African Court on Human and Peoples' Rights

Request for an Advisory Opinion on the Obligations of States with Respect to the Climate Change Crisis

Amicus Brief submitted by the Sabin Center for Climate Change Law on Climate Science and Human Rights Obligations

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Statement of Interest

The Sabin Center for Climate Change Law at Columbia Law School submits this *amicus curiae* brief to the African Court on Human and People's Rights (Court) in the matter of the Request by the Pan African Lawyers Union (PALU) for an Advisory Opinion on the Obligations of States with Respect to the Climate Change Crisis. The Sabin Center is an academic center dedicated to advancing action on climate change through legal scholarship and engagement. We track developments in global climate change law and litigation, conduct research on the development of legal strategies and legal structures to address climate change, and provide training and educational resources to the legal community. As part of our work, we collaborate with climate scientists as well as a wide range of governmental, non-governmental and academic organizations.

The purpose of this brief is to explain how climate science can help inform the Court's assessment of State obligations to respect, protect, and fulfill human rights in the context of climate change. Our analysis is based on our collective knowledge of climate law, human rights law, and how scientific evidence factors into legal assessments of government obligations to prevent, prepare for, and respond to the effects of climate change.[1]

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[1] *See* MARIA ANTONIA TIGRE & MARGARET BARRY, CLIMATE LITIGATION REPORT 2025 - CLIMATE CHANGE IN THE COURTROOM: TRENDS, IMPACTS AND EMERGING LESSONS (Sabin Center for Climate Change Law & United Nations Environment Programme, 2025), https://scholarship.law.columbia.edu/sabin_climate_change/257; MARIA ANTONIA TIGRE & ARMANDO ROCHA (EDS.), THE ROLE OF ADVISORY OPINIONS IN INTERNATIONAL LAW IN THE CONTEXT OF THE CLIMATE CRISIS (Brill 2025); MARIA ANTONIA TIGRE, MELANIE JEAN MURCOTT & SUSAN ANN SAMUEL (EDS.), CLIMATE LITIGATION AND VULNERABILITIES: GLOBAL SOUTH PERSPECTIVES (Routledge, 2025); JESSICA WENTZ, CLIMATE CHANGE AND HUMAN HEALTH: A SYNTHESIS OF SCIENTIFIC RESEARCH AND STATE OBLIGATIONS UNDER INTERNATIONAL LAW (Sabin Center for Climate Change Law, 2024); MARIA ANTONIA TIGRE, CLIMATE LITIGATION IN THE GLOBAL SOUTH: MAPPING REPORT (Sabin Center for Climate Change Law, Columbia Law School, 2024), https://scholarship.law.columbia.edu/sabin_climate_change/230/; MICHAEL BURGER & MARIA ANTONIA TIGRE, GLOBAL CLIMATE LITIGATION REPORT: 2023 STATUS REVIEW (Sabin Center for Climate Change Law, Columbia Law School & United Nations Environment Programme, 2023), https://www.unep.org/resources/report/global-climate-litigation-report-2023-status-review; KATELYN HORNE, MARIA ANTONIA TIGRE, & MICHAEL GERRARD, STATUS REPORT ON PRINCIPLES OF INTERNATIONAL AND HUMAN RIGHTS LAW RELEVANT TO CLIMATE CHANGE (Sabin Center for Climate Change Law, 2023), https://scholarship.law.columbia.edu/faculty_scholarship/3924/; Maria Antonia Tigre, Natalia Urzola, & Alexandra Goodman, *Climate Litigation in Latin America: Is the Region Quietly Leading a Revolution?* 14(1) J. HUM. RTS. & ENVT. 67 (2023), https://www.elgaronline.com/view/journals/jhre/14/1/article-p67.xml; Maria Antonia Tigre, *Climate Change and Indigenous Groups: The Rise of Indigenous Voices in Climate Litigation*, 9(3) E-PUBLICA 214 (2022), https://scholarship.law.columbia.edu/sabin_climate_change/196/; Michael Burger, Jessica Wentz, & Daniel J. Metzger, *Climate Science and Human Rights: Using Attribution Science to Frame Government Mitigation and Adaptation Obligations,* in LITIGATING THE CLIMATE EMERGENCY (César Rodríguez-Garavito, ed. Cambridge University Press 2022), https://www.cambridge.org/core/books/litigating-the-climate-emergency/climate-science-and-human-rights/01D494CAB875536C9FC859D602F34326; Michael Burger, Jessica Wentz, & Radley Horton, *The Law and Science of Climate Change Attribution,* 45(1) COLUM. J. ENVTL. L. 57 (2020), https://journals.library.columbia.edu/index.php/cjel/article/view/4730; Michael Burger & Jessica Wentz, *Climate Change and Human Rights,* in HUMAN RIGHTS AND THE ENVIRONMENT: LEGALITY, INDIVISIBILITY, DIGNITY AND GEOGRAPHY (James R. May and Erin Daly eds., Elgar Encyclopedia of Environmental Law series, Vol. 7, 2019),

Introduction and Summary

The Court has been asked to provide an advisory opinion on the obligations of States to protect and safeguard the human rights of individuals and peoples who are adversely affected by climate change, pursuant to their obligations under the African Charter on Human and Peoples' Rights ("African Charter") and other relevant instruments.[2] The Request specifically raises questions about State obligations with regards to: (i) climate change adaptation, resilience, and mitigation; (ii) international cooperation, (iv) compensation for loss and damage; (iv) facilitating a just, transparent, and equitable energy transition; (v) preventing and mitigating harm from third party conduct; and (v) protecting vulnerable individuals and groups, including environmental human rights defenders, indigenous communities, women, children, youth, future generations, the current generation, past generations, the elderly, and people with disabilities.[3]

This brief provides insights on how climate science can inform the Court's assessment of State obligations to prevent, minimize, provide redress for, or otherwise respond to the harmful effects of climate change. Part I begins with an overview of relevant scientific information about the causes and impacts of climate change, the ways in which it is adversely affecting human and natural systems in Africa and throughout the world, and projected future impacts at different levels of warming and under different emissions scenarios. Part II explains the connection between scientific evidence of injuries attributable to climate change and threats to specific rights protected under the African Charter and other relevant human rights instruments. Part III describes how this information can factor into the Court's assessment and characterization of State obligations related to GHG mitigation, climate change adaptation, international cooperation, compensation for loss and damage, and equity and transparency in government decision-making.[4]

Key Conclusions: First, the existing body of scientific evidence clearly supports the conclusion that human-induced climate change poses an "actual" and "imminent" threat to a broad

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https://www.e-elgar.com/shop/usd/human-rights-and-the-environment-9781788111454.html; MICHAEL BURGER & JESSICA WENTZ, HUMAN RIGHTS AND CLIMATE CHANGE (United Nations Environment Programme 2015), https://scholarship.law.columbia.edu/sabin_climate_change/119/.

[2] Request for Advisory Opinion on the Obligations of States with Respect to the Climate Change Crisis (May 2, 2025) (hereinafter "Request for Advisory Opinion") at ¶ 93.

