157964.001. **[SROCC]**, CCB9

[32] WGII Chapter 15. Table 15.5

erosion caused by a combination of sand mining and extreme climate-ocean events exacerbated by SLR (Fitzpatrick et al., 2006).[33]

SETTLEMENTS AND INFRASTRUCTURE

Categories 4 and 5 TCs are severely impacting settlements and infrastructure in small islands. TC Maria in 2017 destroyed nearly all of Dominica's infrastructure and losses per unit of GDP amounted to more than 225% of the annual GDP (Eckstein et al., 2018). Destruction from TC Winston in 2016 amounted to more than 20% of Fiji's current GDP (Cox et al., 2018). Additionally, living conditions in human settlements are changing due to storm surge which is already penetrating further inland compared with a few decades ago (IPCC, 2018, Section 3.4.4.3; Brown et al., 2018).[34]

As a result of slow-onset ocean and climate changes and changes in extreme events, settlements and infrastructure of small islands are at growing risk due to climate change in the absence of adaptation measures (*high confidence*). Ocean acidification and deoxygenation, increased ocean temperatures and relative SLR are impacting marine, coastal and terrestrial biodiversity and ecosystem services, making settlements more exposed and vulnerable to climate-related hazards. **Changes in rainfall patterns such as heavy precipitation result in annual flood events that damage major assets and result in a loss of human life. Examples of settlements where this has occurred are Port of Spain (Mycoo, 2014b; 2018a), Haiti** (Weissenberger, 2018), Viti Levu (Brown et al., 2017; Singh-Peterson and Iranacolaivalu, 2018), urban areas of Fiji and Kiribati (McAneney et al., 2017; Cauchi et al., 2021), Male', Maldives (Wadey et al., 2017), and Mahé, in the Seychelles (Etongo, 2019).[35]

Coastal settlements with high inequality, for example a high proportion of informal settlements, as well as deltaic cities prone to land subsidence (e.g., Bangkok, Jakarta, Lagos, New Orleans, Mississippi, Nile, Ganges-Brahmaputra deltas) and **small island states are highly vulnerable and have experienced impacts from severe storms and floods in addition to, or in combination with, those from accelerating sea level rise (*high confidence*).**[36]

HUMAN MOBILITY

The most common climatic drivers for migration and displacement are drought, tropical storms and hurricanes, heavy rains and floods (*high confidence*). Extreme climate events act as both direct drivers (e.g., destruction of homes by tropical cyclones) and indirect drivers (e.g., rural income losses during prolonged droughts) of involuntary migration and displacement (*very high confidence*). The largest absolute number of people displaced by extreme weather each year occurs in Asia (South, Southeast and East), followed by sub-Saharan Africa, but

[33] WGII Chapter 15 Section 15.3.4.7

[34] WGII Chapter 15 Section 15.3.4.1

[35] WGII Chapter 15 Section 15.3.4.1

[36] WGII Technical Summary TS.B.8.2

small island states in the Caribbean and South Pacific are disproportionately affected relative to their small population size (*high confidence*).[37]

[37] WGII Technical Summary TS.B.6.1

5. PROJECTED RISKS IN THE CARIBBEAN

It is widely recognized that small islands are very sensitive to climate change impacts such as sea level rise, oceanic warming, heavy precipitation, cyclones and coral bleaching (*high confidence*) (Nurse et al., 2014; Ourbak and Magnan, 2017). **Even at 1.5°C of global warming, the compounding impacts of changes in rainfall, temperature, tropical cyclones and sea level are likely to be significant across multiple natural and human systems. There are potential benefits to small island developing states (SIDS) from avoided risks at 1.5°C versus 2°C, especially when coupled with adaptation efforts**. In terms of sea level rise, by 2150, roughly 60,000 fewer people living in SIDS will be exposed in a 1.5°C world than in a 2°C world (Rasmussen et al., 2018). Constraining global warming to 1.5°C may significantly reduce water stress (by about 25%) compared to the projected water stress at 2°C, for example in the Caribbean region (Karnauskas et al., 2018), and may enhance the ability of SIDS to adapt (Benjamin and Thomas, 2016). Up to 50% of the year is projected to be very warm in the Caribbean at 1.5°C, with a further increase by up to 70 days at 2°C versus 1.5°C (Taylor et al., 2018). By limiting warming to 1.5°C instead of 2°C in 2050, risks of coastal flooding (measured as the flood amplification factors for 100-year flood events) are reduced by 20–80% for SIDS (Rasmussen et al., 2018). **A case study of Jamaica with lessons for other Caribbean SIDS demonstrated that the difference between 1.5°C and 2°C is likely to challenge livestock thermoregulation, resulting in persistent heat stress for livestock (Lallo et al., 2018).**[38]

Global warming of 1.5°C is expected to prove challenging for small island developing states (SIDS) that are already experiencing impacts associated with climate change (*high confidence*). At 1.5°C, compounding impacts from interactions between climate drivers may contribute to the loss of, or change in, critical natural and human systems (*medium to high confidence*). There are a number of reduced risks at 1.5°C versus 2°C, particularly when coupled with adaptation efforts (*medium to high confidence*).[39]

SIDS are home to 65 million people (UN-OHRLLS, 2015). More than 80% of small island residents live near the coast where flooding and coastal erosion already pose serious problems (Nurse et al., 2014) and **since the IPCC 5th Assessment Report (AR5) and the Special Report on Global Warming of 1.5ºC (SR1.5), there is consensus on the increasing threats to island sustainability in terms of land, soils and freshwater availability. As a result, there is growing concern that some island nations as a whole may become uninhabitable due to rising sea levels and climate change, with implications for relocation, sovereignty and statehood** (Burkett, 2011; Gerrard and Wannier, 2013; Yamamoto and Esteban, 2014; Donner, 2015).[40]

Key risks for Small Islands include: Loss of terrestrial, marine and coastal biodiversity and ecosystem services- Loss of lives and assets, risk to food security and economic disruption due to destruction of settlements and infrastructure- Economic decline and livelihood failure of fisheries, agriculture, tourism and from biodiversity loss from traditional agroecosystems - Reduced habitability of reef and non-reef islands leading to increased displacement- Risk to water security in almost every small island.[41] *[See Figure pg. 23]*

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[38] SR 1.5C, Section 3.5.4.9

[39] SR 1.5C, Box 3.5

[40] SROCC, CCB9

[41] WGII Technical Summary Figure TS.4

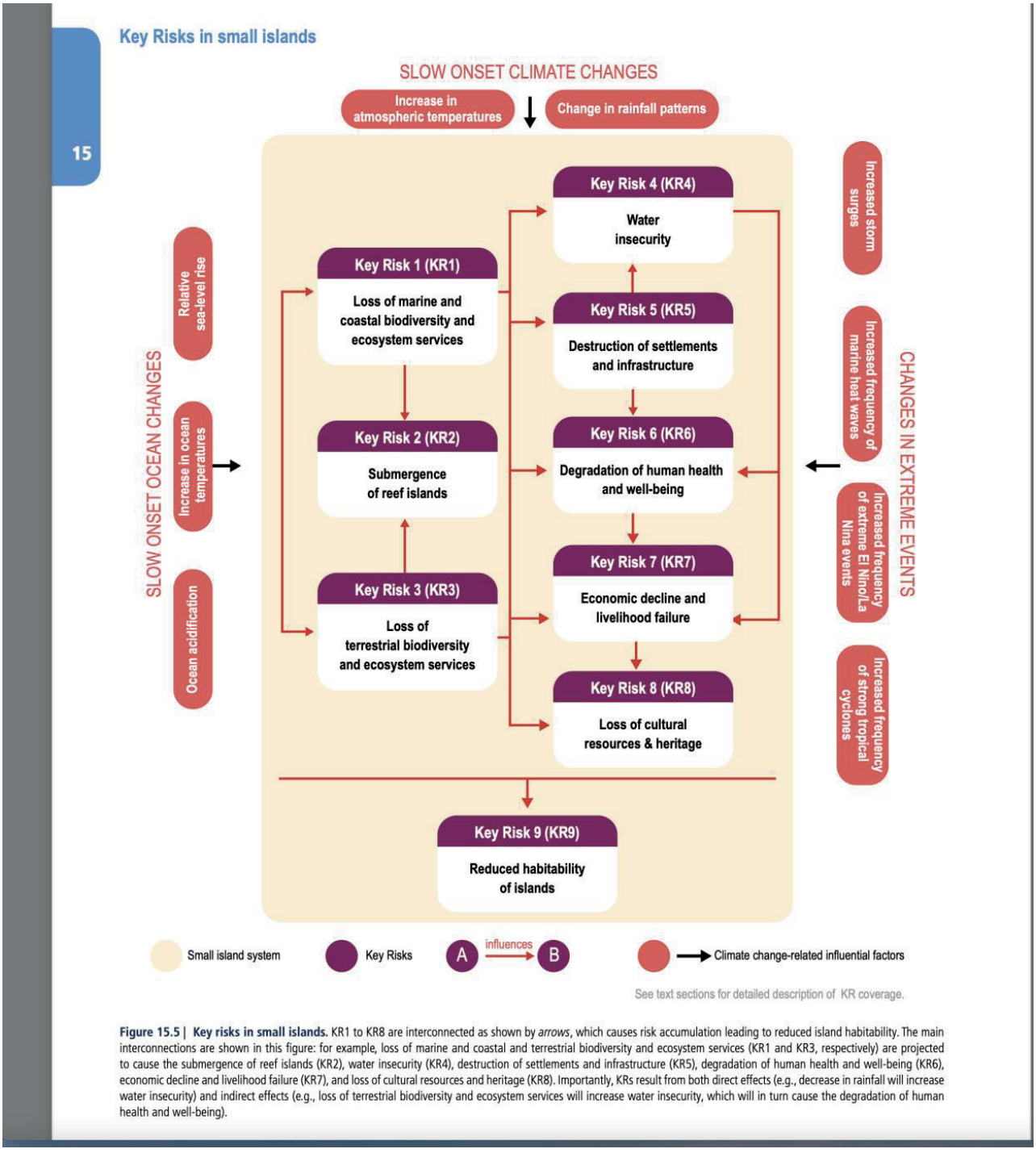

Figure 15.5 | Key risks in small islands. KR1 to KR8 are interconnected as shown by *arrows*, which causes risk accumulation leading to reduced island habitability. The main interconnections are shown in this figure: for example, loss of marine and coastal and terrestrial biodiversity and ecosystem services (KR1 and KR3, respectively) are projected to cause the submergence of reef islands (KR2), water insecurity (KR4), destruction of settlements and infrastructure (KR5), degradation of human health and well-being (KR6), economic decline and livelihood failure (KR7), and loss of cultural resources and heritage (KR8). Importantly, KRs result from both direct effects (e.g., decrease in rainfall will increase water insecurity) and indirect effects (e.g., loss of terrestrial biodiversity and ecosystem services will increase water insecurity, which will in turn cause the degradation of human health and well-being).