[3] *Id.*

[4] The protection of vulnerable groups is a cross-cutting issue that factors into our recommendations on how the Court should interpret State obligations related to mitigation, adaptation, international cooperation, loss and damage, and government decision-making. The question of how States should address third party conduct is largely addressed in the discussion of mitigation obligations.

range of human rights. Climate change is already causing pervasive harm to human and natural systems across the planet, in many cases posing a direct threat to human health, lives, livelihoods, culture, development, self-determination, and the ecosystems and natural resources that humans depend on for all of these values. The severity of the harm will increase with every increment of warming, and many more people and ecosystems will be at risk of severe or catastrophic harm if anthropogenic warming is not limited to 1.5°C or "well below" 2°C.[5]

Second, the harmful effects of climate change are unevenly distributed and may significantly exacerbate existing inequalities.[6] In many cases, the people who are suffering the greatest harm from climate change are those who have contributed the least to the problem and who have fewer resources at their disposal for mitigation and adaptation. These inequities are linked to differences in geography, hazards, and exposures, as well as underlying inequities in social and economic systems. For example, the continent of Africa is uniquely vulnerable to climate change due to greater exposure to physical impacts (e.g., droughts, floods, and heatwaves) as well as underlying socioeconomic factors. Climate change also disproportionately affects some groups and individuals, including women, children, people with disabilities, indigenous peoples, subsistence farmers and fisherman, internally displaced people, and others.[7]

Third, it is clear that States must achieve deep and rapid reductions in greenhouse gas (GHG) emissions in the next five years in order to have a chance of limiting global warming to 1.5°C or "well below" 2°C. Researchers estimate that the remaining carbon budget for a 50% chance of limiting global warming to 1.5°C was only 130 gigatons of carbon dioxide ($GtCO_2$) at the start of 2025, equal to approximately three years of current CO_2 emissions.[8] Thus, meeting global climate targets will require ambitious efforts on the part of all States to reduce GHG emissions, with an aim of achieving net zero emissions as quickly as possible, taking into account their respective

[5] The ICJ and other legal authorities have recognized that the legality of State action related to climate change should be assessed in reference to the goal of limiting global warming to 1.5°C based on scientific evidence and international treaty obligations. *See infra* Part III(A).

[6] These inequities are linked to differences in geography, hazards, and exposures, as well as underlying inequities in social and economic systems.

[7] Melanie Jean Murcott et al., *Linking Global South vulnerability, intersectionality, and climate litigation,* in CLIMATE LITIGATION AND VULNERABILITIES (MARIA ANTONIA TIGRE ET AL. EDS., 2025), *supra* note 1.

[8] Piers M. Forster et al., *Indicators of Global Climate Change 2024: Annual Update of Large-Scale Indicators of the State of the Climate System and Human Influence,* 17(6) ESSD 2641 (2025), https://essd.copernicus.org/articles/17/2641/2025/.

capabilities and resources. States will need to enact regulations aimed at phasing out fossil fuel use and controlling GHG emissions from other sectors, including emissions attributable to agriculture, livestock, deforestation and other land use decisions. States should seek to reduce emissions of both CO_2 and more potent GHGs such as methane (CH_4), which have a larger effect on near-term warming.

Fourth, there are a number of ways in which climate science can be used to characterize the responsibilities of individual States with regards to GHG emissions and climate damages. For example, climate attribution research can be used to assess and, in some cases, quantify State contributions to climate change-related harms, which is relevant when assessing the adequacy of State ambition with regards to GHG mitigation, climate finance, and compensation for loss and damage.[9] In addition, research on the equitable allocation of carbon budgets (i.e., "fair share" research) can be used to evaluate the sufficiency of GHG reduction targets, and research on mitigation pathways can be used to evaluate whether a State's climate policies reflect the greatest possible ambition.

Fifth, States should facilitate a just and equitable energy transition by using all available means to support the deployment of clean energy technologies, and ensuring equitable access to the benefits of these technologies. The clean energy transition presents an important opportunity for African States to expand energy access and promote socioeconomic development while also achieving goals related to GHG mitigation, pollution reduction, and human rights protection. African States are uniquely poised to benefit from this transition – and potentially "leapfrog" fossil fuel dependence – due to the abundance of renewable resources in Africa, the rapidly declining costs of clean energy technologies, and the lack of extensive legacy fossil fuel infrastructure in many areas.

Sixth, even with ambitious GHG mitigation, States will still need to make substantial investments in adaptation to protect human rights from the harmful impacts of climate change. Scientific research provides critical insights on the ways in which climate change is affecting specific regions, communities, and individuals and the types of adaptation measures that are most

[9] We use the term "climate attribution research" to describe: (i) research that deals with the attribution of trends, extremes, and impacts to anthropogenic climate change, and (ii) research that evaluates the relative contributions of different sources to climate change trends, extremes, and impacts.

urgently needed to protect human rights. This information can be used to evaluate the reasonableness of State adaptation measures.

Finally, it is important to recognize that climate change is a dynamic process and scientific understanding of this process is constantly evolving. States will need to periodically reassess and revise their responses to climate change in light of new scientific evidence, and should incorporate provisions for adaptative management and science-based decision-making into their governance procedures. States should also ensure that decision-making processes related to climate policy are transparent and inclusive, with ample opportunities for public participation, and access to justice for violations of environmental and human rights law.

I. Scientific Research on Climate Change

The Intergovernmental Panel on Climate Change (IPCC), the leading scientific authority on climate change,[10] has found "unequivocal" evidence that humans are influencing the climate system through GHG emissions and other climate forcers,[11] resulting in "[w]idespread changes in the atmosphere, ocean, cryosphere, and biosphere"[12] and pervasive harm to human and natural systems across the planet.[13] These findings are based on a substantial body of scientific evidence, as detailed in the in the IPCC's Sixth Assessment Report (AR6). Many other scientific authorities have reached similar conclusions about the causes and impacts of human-induced climate change.[14] The International Court of Justice (ICJ) and other legal authorities have recognized the IPCC as the world's leading expert body on climate science, and that the IPCC reports reflect the best available science on climate change.[15]

This brief focuses on several areas of research that are particularly relevant to the Court's assessment of human rights and State obligations.[16] We begin with an overview of **detection and attribution science**, which provides critical insights on the role of human activities in observed

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[10] The IPCC was established in 1988 by the United Nations Environment Programme (UNEP) and the World Meteorological Organization (WMO) as the leading scientific body for the assessment and synthesis of research on climate change. The IPCC was awarded the Nobel Peace Prize in 2007 for its role in synthesizing and disseminating climate research. The IPCC is widely recognized by courts and other legal authorizes as an authoritative and credible source of climate science, and IPCC findings have been cited in essentially every major legal decision on climate change *See* Maria L. Banda, *Climate Science and the Courts: A Review of U.S. and International Judicial Pronouncements,* ENVIRONMENTAL LAW INSTITUTE (2020), https://www.eli.org/research-report/climate-science-courts-review-us-and-international-judicial-pronouncements; Burger, Wentz, & Horton (2020), *supra* note 1.

[11] A "climate forcer" is any substance that affects the flow of energy coming into or out of the global climate system.

[12] IPCC, CLIMATE CHANGE 2021: THE PHYSICAL SCIENCE BASIS. CONTRIBUTION OF WORKING GROUP I TO THE SIXTH ASSESSMENT REPORT OF THE IPCC 4 (2021) [hereinafter IPCC AR6 WGI] at 6, 148, https://www.ipcc.ch/report/sixth-assessment-report-working-group-i/.

[13] IPCC, CLIMATE CHANGE 2022: IMPACTS, ADAPTATION, AND VULNERABILITY, WORKING GROUP II CONTRIBUTION TO THE SIXTH ASSESSMENT REPORT OF THE IPCC (2022), https://report.ipcc.ch/ar6/wg2/IPCC_AR6_WGII_FullReport.pdf [hereinafter IPCC AR6 WGII] at 9.

[14] *See, e.g.,* NATIONAL ACADEMIES OF SCIENCES, ENGINEERING, AND MEDICINE, EFFECTS OF HUMAN-CAUSED GREENHOUSE GAS EMISSIONS ON U.S. CLIMATE, HEALTH, AND WELFARE (September 2025), https://nap.nationalacademies.org/catalog/29239/effects-of-human-caused-greenhouse-gas-emissions-on-us-climate-health-and-welfare; WORLD METEOROLOGICAL ORGANIZATION, STATE OF THE GLOBAL CLIMATE 2024 (March 19, 2025), https://wmo.int/publication-series/state-of-global-climate-2024; American Meteorological Society, *State of the Climate in 2024,* Special Supplement to the Bulletin of the American Mereological Society, Vol. 106, No. 8 (August 2025), https://www.ametsoc.org/ams/publications/bulletin-of-the-american-meteorological-society-bams/state-of-the-climate/; NATIONAL RESEARCH COUNCIL, CLIMATE CHANGE: EVIDENCE AND CAUSES: UPDATE 2020 (2020), https://nap.nationalacademies.org/catalog/25733/climate-change-evidence-and-causes-update-2020.