[42]

[42] WGII Chapter 15. Figure 15.5 Key risks in small islands

PROJECTED RISKS FOR CARIBBEAN CLIMATE

TEMPERATURE

Small Islands will very likely continue to warm this century, though at a rate less than the global average (Figure Atlas.28), with consequent increased frequency of warm extremes for the Caribbean and western Pacific islands, and heatwave events for the Caribbean (*high confidence*).[43]

Mean surface temperature is projected to increase in SIDS at 1.5°C of global warming (*high confidence*). The Caribbean region will experience 0.5°C–1.5°C of warming compared to a 1971–2000 baseline, with the strongest warming occurring over larger land masses (Taylor et al., 2018). Under the Representative Concentration Pathway (RCP)2.6 scenario, the western tropical Pacific is projected to experience warming of 0.5°C–1.7°C relative to 1961–1990. Extreme temperatures will also increase, with potential for elevated impacts as a result of comparably small natural variability (Reyer et al., 2017a). **Compared to the 1971–2000 baseline, up to 50% of the year is projected to be under warm spell conditions in the Caribbean at 1.5°C, with a further increase of up to 70 days at 2°C** (Taylor et al., 2018).[44]

PRECIPITATION

Rainfall is very likely to decline over the Caribbean, in the annual mean and especially in JJA, with a stronger and more coherent signal in CMIP6 compared to CMIP5 (Figure Atlas.28 and Interactive Atlas) and reductions of 20–30% by the end of the century under high future emissions (SSP5-8.5). This JJA drying has been linked to a future strengthening of the Caribbean low level jet (CLLJ) (Taylor et al., 2013a), a westward expansion and intensification of the NASH, stronger low-level easterlies over the region, a southwardly-placed eastern Pacific ITCZ (Rauscher et al., 2008), and changing dynamics due to increased greenhouse gas concentrations (*very high confidence*) (W. Li et al., 2012). Projections from 15 GCM and two RCM experiments for 2080–2089 relative to 1970–1989 were for a generally drier Caribbean and a robust summer drying (Karmalkar et al., 2013). More recent downscaling studies (e.g., Taylor et al., 2018; Vichot-Llano et al., 2021a) also project a drier Caribbean and longer dry spells (Van Meerbeeck, 2020).[45]

Changes in precipitation patterns, freshwater availability and drought sensitivity differ among small island regions (*medium to high confidence*). **In accordance with an overall drying trend, an increasing drought risk is projected for Caribbean SIDS (Lehner et al., 2017), and moderate to extreme drought conditions are projected to be about 9% longer on average at 2°C versus 1.5°C for islands in this region** (Taylor et al., 2018).[46]

Projected increases in aridity and decreases in freshwater availability at 1.5°C of warming, along with additional risks from SLR and increased wave-induced run-up, might leave several atoll islands uninhabitable (Storlazzi et al.,

[43] WGI Atlas Cross Chapter Box Atlas.2

[44] SR 1.5C, Box 3.5

[45] WGI Atlas Cross Chapter Box Atlas.2

[46] SR 1.5C, Box 3.5

2015; Gosling and Arnell, 2016). Changes in the availability and quality of freshwater, linked to a combination of changes to climate drivers, may adversely impact SIDS' economies (White and Falkland, 2010; Terry and Chui, 2012; Holding and Allen, 2015; Donk et al., 2018). Growth-rate projections based on temperature impacts alone indicate robust negative impacts on gross domestic product (GDP) per capita growth for SIDS (Sections 3.4.7.1, 3.4.9.1 and 3.5.4.9; Pretis et al., 2018). These impacts would be reduced considerably under 1.5°C but may be increased by escalating risks from climate-related extreme weather events and SLR (Sections 3.4.5.3, 3.4.9.4 and 3.5.3).[47]

TROPICAL CYLCONES (HURRICANES)

It is likely that the proportion of major (Category 3–5) tropical cyclones (TCs) and the frequency of rapid TC intensification events have increased over the past four decades. The average location of peak TC wind-intensity has very likely migrated poleward in the western North Pacific Ocean since the 1940s, and TC forward translation speed has likely slowed over the contiguous USA since 1900. It is likely that the poleward migration of TCs in the western North Pacific and the global increase in TC intensity rates cannot be explained entirely by natural variability. **There is high confidence that average peak TC wind speeds and the proportion of Category 4–5 TCs will increase with warming and that peak winds of the most intense TCs will increase.** There is medium confidence that the average location where TCs reach their maximum wind-intensity will migrate poleward in the western North Pacific Ocean, while the total global frequency of TC formation will decrease or remain unchanged with increasing global warming. {11.7.1}[48]

Additional regional changes in Small Islands, besides those features described in Section TS.4.3.1, include a likely decrease in rainfall during boreal summer in the Caribbean and in some parts of the Pacific islands poleward of 20° latitude in both the Northern and Southern Hemispheres. These drying trends will likely continue in coming decades. **Fewer but more intense tropical cyclones are projected starting from a 2°C Global Warming Level** (medium confidence). {9.6, 11.3, 11.4, 11.7, 11.9, 12.4.7, Atlas.10.2, Atlas.10.4, Cross-Chapter Box Atlas.2}[49]

OCEAN AND CRYOSPHERE

Ocean and cryosphere changes already impact Low-Lying Islands and Coasts (LLIC), including Small Island Developing States (SIDS), with cascading and compounding risks. Disproportionately higher risks are expected in the course of the 21st century. Reinforcing the findings of the IPCC Special Report on Global Warming of 1.5°C, vulnerable human communities, especially those in coral reef environments and polar regions, may exceed adaptation limits well before the end of this century and even in a low greenhouse gas emission pathway (*high confidence*).[50]

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[47] SR 1.5C, Box 3.5

[48] WGI Technical Summary Section TS2.3

[49] WG1 Technical Summary Section TS4.3.2.7

[50] SROCC. Technical Summary

Due to projected GMSL rise, ESLs that are historically rare (for example, today's hundred-year event) will become common by 2100 under all RCPs (*high confidence*). Many low-lying cities and small islands at most latitudes will experience such events annually by 2050. Greenhouse gas (GHG) mitigation envisioned in low-emission scenarios (e.g., RCP2.6) is expected to sharply reduce but not eliminate risk to low-lying coasts and islands from SLR and ESL events. Low-emission scenarios lead to slower rates of SLR and allow for a wider range of adaptation options. For the first half of the 21st century differences in ESL events among the scenarios are small, facilitating adaptation planning.[51]

Extreme precipitation in small island regions is often linked to tropical storms and contributes to the climate hazard (Khouakhi et al., 2017). Similarly, **extreme sea levels for small islands, particularly in the Caribbean, are linked to tropical cyclone occurrence (Khouakhi and Villarini, 2017). Under a 1.5°C stabilization scenario, there is a projected decrease in the frequency of weaker tropical storms and an increase in the number of intense cyclones** (Section 3.3.6; Wehner et al., 2018a).[52]

PROJECTED BIOPHYSICAL RISKS

BIODIVERSITY

Even achieving emission reduction targets consistent with the ambitious goal of 1.5°C of global warming under the Paris Agreement will result in the further **loss of 70–90% of reef-building corals compared to today, with 99% of corals being lost under warming of 2°C or more above the pre-industrial period (*high confidence*)** (Hoegh-Guldberg et al., 2018).[53]

Marine systems and associated livelihoods in SIDS face higher risks at 2°C compared to 1.5°C (*medium to high confidence*). **Mass coral bleaching and mortality are projected to increase because of interactions between rising ocean temperatures, ocean acidification, and destructive waves from intensifying storms** (Section 3.4.4 and 5.2.3, Box 3.4). At 1.5°C, approximately 70–90% of global coral reefs are projected to be at risk of long-term degradation due to coral bleaching, with these values increasing to 99% at 2°C (Frieler et al., 2013; Schleussner et al., 2016b). Higher temperatures are also related to an increase in coral disease development, leading to coral degradation (Maynard et al., 2015). For marine fisheries, limiting warming to 1.5°C decreases the risk of species extinction and declines in maximum catch potential, particularly for small islands in tropical oceans (Cheung et al., 2016a).[54]

The majority of studies modelling geographical range changes of small island species, to even the most optimistic 21st century climate change scenarios, imply a reduction in climate refugia (Table 15.3, Box CCP1.1). This is due to projected strong shifts, reductions or even complete losses of climatic niches resulting from

[51] SROCC. Technical Summary

[52] SR 1.5C, Box 3.5

[53] WGII Chapter 15. Section 15.3.3.1.3

[54] SR 1.5C, Box 3.5

inadequate geographic space for species to track suitable climate envelopes (*high confidence*) (e.g., Maharaj and New, 2013; Fortini et al., 2015; Struebig et al., 2015b). **Because of the high proportion of global endemics hosted within small and especially isolated islands, the resulting increased extinction risk of such species (up to 100%) could lead to disproportionate losses in global biodiversity (*medium to high confidence*)** (Harter et al., 2015; Manes et al., 2021).[55]

SLR has been projected to impact the terrestrial biodiversity of lowlying islands and coastal regions via large habitat losses both directly (e.g., submergence) and indirectly (e.g., salinity intrusion, salinization of coastal wetlands and soil erosion) at even the 1-m scenario (*medium to high confidence*). However, these impacts vary depending on the islands' topographical differences. **In a study of SLR impacts on insular biodiversity hotspots, Bellard et al. (2013a) reported that the Caribbean islands**, Sundaland and the Philippines **were projected to suffer the most habitat loss** while the East Melanesian islands were projected to be less (but not minimally) affected. **The most threatened of these, the Caribbean, was projected to have between 8.7% and 49.2% of its islands entirely submerged, respectively, from 1-m to 6-m SLR** (Bellard et al., 2013a). However, many current projection studies consider marine flooding directly and seldom incorporate other indirect impacts such as increased habitat losses from horizontal erosion loss, increased salinity levels, tidal ranges and extreme events. **These projections are considered to be conservative**, underestimating the extent of habitat loss to terrestrial biodiversity (Bellard et al., 2013b).[56]

PROJECTED SOCIO-ECONOMIC RISKS

MOBILITY

Risks of impacts across sectors are projected to be higher at 1.5°C compared to the present, and will further increase at 2°C (*medium to high confidence*). **Projections indicate that at 1.5°C there will be increased incidents of internal migration and displacement (Sections 3.5.5, 4.3.6 and 5.2.2; Albert et al., 2017), limited capacity to assess loss and damage (Thomas and Benjamin, 2017) and substantial increases in the risk to critical transportation infrastructure from marine inundation** (Monioudi et al., 2018).[57]