[15] *See, e.g.,* ICJ, Advisory Opinion of 23 July 2025, ¶ 74.

[16] This assessment draws heavily on findings from IPCC AR6, which are based on a synthesis of thousands of peer-reviewed studies and other scientific resources, and reflect the expert opinions of hundreds of climate scientists.

climate change, the effect of climate change on people and ecosystems, and the relative contribution of different sources, including State actors, to climate change. This is followed by a discussion of **climate change projections,** i.e., estimates of possible future effects under different warming and emissions trajectories. In these first two sections, we focus on general findings and global trends. We then summarize the latest research on **observed and projected impacts of climate change in Africa**, which shows that the continent is already experiencing widespread losses and damages due to human-induced climate change, which will become increasingly severe with each additional increment of warming. Finally, we discuss research on the **carbon budgets, emission reduction pathways, and fossil fuel production horizon,** which provide insights on the remaining amount of GHG emissions that can be released into the atmosphere (or fossil fuels that can be burned) without exceeding warming thresholds such as 1.5 or 2 °C.[17]

A. Detection and Attribution of Climate Change

Detection and attribution methods are used to determine whether and to what extent observed changes in the climate and other interconnected systems can be attributed to human influence on climate.[18] In past work,[19] we have identified four interrelated components of attribution research that correspond with different links in the causal chain connecting human activities to climate change impacts: (i) **climate change attribution** (i.e., "trend" or "mean state" attribution), which examines how human activities, in the aggregate, affect long-term average conditions in the climate system;[20] (ii) **extreme event attribution**, which examines how human-induced changes in the climate system affect the frequency, magnitude, and other characteristics of extreme events;[21] (iii) **impact attribution**, which examines how human-induced changes in the climate

[17] We also briefly discuss research on mitigation and adaptation pathways, which provides insights on how States can achieve climate targets. *See* section I(E). However, an in-depth discussion of that research and its application to the legal questions posed in the Petition is beyond the scope of this brief.

[18] "Detection" refers to the process of demonstrating that a particular variable has changed in a statistically significant way without assigning cause. "Attribution" involves evaluating the relative contributions of different causal factors to determine the role of one or more drivers with respect to the detected change.

[19] Burger, Wentz & Horton (2020), *supra* note 1.

[20] Climate change attribution, as defined here, would include, e.g., studies examining the relationship between increases in atmospheric concentrations of GHGs and long-term changes in climate variables such as global mean surface temperature, atmospheric water vapor, ocean heat content, and global mean sea level.

[21] Extreme weather is part of the global climate system, and thus extreme event attribution can be viewed as a subset of climate change attribution. However, there are unique challenges associated with extreme event attribution because it deals with climatological extremes and specific events rather than changes in long-term average variables. There is

system affect other interconnected natural and human systems;[22] and (iv) **source attribution**, which examines the relative contributions of different emission sources to climate change. These different components are combined in **"end-to-end" attribution** research, which connects emission sources to changes in climatological trends, extreme events, and impacts.[23]

Attribution studies rely on multiple lines of evidence, including physical understanding of the climate system, observational datasets, paleoclimate reconstructions, statistical methods, and climate models that can be used to simulate conditions both with and without anthropogenic forcing on climate.[24] Much of the research is quantitative in nature, providing insights on the magnitude of change attributable to human forcing (e.g., increases in average temperature, sea level rise), as well as the extent to which human forcing has influenced the probability or risk of certain extreme events and impacts (e.g., heatwaves, storms, floods). Qualitative research methods are also used, particularly in impact attribution studies that deal with difficult-to-quantify variables.

Attribution research is relevant to discussions about legal responsibility for climate change because it provides: (i) general insights on the ways in which climate change is currently affecting human and natural systems, and (ii) more targeted insights on the injuries attributable to climate change and the contributions of specific sources to those injuries. This information is pertinent when considering State obligations related to GHG mitigation, adaptation, risk disclosure, and loss and damage, among others.

1. Climate Change Attribution

IPCC AR6 found "unequivocal" evidence that humans have warmed the atmosphere, oceans, and land.[25] The primary drivers of observed warming are GHG emissions from fossil fuel

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also overlap with impact attribution, as many extreme event studies deal with event characteristics and outcomes that are not purely climatological (e.g., flood damages, wildfire acres burned, or heat wave-related deaths).

[22] Impact attribution would include, e.g., studies aimed at characterizing the effects of climate change on human health, ecosystems, infrastructure, agricultural systems, food security, and water security.

[23] The term "source attribution" is also sometimes used to describe end-to-end attribution research.

[24] The effect of GHG emissions on the atmosphere is an example of anthropogenic "climate forcing" or "radiative forcing", i.e., a change in the energy flux within the Earth's atmosphere. Positive radiative forcing occurs when the Earth receives more incoming energy from sunlight than it radiates into space, and this net gain of energy causes warming. There are natural processes that can affect net radiative forcing, e.g., changes in the percentage of incoming solar radiation absorbed by the earth, volcanic activity, orbital cycles, and changes in global biochemical cycles. There are also other human drivers that can affect atmospheric energy flux, e.g., land use changes can have positive or negative effects on radiative forcing, and aerosol emissions have negative radiative forcing (thus contribute to cooling). A climate "forcer" is any substance or process that may affect the energy flux of the atmosphere.

[25] IPCC AR6 WGI at 4.

combustion and other industrial sources. When AR6 was published, the decadal average global surface temperature (for 2011-2020) had increased approximately 1.1°C over pre-industrial levels (1850-1900), with larger increases over land (1.59°C) than the ocean (0.88°C).[26] More recent data indicates that decadal global average surface temperatures were approximately 1.24°C higher than pre-industrial levels in 2015-2024.[27] This warming trend is unprecedented in at least the last 2000 years and it is "already affecting every inhabited region across the globe."[28]

Based on these estimates, there is a high probability that humans will cause sustained global warming in excess of 1.5°C within the next five years.[29] We already surpassed this threshold in 2024, with annual global average temperatures exceeding pre-industrial levels by 1.55°C, although long-term warming (averaged over decades) remains below 1.5°C.[30] Some of the other consequences of human influence on the climate system include: (i) ocean warming, which is the primary driver of sea level rise and ocean deoxygenation, [31] (ii) ocean acidification, which occurs due to the dissolution of CO_2 in seawater;[32] (iii) substantial declines in sea ice, glaciers, and snowpack;[33] (iv) changes in atmospheric and ocean circulation, which play a major role in regional weather patterns;[34] and (v) changes in the hydrological cycle, with both increases and decreases in precipitation depending on the region.[35]

There are important regional differences in the pace and magnitude of these climatological changes. For example, studies indicate that surface temperatures in North Africa are increasing at 1.5 to 3.5 times the global average, with corresponding increases in extreme heat and heat-related damages.[36] Part I(C) provides a more detailed overview of of climate impacts in Africa.

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[26] *Id.* at 5.

[27] Forster et al. (2025), *supra* note 8.

[28] IPCC AR6 WGI at 5.

[29] *See infra* § I(C) ("Carbon Budgets, Emission Limits, and Fossil Fuel Production Horizons").

[30] WMO, STATE OF THE GLOBAL CLIMATE 2024 (March 2025), https://wmo.int/publication-series/state-of-global-climate-2024.

[31] The IPCC estimates that ocean warming accounted for 91% of the total warming in the climate system, and total ocean heat content increased by ~ 0.396 yottajoules between 1971 and 2018. IPCC AR6 WGI at 283, 1214.

[32] IPCC AR6 WGI at 714.

[33] *Id.* at 1215-1216.

[34] *Id.* at 70, 1237.

[35] *Id.* at 1057, 1080-81.

[36] *See, e.g.,* Abdul Malik et al., *Accelerated Historical and Future Warming in the Middle East and North Africa,* 129(22) JGR ATMOSPHERES e2024JD041625 (2024).

2. Extreme Event Attribution

As recognized in IPCC AR6, there have been major advances in extreme event attribution over the past decade, and it is now an "established fact" that anthropogenic climate forcing has increased the frequency and/or intensity of some weather and climate extremes, particularly heat extremes.[37] There is also evidence linking human influence to increases in the severity and frequency of heavy precipitation, flooding, droughts, tropical cyclones, and wildfires. Table I.A.2 summarizes the level of scientific confidence in the attribution of different extremes, based on the IPCC's synthesis of research through 2019.[38]

Table I.A.2. Scientific Confidence in Extreme Event Attribution (IPCC AR6)

Type of extreme	Likelihood / confidence in attribution
Extreme heat (including marine heatwaves)	Virtually certain
Extreme precipitation	Likely / high confidence
Extreme precipitation associated with tropical cyclones	Likely / high confidence
Concurrent heatwaves and droughts	Likely / high confidence
Increase in compound flooding	Medium confidence
Increase in agricultural and ecological drought	Medium confidence
Increase in fire weather	Medium confidence
Intensity of tropical cyclones	Medium confidence

Note: These attribution findings reflect the IPCC's assessment of whether human influence on climate is causing an increase in the frequency and/or severity of the extremes listed here, at a global level. The IPCC AR6 WGI report also discusses regional differences in attribution findings for extreme events (*see, e.g.*, Figure SPM.3).

Research on extreme event attribution has continued to progress since 2019, with many new studies evaluating how climate change influenced the probability or magnitude of specific extreme events. These studies affirm the strong causal relationship between climate change and increases in extreme heat, and also lend greater confidence to the attribution of extreme precipitation, wildfires, droughts, tropical cyclones, and other events.[39] Researchers have also identified an

[37] IPCC AR6 WGI at 1517.

[38] *See id.* at 67 (Table TS-2), Chapter 11. The IPCC uses five qualifiers to express level of scientific confidence in findings: very high, high, medium, low, and very low), The following terms are used to indicate the assessed likelihood of an outcome or a result: virtually certain 99–100% probability, very likely 90–100%, likely 66–100%, more likely than not >50–100%, about as likely as not 33–66%, unlikely 0–33%, very unlikely 0–10%.

[39] *See, e.g.,* Mireia Ginesta et al., *A Methodology for Attributing Severe Extratropical Cyclones to Climate Change Based on Reanalysis Data: The Case Study of Storm Alex 2020*, CLIM. DYN. (2022), https://link.springer.com/article/10.1007/s00382-022-06565-x; Michael Goss et al., *Climate Change is Increasing the*

increasing number of extreme events that would be virtually impossible or extremely unlikely without human influence on the climate system.[40]

The latest findings on extreme heat and climate change are particularly alarming. The last ten years were the warmest in recorded history, and 2024 was the hottest year on record by a wide margin (exceeding the pre-industrial average by approximately 1.55°C).[41] There were also record-high ocean temperatures in 2024, resulting in widespread marine heatwaves.[42] Many regions experienced unprecedented heatwaves during this period, exacerbated by climate change. A global analysis of extreme heat-related events between May 2024 and May 2025 found that nearly half the world's people (49% or 4 billion) had suffered an extra 30 days of temperatures than were hotter than those experienced 90% of the time between 1991 and 2020.[43] The effects of these extreme heat events on people and ecosystems are discussed in further detail below.

3. Impact Attribution

Human-induced climate change is already causing "widespread adverse impacts and related losses and damages" to people and ecosystems across the planet.[44] Observed increases in the severity and frequency of extreme events have been linked to "widespread, pervasive impacts to ecosystems, people, settlements, and infrastructure,"[45] including increases in heat-related human mortality, coral bleaching and mortality, increases in drought-related tree mortality, increases in areas burned by wildfires, and increases in storm-related losses and damages.[46] Slow-onset

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Likelihood of Extreme Autumn Wildfire Conditions Across California, 15 ENVIRO. RES. LETT. 094016 (2020), https://iopscience.iop.org/article/10.1088/1748-9326/ab83a7; G.G. Riberio Neto et al., *Attributing the 2015/2016 Amazon Basin Drought to Anthropogenic Influence*, CLIMATE RESIL. SUSTAIN. (2022), https://rmets.onlinelibrary.wiley.com/doi/10.1002/cli2.25; Marco Turco et al., *Anthropogenic Climate Change Impacts Exacerbate Summer Forest Fires in California,* 120(25) PROC. NATL. ACAD. SCI. U.S.A. e2213815120 (2023), https://www.pnas.org/doi/full/ 10.1073/pnas.2213815120; Zhongwei Liu et al., *The April 2021 Cape Town Wildfire: Has Anthropogenic Climate Change Altered the Likelihood of Extreme Fire Weather?*, 104 BULL. AM. METEOROL. SOC. E298 (2023), https://journals.ametsoc.org/view/journals/bams/104/1/BAMS-D-22-0204.1.xml.

[40] *See, e.g.,* A. Ciavarella et al., *Prolonged Siberian Heat of 2020 Almost Impossible Without Human Influence,* CLIM. CHANGE (2021), https://link.springer.com/article/10.1007/s10584-021-03052-w.

[41] WMO State of the Climate 2024, *supra* note 30.

[42] Lijing Cheng, *Record High Temperatures in the Ocean in 2024*, 42 ADVANCES IN ATMOSPHERIC SCIENCES 1092 (2025).

[43] Giguere et al., *Climate Change and the Escalation of Global Extreme Heat: Assessing and Addressing the Risks*, Climate Central, Red Cross, Crescent Climate Centre, World Weather Attribution (May 30, 2025), https://www.climatecentral.org/report/climate-change-and-the-escalation-of-global-extreme-heat-2025.

[44] IPCC AR6 WGII at 9.

[45] *Id.*

[46] *Id.*

processes, such as ocean acidification, sea level rise, and changes in average precipitation, are also having pervasive effects on human and natural systems.

The existing body of research leaves no question that climate change poses an enormous risk to human health and well-being. IPCC AR6 estimated that approximately 3.3 to 3.6 billion people live in contexts that are highly vulnerable to climate change,[47] and there are many interrelated pathways through which climate change adversely affects human lives, physical and mental health, food and water security, livelihoods, property, critical infrastructure (e.g., sanitation, transportation, and energy systems), socioeconomic development, and cultural practices. Some of the key ways in which climate change causes harm include:

- **Ecosystem degradation:** IPCC AR6 expressed *high confidence* that climate change has already caused "substantial damages, and increasingly irreversible losses" in terrestrial, freshwater, and marine ecosystems, including "[w]idespread deterioration of ecosystem structure and function, resilience and natural adaptive capacity."[48] For example, AR6 expressed *very high confidence* that climate change has caused widespread coral bleaching and mortality, primarily due to heat stress associated with ocean warming, resulting in deterioration to and loss of coral reef ecosystems across the planet.[49] Other ecosystems that are uniquely sensitive to and affected by climate change include tropical forests, island ecosystems, coastlines, wetlands, mountains, and polar regions.
- **Effects of extreme events:** The increasing severity and frequency of climate and weather extremes is a major source of injury to people and nature. AR6 expressed *very high confidence* that increasing temperatures and heatwaves have increased mortality and morbidity in all regions.[50] Some studies have quantified the increases in heat- and disaster-related mortality attributable to climate change, e.g., Vicedo-Cabrera et al. (2021) examined data from 732 locations in 43 countries and found that 37% (range 20.5-76.3%) of warm season heat-related deaths can be attributed to climate change.[51] Extreme events also contribute to ecosystem degradation, food and water insecurity, and essentially all of the adverse effects described herein.
- **Food and water security:** Climate change is already threatening food and water security in many regions, including some of the most vulnerable regions of the world, and these

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[47] IPCC, *Summary for Policymakers,* CLIMATE CHANGE 2023: SYNTHESIS REPORT, CONTRIBUTION OF WORKING GROUPS I, II, AND III TO THE SIXTH ASSESSMENT REPORT FOR THE IPCC (2023) [hereinafter IPCC AR6 SYR], ¶ A.2.2, https://www.ipcc.ch/report/sixth-assessment-report-cycle/.