FRESHWATER STRESS

Projected changes in aridity are expected to impose freshwater stress on many small islands, especially SIDS (*high confidence*). **These changes are congruent with drought risk projections for Caribbean SIDS (Lehner et al., 2017; Taylor et al., 2018) and aligned with observations from the Shared Socioeconomic Pathway (SSP) 2 scenario, where a 1°C increase in temperature (from 1.7°C to 2.7°C) could result in a 60% increase in the number of people**

[55] WGII Chapter 15. Section 15.3.3.3

[56] WGII Chapter 15. Section 15.3.3.3

[57] SR1.5 Chapter 3 Box3.5

projected to experience severe water resources stress from 2043 to 2071 (Schewe et al., 2014; Karnauskas et al., 2018).[58]

Projected changes in aridity are expected to impose freshwater stress on many small islands, especially SIDS (*high confidence*). It is estimated that with a warming of 1.5°C or less, freshwater stress on small islands would be 25% less as compared to 2.0°C. While some island regions are projected to experience substantial freshwater decline, an opposite trend is observed for some western Pacific and northern Indian Ocean islands. **Drought risk projections for Caribbean SIDS aligned with observations from the Shared Socioeconomic Pathway (SSP) 2 scenario indicate that a 1°C increase in temperature (from 1.7°C to 2.7°C) could result in a 60% increase in the number of people projected to experience severe water resources stress from 2043 to 2071**. In some Pacific atolls, freshwater resources could be significantly affected by a 0.40-m SLR. **Similar impacts are anticipated for some Caribbean countries with the worst-case scenario (RCP8.5) indicating a 0.5-m SLR by the mid-century (2046–2065) and a 1-m SLR by the end-of-century (2081–2100). SIDS with high projected population growth rates are expected to experience the most severe freshwater stress by 2030 under a 2°C warming threshold scenario** {15.3.3.2}[59]

AGRICULTURE AND FOOD SECURITY

In the Caribbean, additional warming by 0.2°–1.0°C could lead to a predominantly drier region (5–15% less rain than present-day), a greater occurrence of droughts (Taylor et al., 2018) along with associated impacts on agricultural production and yield in the region (Gamble et al., 2017; Hoegh-Guldberg et al., 2019; Nicolas et al., 2020). **Crop suitability modelling on several commercially important crops grown in Jamaica found that even an increase of less than 1.5°C could result in a reduction in the range of crops that farmers may grow** (Rhiney et al., 2018).[60]

Climate change will increasingly add significant pressure and regionally different impacts on all components of food systems, undermining all dimensions of food security (*high confidence*). Extreme weather events will increase risks of food insecurity via spikes in food prices, reduced food diversity and reduced income for agricultural and fishery livelihoods (*high confidence*), preventing achievement of the UN SDG 2 ('Zero Hunger') by 2030 in regions with limited adaptive capacities, including Africa, small island states and South Asia (*high confidence*).[61]

TOURISM

The tourism sector is also affected by climate-induced changes in environmental assets critical for tourism, including biodiversity, beaches, glaciers and other features important for environmental and cultural heritage. Limited analyses of projected risks associated with 1.5°C versus 2°C are available (Section 3.4.4.12). A global analysis of sea level rise (SLR) risk to 720 UNESCO Cultural World Heritage sites projected that about 47 sites might

[58] WGII Chapter 15. Section 15.3.3.1.4

[59] WGII Chapter 15. ES.

[60] WGII Chapter 15. Section 15.3.4.4

[61] WGII Technical Summary TS.C.3.3

be affected under 1°C of warming, with this number increasing to 110 and 136 sites under 2°C and 3°C, respectively (Marzeion and Levermann, 2014). Similar risks to vast worldwide coastal tourism infrastructure and beach assets remain unquantified for most major tourism destinations and small island developing states (SIDS) that economically depend on coastal tourism. One exception is the projection that **an eventual 1 m SLR could partially or fully inundate 29% of 900 coastal resorts in 19 Caribbean countries, with a substantially higher proportion (49–60%) vulnerable to associated coastal erosion** (Scott and Verkoeyen, 2017).[62]

SUBMERGENCE AND FLOODING OF ISLANDS AND COASTAL AREAS

In the absence of adaptation, more intense and frequent ESL events, together with trends in coastal development will increase expected annual flood damages by 2-3 orders of magnitude by 2100 (*high confidence*). However, well designed coastal protection is very effective in reducing expected damages and cost efficient for urban and densely populated regions, but generally unaffordable for rural and poorer areas (high confidence). Effective protection requires investments on the order of tens to several hundreds of billions of USD yr-1 globally (*high confidence*). While investments are generally cost efficient for densely populated and urban areas (*high confidence*), rural and poorer areas will be challenged to afford such investments with relative annual costs for some small island states amounting to several percent of GDP (*high confidence*). Even with well-designed hard protection, the risk of possibly disastrous consequences in the event of failure of defences remains.[63]

In Hawaii and the Caribbean, SLR is projected to exponentially increase flooding, with nearly every centimetre of SLR causing a doubling of the probability of flooding (Taherkhani et al., 2020).[64]

Long-term risks of coastal flooding and impacts on populations, infrastructure and assets are projected to increase with higher levels of warming (*high confidence*). **Tropical regions including small islands are expected to experience the largest increases in coastal flooding frequency, with the frequency of extreme water-level events in small islands projected to double by 2050** (Vitousek et al., 2017). Wave-driven coastal flooding risks for reef-lined islands may increase as a result of coral reef degradation and SLR (Quataert et al., 2015). Exposure to coastal hazards is particularly high for SIDS, with a significant share of population, infrastructure and assets at risk (Sections 3.4.5.3 and 3.4.9; Scott et al., 2012; Kumar and Taylor, 2015; Rhiney, 2015; Byers et al., 2018). **Limiting warming to 1.5°C instead of 2°C would spare the inundation of lands currently home to 60,000 individuals in SIDS by 2150** (Rasmussen et al., 2018). However, such estimates do not consider shoreline response (Section 3.4.5) or adaptation.[65]

Reef island and coastal area habitability in small islands is expected to decrease because of increased temperature, extreme sea levels and degradation of buffering ecosystems, which will increase human exposure to sea-related hazards (*high confidence*). Climate and non-climate drivers of reduced habitability are context specific. On small islands, coastal land loss attributable to higher sea level, increased extreme precipitation and wave impacts and increased aridity have contributed to food and water insecurities that are likely to become more acute in many

[62] SR 1.5C, Section 3.4.9.1

[63] SROCC. Technical Summary

[64] WGII Chapter 15 Section 15.3.3.1.1

[65] SR 1.5C, Box 3.5

places (*high confidence*). **In the Caribbean, additional warming by 0.2°–1.0°C, could lead to a predominantly drier region (5–15% less rain than present day), a greater occurrence of droughts along with associated impacts on agricultural production and yield in the region**. Crop suitability modelling on several commercially important crops grown in Jamaica found that even an increase of less than + 1.5°C could result in a reduction in the range of crops that farmers may grow.[66]

TC intensification in the future is likely to cause severe damage to human settlements and infrastructure in small islands. Additionally, SLR is expected to cause significant losses and damages (Martyr-Koller et al., 2021). Based on SLR projections, almost all port and harbour facilities in the Caribbean will suffer inundation in the future (Cashman and Nagdee, 2017). In Jamaica and St. Lucia, SLR and ESLs are projected to be key risks to transport infrastructure at 1.5°C unless further adaptation is undertaken (Monioudi et al., 2018).[67]

HEALTH

Small islands face disproportionate health risks associated with changes in temperature and precipitation, climate variability, and extremes (Cross-Chapter Box INTERREG in Chapter 16; KR4 in Section 15.3.9, Figure 15.5). Climate change is projected to increase the current burden of climate-related health risks (Weatherdon et al., 2016; Ebi et al., 2018; Schnitter et al., 2019). Health risks can arise from exposures to extreme weather and climate events, including heatwaves; changes in ecological systems associated with changing weather patterns that can result, for example, in more disease vectors, or in compromised safety and security of water and food; and exposures related to disruption of health systems, migration, and other factors (see Cross-Chapter Box ILLNESS in Chapter 2; McIver et al., 2016; Mycoo, 2018a; WHO, 2018).[68]

Heat-related mortality and risks of occupational heat stress in small island states are projected to increase with higher temperatures (HoeghGuldberg et al., 2018; Mendez-Lazaro et al., 2018). Higher temperatures can also affect the productivity of outdoor workers (Taylor et al., 2021). Climate change, urbanisation, and air pollution are risk factors for the rise of allergic diseases in Asia Pacific (Pawankar et al., 2020).[69]

Tropical and subtropical islands face risks from vector-borne diseases, such as malaria, dengue fever, and the Zika virus. El Niño events can increase the risk of diseases such as Zika virus by increasing biting rates, decreasing mosquito mortality rates and shortening the time required for the virus to replicate within the mosquito (Caminade et al., 2017). **By combining disease prediction models with climate indicators that are routinely monitored, alongside evaluation tools, it is possible to generate probabilistic dengue outlooks in the Caribbean and early warning systems (Oritz et al., 2015; Lowe et al., 2018). Projections suggest that more individuals will become at risk of dengue fever by the 2030s and beyond because of an increasing abundance of mosquitos and larger geographic range** (Ebi et al., 2018). Projected increases in mean temperature could double the dengue burden in New Caledonia by 2100 (Teurlai et al., 2015). **In the Caribbean, Saharan dust transported across the Atlantic can**

[66] WGII Chapter 15 ES

[67] WGII Chapter 15. Section 15.3.4.1

[68] WGII Chapter 15. Section 15.3.4.2

[69] WGII Chapter 15. Section 15.3.4.2

interact with Caribbean seasonal climatic conditions to become respirable and contribute to asthma presentations at the emergency department (See Table 15.5; Akpinar-Elci et al., 2015).[70]

LIMITS TO ADAPTATION AND ADAPTIVE CAPACITY

At 1.5°C, limits to adaptation will be reached for several key impacts in SIDS, resulting in residual impacts, as well as loss and damage (Section 1.1.1, Cross-Chapter Box 12 in Chapter 5). Limiting temperature increase to 1.5°C versus 2°C is expected to reduce a number of risks, particularly when coupled with adaptation efforts that take into account sustainable development (Section 3.4.2 and 5.6.3.1, Box 4.3 and 5.3, Mycoo, 2017; Thomas and Benjamin, 2017). Region-specific pathways for SIDS exist to address climate change (Section 5.6.3.1, Boxes 4.6 and 5.3, Cross-Chapter Box 11 in Chapter 4).[71]