[48] *Id.*

[49] IPCC AR6 WGII at § 3.4.2.1.

[50] IPCC AR6 WGII at 51.

[51] A.M. Vicedo-Cabrera et al., *The Burden of Heat-Related Mortality Attributable to Recent Human-Induced Climate Change,* 11 NAT. CLIM. CHANGE 492 (2021), https://pubmed.ncbi.nlm.nih.gov/34221128/.

impacts will be much more severe if we surpass 1.5 or 2 °C of warming.[52] For example, IPCC AR6 expressed *high confidence* that climate change has "affected the productivity of all agricultural and fishery sectors, with negative consequences for food security and livelihoods" and, moreover, that it "has contributed to malnutrition in all its forms in many regions… especially for pregnant women, children, low-income households, Indigenous Peoples, minority groups and small-scale producers."[53]

- **Food, water, and vector-borne diseases:** Climate change is affecting the spread of communicable diseases as a result of changes in temperature, humidity, rainfall, sea level rise, and extreme weather. IPCC AR6 expressed *high confidence* that higher temperatures and other climate impacts are already causing an increase in vector-borne diseases, including dengue, Lyme disease, West Nile fever, Rift Valley fever, tick-borne encephalitis, and chikungunya virus, as well as food- and water-borne illnesses.[54]

- **Submergence of low-lying coastal areas and islands:** Coastal areas and islands are increasingly experiencing adverse impacts such as submergence, flooding, erosion, and saltwater intrusion due to sea level rise, more severe storms, and storm surge. These impacts have adverse effects on humans and infrastructure as well as coastal and estuarine ecosystems (which provide critical services to coastal communities). Many people are already facing an imminent threat of forced displacement, and some island states and communities will become uninhabitable due to sea level inundation even if global warming is limited to 2 °C.[55] IPCC AR6 expressed *very high confidence* that small islands and low-lying cities and settlements will face "severe disruption by 2100, and as early as 2050 in many cases" under *all* climate and socioeconomic scenarios.[56]

- **Humanitarian crises, forced displacement, and migration:** Climate change is "contributing to humanitarian crises where climate hazards interact with high vulnerability."[57] For example, flood and drought-related acute food insecurity and malnutrition have increased in Africa and Central and South America.[58] Climate and weather extremes are also driving displacement in all regions of the world, with Small Island States disproportionately affected.[59] Over 20 million people have been internally

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[52] IPCC AR6 WGII, Ch. 4-5. There are many pathways through which climate change affects food and water systems (e.g., ocean warming, acidification, and deoxygenation adversely affect fisheries; changes in temperature and precipitation can adversely affected agricultural systems; drought and aridity can reduce freshwater availability).

[53] *Id.* at 49, 51.

[54] *Id.* at 51. *See also id.*, Ch. 7.

[55] This is one of the reasons that the UNFCCC Conference of the Parties (COP) revised its objective to limit global warming to "well below 2 °C" or 1.5 °C. However, current pledges under the UNFCCC are not sufficient to meet that objective, and it is likely that many islands and low-lying coastal areas will be inundated due to sea level rise under current emissions trajectories. *See infra* § I.B.

[56] IPCC AR6 WGII at 62.

[57] *Id.* at 11.

[58] *Id.*

[59] *Id.*

displaced annually by weather-related events since 2008, with storms and floods and the most common drivers.[60]

- **Physical and mental health:** Climate change is adversely affecting physical and mental as a result of the hazards described above, including more severe and frequent extreme events, increased exposure to diseases, food and water insecurity, humanitarian conflict, and displacement.[61]

The scientific evidence also demonstrates that the harmful impacts of climate change are disproportionately affecting "the most vulnerable people and systems" and some natural and human systems have already been "pushed beyond their ability to adapt."[62]

4. Source and End-to-End Attribution

Although most attribution studies deal with the aggregate effect of human activities on the climate system, researchers are now using source attribution data and end-to-end attribution techniques to isolate the contribution of specific entities to changes in the climate system, extreme events, and impacts. In some cases, it may be possible to isolate the effects of GHG emissions on a per-ton basis.[63] Some of the research focuses on state-level contributions to climate change-related harms. For example, Otto et al. (2017) demonstrated that it is possible to quantify the proportional contribution of individual countries to specific extreme events, using the example of the Argentinian heatwave of 2013-14.[64] An earlier attribution study had found that anthropogenic climate change had made the heatwave approximately five times more likely to occur.[65] Using climate models, Otto et al. determined that emissions from the U.S. and EU had increased the likelihood of that event by 28% and 37%, respectively.[66] The same technique can be applied to

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[60] *Id.* at 48.

[61] *Id.* at 11. *See also* Marina Romanello et al., *The 2025 report of the Lancet Countdown on health and climate change: climate change action offers a lifeline,* 405 THE LANCET 2804 (2025),

[62] *Id*.

[63] E.g., there is a near-linear relationship between cumulative CO_2 emissions and observed declines in September sea ice (the month when Arctic sea ice typically reaches its minimum extent). Based on this, researchers have estimated that each metric ton of CO_2 that is released into the atmosphere may result in a sustained loss of 3 ± 0.3 square meters of September sea ice in the Arctic. Dirk Notz & Julienne Stroeve, *Observed Arctic sea-ice loss directly follows anthropogenic CO_2 emission*, 354 SCIENCE 747 (2016), https://www.science.org/doi/10.1126/science.aag2345.

[64] Friederike Otto et al., *Assigning Historic Responsibility for Extreme Weather Events*, 7 NAT. CLIM. CHANGE 757 (2017), https://www.nature.com/articles/nclimate3419.

[65] A. Hannart et al., *Causal Influence of Anthropogenic Forcings on the Argentinian Heat Wave of December 2013*, 96(12) BULL. AM. METEROL. SOC. S41, https://journals.ametsoc.org/view/journals/bams/96/12/bams-d-15-00137.1.xml.

[66] Otto et al. (2017), *supra* note 64.

other events, such as the heatwaves that have affected Africa in recent years (see discussion of "Observed and Projected Impacts" below).

Researchers have also developed techniques for estimating economic damages attributable to state-level emissions. For example, Callahan & Mankin (2022) used historical emissions data and climate models to quantify each country's responsibility for historical temperature-driven income changes in all other countries.[67] They found that the top five emitters (U.S., China, Russia, Brazil, and India) had collectively caused US$6 trillion in income losses from warming since 1990, and that many other countries are responsible for billions in losses. The study further found that the distribution of warming impacts from emitters is highly unequal, with high-income, high-emitting countries actually accruing economic benefits while low-income, low-emitting countries are experiencing severe economic losses as a result of climate change. These end-to-end attribution methods have also been used to estimate economic damages attributable to fossil fuel production and consumption.[68]

While these studies highlight how far attribution research can go in terms of quantifying state-level contributions to climate impacts, it is also possible to draw inferences about state responsibility for climate impacts based on the State's relative contribution to global emissions. There are a number of different ways to account for state emissions, all of which provide complementary insights on the nature of State contributions to and responsibility for climate change. These include: (i) historical, present, and future emissions; (ii) territorial, consumption-based, and extraction-based emissions;[69] and (iii) total emissions, per capita emissions, and various metrics of emissions intensity.

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[67] Christopher W. Callahan & Justin S. Mankin, *National Attribution of Historical Climate Damages,* 172 CLIM. CHANGE 40 (2022), https://link.springer.com/article/10.1007/s10584-022-03387-y.

[68] *See* Christopher W. Callahan & Justin S. Mankin, *Carbon majors and the scientific case for climate liability,* 640 NATURE 838 (2025), https://www.nature.com/articles/s41586-025-08751-3 (using Scope 1 and Scope 3 emissions data to estimate economic damages attributable to fossil fuel producers, and finding that major producers like Chevron "very likely caused between US $791 billion and $3.6 trillion in heat-related losses" from 1991 through 2020).

[69] Territorial emissions are generated from combustion, industrial processes, and land use changes within a State's borders. Consumption-based emissions are the emissions embodied in the products consumed within a state. Extraction-based emissions are the emissions embodied in the fossil fuels produced within a State. *See* PETER ERICKSON & MICHAEL LAZARUS, ACCOUNTING FOR GREENHOUSE GAS EMISSIONS ASSOCIATED WITH THE SUPPLY OF FOSSIL FUELS (Stockholm Environment Institute 2013), https://www.sei.org/publications/accounting-for-greenhouse-gas-emissions-associated-with-the-supply-of-fossil-fuels/.

B. Projections of Future Climate Change

Climate change projections provide insights on the magnitude and scope of changes and impacts that may occur under different emission trajectories and warming scenarios. Like attribution research, climate projections are based on physical understanding, climate datasets, statistical methods, and climate models. Such projections are relevant when assessing the foreseeability of future climate harms and corresponding legal obligations to control GHG emissions and prepare for the effects of climate change.

There is no question that the effects of climate change will become increasingly severe and pervasive as GHGs continue to accumulate in the atmosphere. However, the relationship between emissions, changes in the global climate system, and corresponding impacts is not always linear – for example, there are potential tipping points, feedback cycles, and cascading impacts that could result in acceleration of certain trends such as sea level rise. Even with these complexities, the IPCC has stated that global climate models can provide credible quantitative estimates of future climate change for most variables at large geographic scales.[70]

IPCC AR6 found that "global surface temperature will continue to increase until at least mid-century under all emissions scenarios considered", and that "global warming of 1.5°C and 2°C will be exceeded during the 21st century" unless there are deep reductions in GHG emissions in the next few decades.[71] In the near term, global warming is *more likely than not* to reach 1.5°C even under a very low GHG emission scenario (SSP1-1.9), and this level of warming will cause "unavoidable increases in multiple climate hazards and present multiple risks to ecosystems and humans (*very high confidence*)."[72]

The science indicates that the loss and damage caused by anthropogenic climate change will be severe for some regions and communities even if humans limit global warming to 1.5 or 2.0°C, and significantly worse if we exceed those thresholds (see Table 1.B, next page).[73] IPCC AR6 expressed *very high confidence* that "[n]ear-term actions that limit global warming to close to

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[70] IPCC AR6 WGI, Ch. 4.

[71] *Id.* at 14.

[72] IPCC AR6 WGII at 13.

[73] IPCC, 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 5 (2018), https://www.ipcc.ch/sr15/ [hereinafter IPCC 1.5°C REPORT].

1.5°C would substantially reduce projected losses and damages related to climate change in human systems and ecosystems, compared to higher warming levels, but cannot eliminate them all."[74]

Table I.B. Select Impacts of Climate Change at Different Levels of Warming (AR6)[75]

Projected Impacts	**Global Temperature Increase**			
	1.5°	2.0°	3.0°	4.0°
Water availability and water-related hazards. Risks in physical water availability and water-related hazards will continue to increase by the mid- to long-term in all assessed regions, with greater risk at higher global warming levels (*high confidence*).				
People in urban areas exposed to water scarcity from severe droughts	+ 350 million	+ 410 million		
Projected decline in snowmelt water availability for irrigation in some snowmelt dependent river basins		20% decline		40 % decline
Adaptation limits for islands and glacier/snowmelt dependent regions	>1.5°C, limited freshwater resources pose potential hard limits for small islands and regions dependent on glacier and snow-melt.			
Projected increases in direct flood damages, without adaptation		↑ 1.4 - 2x compared to 1.5°C	↑ 2.5 - 3.9x compared to 1.5°C	
Food Production and Access. Climate change will increasingly put pressure on food production and access, especially in vulnerable regions, undermining food security and nutrition (*high confidence*).				
Risk of food insecurity in vulnerable regions	Moderate risk	High risk	Risk "expands substantially" compared with 2°C	
Biodiversity. Biodiversity loss and degradation, damages to and transformation of ecosystems are already key risks for every region due to past global warming and will continue to escalate with every increment of global warming (*very high confidence*). Risks to ecosystem integrity, functioning and resilience are projected to escalate with every tenth of a degree increase in global warming (*very high confidence*).				
Percent of assessed species in terrestrial ecosystems likely facing a "very high risk" of extinction	3-14%	3-18%	3- 29%	3-39%
Risk of biodiversity loss in ocean and coastal ecosystems	moderate - very high risk	moderate – very high risk	high - very high risk	
Loss of warm-water coral reefs	70-90% decline	>99% decline		
Biodiversity hotspots	24% of species face "very high extinction risk"			
Polar, mountain, and coastal ecosystems	>1.5°C, irreversible impacts on some ecosystems, particularly those impacted by ice-sheet melt, glacier melt, and sea level rise.			

Note: See Section I(C), below, for an overview of projected impacts and damages in Africa.

[74] IPCC AR6 WGII SPM, ¶ B3.

[75] These impacts were selected based on the availability of information about the magnitude of the impact at specific warming levels in IPCC AR6 WGII. This is not intended to be an exhaustive or comprehensive list of climate impacts.

Some impacts and hazards do not scale linearly with emissions and are highly sensitive to even minor increases in temperature. For example, even "relatively small incremental increases in global warming (+0.5°C) cause statistically significant changes in extremes" including temperature extremes (*high confidence*), precipitation extremes (*high confidence*), tropical cyclones (*medium confidence*), and the worsening of droughts in some regions (*medium confidence*).[76] Ecosystem impacts are another example of a non-linear hazard: climate change causes cascading and compounding disruptions to ecosystems, such that small increases in warming can have major impacts on ecological health and biodiversity, which may in turn have significant impacts on human rights. The effects of climate change will also interact with non-climatic risks, creating "compound and cascading risks that are more complex and difficult to manage."[77]

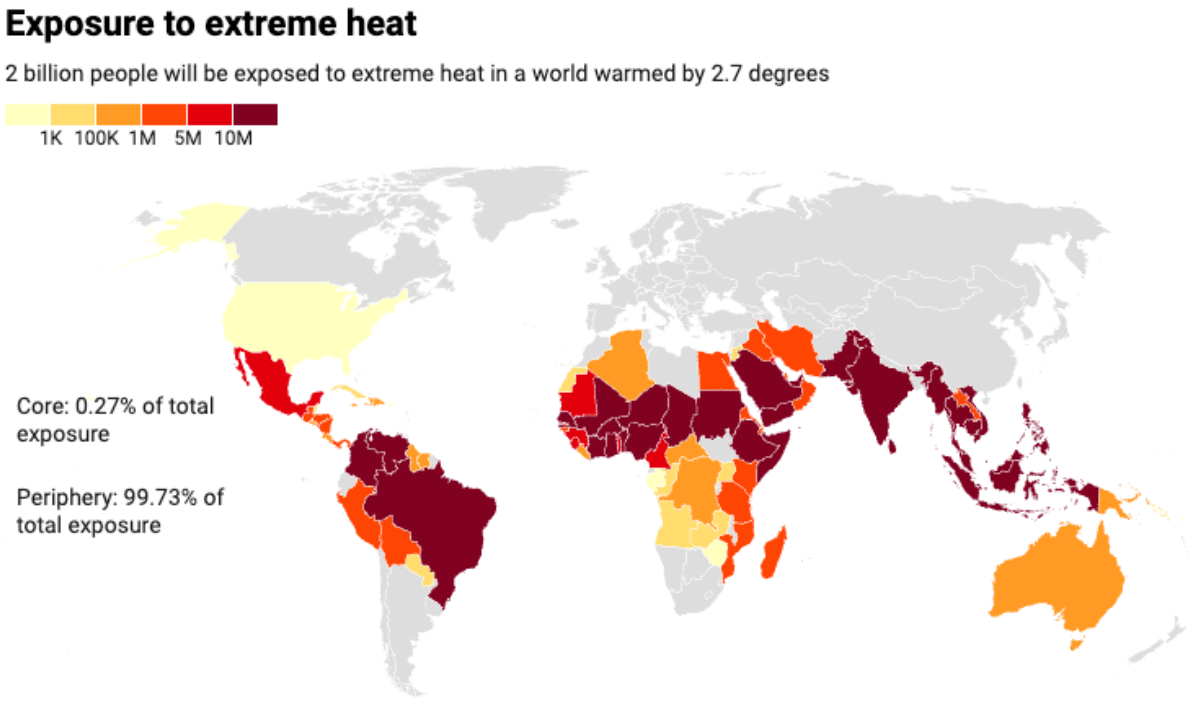
A recent study on the human costs of global warming found that current climate policies, which are projected to result in 2.7°C of warming by end-of-century (2080-2100), would leave up to one third (22-39%) of people outside of the "human climate niche", i.e., the climatic conditions in which most humans have historically survived, and would expose approximately 22% of people to extreme heat (≥ 29°C).[78] In comparison, limiting global warming to 1.5°C would reduce the number of people outside of the climate niche by approximately half, and only 5% of people would be exposed to extreme heat. The study also looked at country-level exposure to extreme heat, as well as how country-level per capita GHG emissions increased population exposure to extreme heat, thus providing insights on State responsibility and State injury under different warming scenarios. This analysis provides further evidence of the inequity inherent in climate change: whereas countries in the global north are responsible for most climate forcing, the vast majority of projected exposure to extreme heat under a 2.7°C scenario will occur in the Global South, including Africa (see Figure I.B, next page).