Risks to natural and human systems are expected to be lower at 1.5°C than at 2°C of global warming (*high confidence*). This difference is due to the smaller rates and magnitudes of climate change associated with a 1.5°C temperature increase, including lower frequencies and intensities of temperature-related extremes. Lower rates of change enhance the ability of natural and human systems to adapt, with substantial benefits for a wide range of terrestrial, freshwater, wetland, coastal and ocean ecosystems (including coral reefs) (*high confidence*), as well as food production systems, human health, and tourism (medium confidence), together with energy systems and transportation (*low confidence*).[72]

Current ecosystem services from the ocean are expected to be reduced at 1.5°C of global warming, with losses being even greater at 2°C of global warming (*high confidence*). The risks of declining ocean productivity, shifts of species to higher latitudes, damage to ecosystems (e.g., coral reefs, and mangroves, seagrass and other wetland ecosystems), loss of fisheries productivity (at low latitudes), and changes to ocean chemistry (e.g., acidification, hypoxia and dead zones) are projected to be substantially lower when global warming is limited to 1.5°C (*high confidence*).[73]

[70] WGII Chapter 15 Section 15.3.4.2

[71] SR 1.5C, Box 3.5

[72] SR1.5C ES

[73] SR1.5C ES

6. RESEARCH GAPS

Despite intensive study, many knowledge gaps remain due to the complexity of biophysical and social interactions as well as the local and regional diversity of small islands. Research and data gaps exist in four areas: island-scale data availability; ecosystem services data; vulnerability and resilience, and adaptation. [74]

Research gap	Elaboration
Unavailability of adequately downscaled climate data	There is a lack of oceanographic (e.g., tidal), meteorological, high-resolution topographic and bathymetric data, as well as future sea level and wave climate projections for most islands, which severely constrain modelling studies and therefore improved understanding of future coastal flooding, erosion, and rates of saline intrusion into aquifers (Giardino et al., 2018; Lal and Datta, 2019)
	There is a need for further developing context-specific numerical models, especially through the inclusion of sediment transport, production and delivery (Shope and Storlazzi, 2019), coastal and marine ecosystems' responses (Beetham et al., 2017), and various societal responses (e.g., engineering and ecosystem-based solutions (Giardino et al., 2018)) under different climate change and SLR scenarios
	The complexity and specificities of small island environments and unavailability of robust baseline data considerably challenge modelling studies in small islands contexts, as reflected by the serious limitations of global modelling impact studies for these (Mentaschi et al., 2018; Vousdoukas et al., 2020)
	Data and model developments are therefore urgently needed to assess the future habitability or exploitability of the islands that are the most critical to small island countries and territories, and to help identify and promote appropriate (especially in technical terms) solutions
	Adequately downscaled Regional Climate Model (RCM) data (sub-5 km^2) is also required to conduct modelling assessments for small island terrestrial ecosystems. This is particularly needed for islands with complex topography which could be important in providing much-needed climate refugia for the survival of narrow range species such as endemics (Balzan et al., 2018). Such spatial data could be used to maximise the potential of islands to deliver critical ecosystem services (Katovai et al., 2015; Balzan et al., 2018)
	Widely used WorldClim data may not be suitable when applied to the small island context (Box CCP1.1). Without such data, robust ecosystem-based adaptation strategies such as climate-smart PA planning and management under changing climate conditions cannot be developed
	Thomas and Benjamin (2017) highlighted the lack of data as an area of concern related to assessing loss and damage at 1.5°C. Understanding losses and damages also requires more detail on island-specific losses and damages accruing from anthropogenic climate change impacts. At the moment, such assessments are limited, and most of the small islands have not yet documented these factors in their national adaptation plans or policies (Handmer and Nalau, 2019). There is a need for specific studies also on biophysical variables and species (e.g., impact of temperature rise on mangroves); long-term impacts of ocean acidification on species, including relationship to disease outbreaks, and changing breeding grounds of marine species and impacts on fisheries and marine-based livelihoods; incorporating biophysical feedback and interconnectivity of environments into models; and more detailed datasets (e.g., bathymetry, coastal assets) (World Bank, 2016; McField, 2017; Wilson, 2017)

[74] WGII Chapter 15 Section 15.8

Vulnerability and resilience	There is need for new research that investigates the variability of vulnerability within and between islands and states, typologies of best practice (Oculi and Stephenson, 2018), frequency of knowledge sharing among islands and regions (Foley, 2018), identification of regional framework mechanisms, and mapping the complex impact and hazard interactions at a regional scale (Duvat et al., 2017b; Neef et al., 2018; Scandurra et al., 2018; Thiault et al., 2018). Research needs to also examine resilience-building efforts within the four domains of islandness (boundedness, smallness, isolation, and littorality) to effectively capture subjective nuances associated with climate development efforts on islands (Kelman, 2018)
	Research gaps in place-based assessments of social service bundles coupled with policy actions (Balzan et al., 2018) highlight the need for new knowledge to strengthen communication, collaboration and networks between academia, donors, the private sector, community and government (Allahar and Brathwaite, 2016; Schipper et al., 2016) so as to improve understanding of vulnerability and resilience in small islands
	A paucity of research exists currently on the vulnerability of island ecosystem services to climate change (Balzan et al., 2018). While there is rich scientific evidence on the pressures of habitat loss and degradation, impacts of natural hazards and invasive species, far less is known about the interactions of these factors with adaptive capacity and livelihood conditions on islands. In small island contexts, there is a specific need for assessing the effectiveness and cost of ecosystem- and community-based solutions where the latter have been implemented (Filho et al., 2020). The design of generic assessment methods and tools is required to allow for comparative analyses that will, in turn, provide useful guidance for the promotion of context-specific adaptation strategies (Blair and Momtaz, 2018). For many of the small islands, especially SIDS, the economic valuation of marine and coastal ecosystem services—coastal protection, fisheries, tourism—is of great importance, as well as the subsequent losses in these sectors and related livelihoods due to climate change impacts (Waite et al., 2014; Schuhmann and Mahon, 2015; World Bank, 2016; Layne, 2017; Duijndam et al., 2020). There are few integrated modelling studies to inform future habitability of differentiated small island types and how these models can inform decision support processes for ridge to reef stewardship (Povak et al., 2020). Existing studies (Rasmussen et al., 2018) have progressed knowledge since AR5, but island-specific analyses are required to robustly estimate the future ability of land to support life and livelihoods, taking into account multiple climate-drivers, future population exposure, and adaptation responses
	More research is also needed in understanding how ecosystem benefits are modified under changing climate conditions and how these benefits can be quantified (Doswald et al., 2014). For example, many small islands lack comprehensive (and disaggregated) data related to food security, which makes it challenging to attribute climate impacts on local food systems (Taylor et al., 2019). Balzan et al. (2018) highlight the importance of quantifying the role of biodiversity in delivering key ecosystem services and demonstrate how such data could provide insights into the interrelatedness of island ecosystems and transboundary service benefits