[76] IPCC AR6 WGI at 1517.

[77] *Id.*

[78] Timothy M. Lenton et al., *Quantifying the Human Cost of Global Warming,* NAT. SUSTAIN. (2023), https://www.nature.com/articles/s41893-023-01132-6.

Figure 1.B: Projected Exposure to Extreme Heat at 2.7°C



Extreme heat is defined here as Mean Annual Temperature ≥ 29 °C, which is presently very rare. Population figures are based on a projected global population of 9.5 billion in 2070.

Source: Lenton et al. (2023)

Adaptation measures can play a significant role in mitigating certain risks, such as the risks associated with extreme precipitation and flooding. However, adaptation may not be as effective at mitigating other harmful impacts, such as those on biodiversity and ecosystems. Moreover, the effect of climate change on vulnerable populations and ecosystems often reduces their adaptive capacity, thus creating a compounding problem where adaptation becomes increasingly challenging and costly as climate change becomes more severe. Additionally, most adaptations involve tradeoffs, and there are risks of maladaptation and inequitable adaptation.[79]

The impacts of climate change may also become significantly worse if and when the world surpasses certain "tipping points", i.e., thresholds that, when exceeded, will result in large and typically irreversible changes in the climate and connected systems.[80] Key examples of important

[79] For example, expanding access to air-conditioned spaces is an important adaptation to extreme heat, but air conditioning comes with significant economic and environmental costs, and may be cost prohibitive for poorer households and communities.

[80] The IPCC defines a tipping point as a "critical threshold beyond which a system reorganizes, often abruptly and/or irreversibly". IPCC AR6 WG1 at 95.

tipping points within the climate system are the melting of the Greenland ice sheet (an essentially irreversible process that would ultimately trigger meters of sea level rise as well as changes in atmospheric and ocean dynamics), the melting of Arctic winter sea ice, the dieback of the Amazon rainforest, the loss of mountain glaciers, and the collapse of boreal permafrost. Some critical tipping point thresholds may have already been surpassed, although the full effects have not yet manifested due to time lags and/or incomplete understanding.[81] This highlights an important aspect of tipping points: surpassing thresholds can be "locked in" before the actual event occurs (e.g., the melting of the Greenland ice sheet may already be inevitable due to existing warming).[82] Although much is unknown about the timing and potential consequences of climate tipping points, there are significant risks associated with surpassing these thresholds, since consequences can be so large.[83]

C. Observed and Projected Impacts of Climate Change in Africa

One of the chapters in the IPCC AR6 WGII report contains a detailed synthesis of research on how climate change is affecting people and ecosystems in Africa.[84] Two of the key messages from that chapter are:

(1) Africa is one of the lowest contributors to greenhouse gas emissions causing climate change, yet key development sectors have already experienced widespread losses and damages attributable to human-induced climate change, including biodiversity loss, water shortages reduced food production, loss of lives and reduced economic growth (*high confidence*).

(2) Between 1.5°C and 2°C global warming—assuming localised and incremental adaptation—negative impacts are projected to become widespread and severe with reduced food production, reduced economic growth, increased inequality and poverty, biodiversity loss, increased human morbidity and mortality (*high confidence*). Limiting global warming to 1.5°C is expected to substantially reduce damages to African economies, agriculture,

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[81] David Armstrong McKay et al., *Exceeding 1.5° Global Warming Could Trigger Multiple Climate Tipping Points*, 377(6611) SCIENCE eabn7950 (2022), https://www.science.org/doi/10.1126/science.abn7950.

[82] Niklas Boers & Martin Rypdal, *Critical Slowing Down Suggests that the Western Greenland Ice Sheet is Close to a Tipping Point,* 118(21) PROC. NATL. ACAD. SCI. e2024192118 (2021), https://www.pnas.org/doi/10.1073/pnas.2024192118 (finding that the Greenland Ice Sheet melt tipping point is between 0.8°C and 3.2°C of warming above pre-industrial levels).

[83] Timothy M. Lenton et al., *Climate Tipping Points – Too Risky to Bet Against,* 575(7784) NATURE 592 (2019), https://www.nature.com/articles/d41586-019-03595-0.

[84] *See* Christopher H. Trisos et al., *Africa*, Ch. 9 in IPCC AR6 WGII.

human health, and ecosystems compared to higher levels of global warming (*high confidence*).[85]

The IPCC has thus recognized that Africa is experiencing losses and damages from climate change that are both severe and highly inequitable in nature, and GHG mitigation is urgently needed to prevent and reduce future damages. These findings are based on evidence of many different ways in which climate change is currently affecting people and ecosystems in Africa, as well as projections of future impacts. Below we summarize some key examples of the regional impacts described in IPCC AR6 and other research (e.g., studies published after IPCC AR6). We begin with a discussion of physical hazards, followed by a discussion of human impacts and societal and economic damages.

1. Physical Hazards

Rising temperatures and extreme heat: Human-induced climate change is causing increases in both mean and extreme temperatures throughout Africa, with many regions warming more rapidly than the global average.[86] Attribution studies have found that climate change is contributing significantly to more severe and frequent heatwaves across the continent, including on land and in water, and the climate "signal" has become more robust over the past four decades as GHGs have accumulated in the atmosphere.[87] The influence of climate change has been especially apparent in recent heatwaves. For example, West and Central Africa experienced a heatwave in March-April 2024 with temperatures exceeding 45°C in some regions, resulting in over 100 deaths.[88] Attribution researchers found that a heatwave of this magnitude would be impossible without human-induced warming.[89] Researchers also identified a strong climate signal in heatwaves that affected North Africa in June 2024.[90] and central and western Africa in December 2024.[91] The

[85] *Id.* at 1289.

[86] *Id.* at 1290, 1320-21.

[87] *See* Vishal Bobde et al., *Anthropogenic warming is accelerating recent heatwaves in Africa,* 6 COMMUNICATIONS EARTH & ENVIRONMENT 578 (2025). *See also* IPCC AR6 WGII. at 1290, 1294, 1320, 1322.

[88] Clair Barnes et al., *Extreme Sahel heatwave that hit highly vulnerable population at the end of Ramadan would not have occurred without climate change*, World Weather Attribution Project (April 2024).

[89] *Id.*

[90] *Middle East, Mediterranean, and North Africa experiencing climate-induced extreme heat*, CLIMATE CENTRAL: CLIMATE SHIFT INDEX (June 11, 2024) (estimating that climate change made the June 2024 heatwave at least five times more likely to occur).

[91] Giguere et al. (2025), *supra* note 43 (estimating that climate change made the December 2024 heatwave at least fifteen times more likely to occur).