Adaptation	In the last decade or so, there has been a significant increase in climate-related financing for small island states. However, monitoring and tracking of funding and metrics to evaluate overall impact are lacking (Boyd et al., 2017; Mallin, 2018). Research into adaptation costs could benefit from the inclusion of indirect effects of climate change such as psychological costs (Vincent and Cull, 2014; Gibson et al., 2019) but to date this research is missing. Greater effort could also be placed on quantifying the relationship between adaptation costs and adverse events (Adelman, 2016). There is also a need for overall land use planning guidelines in small coastal communities, including small islands (Major and Juhola, 2016). The usefulness and utility of insurance mechanisms for building resilience to climate hazards require up-to-date information on assets at risk (Tietze and van Anrooy, 2018) and further exploration of adaptation measures in small island contexts (Baarsch and Kelman, 2016). Additionally, the differences between theoretical adaptation practices and observed results from actual implementation, along with the integration of IKLK and external knowledge, are currently not well understood (Mercer et al., 2014b; Kelman, 2015b; Saint Ville et al., 2015; Robinson and Gilfillan, 2016; Robinson, 2017b). Documenting experience-based knowledge of adaptation projects and programme implementation could fill important data gaps. At the project design stage, the paucity of climate finance data is a barrier to accessing climate finance (Bhandary et al., 2021)
	Although studies examining the association between climate and weather extremes, events and conditions and mobility in small islands have increased since AR5 (Birk and Rasmussen, 2014; Kelman, 2015a; Connell, 2016; Stojanov et al., 2017; Barnett and McMichael, 2018), few studies robustly examine the attribution of migration of small island populations, communities and individuals to anthropogenic climate change and other non-climate migration drivers. Biophysical, socioeconomic and in situ adaptation thresholds that force small island populations to migrate remain under-explored (Barnett, 2017; Handmer and Nalau, 2019). The implications of forced and voluntary immobility (Allgood and McNamara, 2017; Farbotko, 2018; Suliman et al., 2019), the socioeconomic, health, psychological and cultural outcomes of climate migrants, and gender dimensions of climate migration all remain under-researched
	Limits to adaptation is still a largely under-researched topic globally (Nalau and Filho, 2018) and specifically in small island contexts, as are the linkages between adaptation limits, loss and damage and transformative adaptation (Thomas et al., 2020). In terms of projected risks and adaptation responses, further work is needed to improve knowledge of commonalities, differences, successes, and failures of natural and human adaptation responses (Kuruppu and Willie, 2015). One of the failings of the current literature on limits to adaptation revolves largely around the use of barriers for sector-specific or small-scale scenarios, which provides an understanding only for that particular scenario and does not identify common constraints (Kuruppu and Willie, 2015). Research gaps on loss and damage include: how to assess the economic costs of loss and damage; mechanisms to develop robust policies in small island contexts; specific data on experienced loss and damage across socioeconomic groups and demographics; monitoring and tracking of slow-onset events (Thomas and Benjamin, 2017; Thomas et al., 2020) and the non-economic aspects including sense of place, health and community cohesion (Thomas and Benjamin, 2019)
	More studies are needed on the role that organisations (international, national and regional) play in adaptation efforts—their effectiveness at achieving desired outcomes, roles and accountability (Robinson and Gilfillan, 2016; Scobie, 2016; Mallin, 2018). It is also important that the impacts of sociopolitical relations inter-state are researched (Belmar et al., 2015) and more focus on climate justice (Baptiste and Devonish, 2019; Moulton and Machado, 2019; Gahman and Thongs, 2020) and gender is similarly needed (McLeod et al., 2018). Given the high number of place-specific case studies in the adaptation literature, more reviews are needed that synthesise key lessons and principles of adaptations in small island contexts from this knowledge. Further research is also needed to capture the lessons from COVID-19 response in small islands and how these could enable more robust adaptation and climate resilient development transitions as has been suggested at a broader scale by Schipper et al. (2020). There is also little to no information on impacts upon terrestrial and freshwater biodiversity from the relocation of coastal human populations inland due to SLR

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[75] WGII Chapter 15 Table 15.8: Research gaps in small islands