IPCC has expressed *very high confidence* that heatwaves on land, in lakes and in the ocean in Africa will increase considerably in both magnitude and duration as global temperatures rise.[92] Scientists also predict that most African countries will enter "unprecedented high temperature climates" earlier in this century than "generally wealthier, higher latitude countries."[93] Africa is uniquely vulnerable to the hazards of increasing extreme heat due to underlying climatological, geographic and socioeconomic factors.

Precipitation, floods, and droughts: Climate change is also affecting precipitation patterns in Africa, causing greater variability in rainfall, more extreme precipitation, and longer dry periods, and thus increasing the severity and likelihood of both floods and droughts. IPCC AR6 showed that changes in precipitation trends had been *detected* across most regions of Africa (as of 2021), and that many of the observed trends are attributable to human-induced climate change.[94] Scientists predict that "[e]xtreme hydrological variability" will progressively amplify under all future climate change scenarios, with significant regional variation.[95]

Recent attribution studies have shown that climate change contributed to some of the most destructive floods in the region, including the 2020 East African floods, the 2022 South African floods, the 2022 West African floods, and the 2024 Sahel floods, and the 2025 floods in Botswana and South Africa, among others.[96] The frequency and intensity of heavy rainfall events is projected to increase at all levels of global warming except in areas of north and southwestern Africa (where precipitation decreases and drought are more likely to occur).[97]

Scientists have also found that human-induced climate change is causing more severe and prolonged droughts in Africa, although the strength of the climate signal varies considerably

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[92] IPCC AR6 WGII at 1290.

[93] *Id.*

[94] IPCC AR6 WGII at 1298. *See also* WMO, STATE OF THE CLIMATE IN AFRICA 2024, WMO No. 1370 (2025), https://library.wmo.int/records/item/69495-state-of-the-climate-in-africa-2024

[95] IPCC AR6 WGII at 1290.

[96] Ben Clarke et al., *Increasing extreme rainfall and rapid urbanization major drivers behind Gaborone's deadly floods,* World Weather Attribution (March 13, 2025); Rosa Pietroiusti et al., *Possible role of anthropogenic climate change in the record-breaking 2020 Lake Victoria levels and floods,* 15(2) EUROPEAN GEOSCIENCES UNION 225 (2024); Izidine Pinto et al., *Conflict, poverty, and water management issues exposing vulnerable communities in Africa to extreme floods that are now common events because of climate change*, World Weather Attribution (Oct. 23, 2024); Mariam Zachariah, *Climate change exacerbated heavy rainfall leading to large scale flooding in highly vulnerable communities in West Africa,* World Weather Attribution (Nov. 16, 2022); Izidine Pinto, *Climate change exacerbated rainfall causing devastating flooding in Eastern South Africa,* World Weather Attribution (May 13, 2022).

[97] IPCC AR6 WGII at 1290.

depending on the event.[98] It appears that climate change played a particularly large role in the 2021-2022 Horn of Africa drought, with one study estimating that climate change has made such droughts approximately 100 times more likely to occur.[99] Significant reductions in rainfall and increases in drought frequency and duration are projected in many parts of Africa with ongoing warming – for example, the duration of meteorological droughts in some regions is excepted to double (from 2 to 4 months) above 3°C of warming, resulting in potentially devastating consequences to people and ecosystems.[100]

Coastal hazards: Sea level rise, more intense storms, and compound storm surge pose a risk to coastal residents, communities, and ecosystems in Africa. The coastal cities of east, west, and north Africa are particularly vulnerable to the effects of rising sea levels,[101] as are coastal ecosystems located in extensive low-lying deltas.[102] The number of people exposed to sea level rise and other coastal hazards in Africa is expected to increase: researchers estimate that approximately 54 million Africans lived in the low elevation coastal zone in 2000, and this number is projected to increase to 117 million in 2030 (+10 cm sea level rise) and 245 million in 2060 (+26 cm sea level rise).[103] By 2100, sea levels are projected to rise at least 40 cm above those in 2000 in a below 2°C scenario, and possibly up to 1 meter by the end of the century under a 4°C warming scenario.[104] Coastal regions in east and southern Africa are also projected to experience tropical cyclones with more intense rainfall and higher windspeeds as warming progresses, although the frequency of tropical cyclones may decrease.[105]

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[98] E.g., researchers estimate that the 2015-2017 Cape Town drought was three times more likely to occur in the context of human-induced climate change. IPCC AR6 WGII at 1290.

[99] Joyce Kimutai et al., *Human-induced climate change increased 2021-2022 drought severity in Horn of Africa*, 47 WEATHER AND CLIMATE EXTREMES 100745 (2025).

[100] IPCC AR6 WGII at 1290.

[101] *Id.* at 1363.

[102] *Id.* at 1333. More localized studies have found the effects of sea level rise on coastal populations, infrastructure, and ecosystems will likely result in significant losses from socioeconomic, cultural and ecological perspectives. *See, e.g.,* Kwasi Appeaning Addo, *Impacts of Coastal Inundation Due to Climate Change in a CLUSTER of Urban Coastal Communities in Ghana, West Africa,* 3(9) REMOTE SENSING 2029 (2011); Michalis I. Vousdoukas et al., *African heritage sites threatened as sea-level rise accelerates,* 12 NATURE CLIMATE CHANGE 256 (2022).

[103] IPCC AR6 WGII at 1364.

[104] *Id.* at 1364.

[105] *Id.* at 1290.

Ecosystem impacts: Climate change is contributing to land and habitat degradation and loss of biodiversity in many parts of Africa.[106] Ecosystems may be adversely affected by extreme events, such as heatwaves (including marine heatwaves), floods, and droughts, as well as more gradual processes, such as increases in average temperatures, changes in long-term precipitation patterns, ocean acidification, and ocean deoxygenation.[107]

2. Human, Societal, and Economic Impacts

Food and water security: There are multiple pathways through which climate change is threatening food and water security in Africa. Increases in average temperatures, greater aridity, extreme heat, changing precipitation patterns, floods, and droughts can adversely affect crops and livestock (e.g., by decreasing crop yields, increasing irrigation demands, placing stress on livestock, and making agricultural labor more difficult and dangerous). IPCC AR6 expressed *high confidence* that climate change is adversely affecting the agricultural sector in Africa. Specifically, climate change has reduced growth in agricultural productivity by 34% since 1961, more than any other region.[108] Regions that are experiencing greater water scarcity due to changing precipitation patterns and prolonged droughts are particularly at risk of food and water insecurity.[109] Climate change also threatens the health of ecosystems that provide food and clean water, including marine and freshwater fisheries. These impacts have important implications for human health, livelihoods, and economic security.

Human health: Climate change affects human health through multiple vectors, including extreme weather, infectious diseases, ecosystem degradation, and food and water insecurity. Some of the most significant drivers affecting health in Africa are: (i) increased risk of malnutrition and dehydration due to food and water insecurity, (ii) increases in the transmission of vector- and water-borne diseases, such as malaria, dengue, and zika; and (iii) increases in heat-related mortality and morbidity (e.g., from heatstroke and dehydration).[110] Children, elderly people, pregnant women,

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[106] *Id.* at 1294.

[107] *Id.* at 1302.

[108] *Id.* at 1291.

[109] For example, several countries in southern Africa have experienced prolonged drought conditions over the past two decades, resulting in significant reductions in aggregate cereal yields and economic disruption. WMO State of the Climate in Africa 2024, *supra* note 30.

[110] IPCC AR6 WGII at 1291, 1371-1380. *See also* Romanello et al. (2025), *supra* note 61; Joshua Jonah Kunda et al., *The effects of extreme heat on human health in tropical Africa,* 68 INTERNATIONAL JOURNAL OF BIOMETEOROLOGY 1015 (2024); Samuel Appiah Ofori et al., *Climate Change, Land, Water, and Food Security: Perspectives From Sub-*

and people with pre-existing health conditions particularly vulnerable to malnutrition, dehydration, heat-related health effects, and diseases. Extreme events such as floods and storms can also cause death and injury. IPCC AR6 expressed *high confidence* that climate change is already adversely affecting the health of tens of millions of Africans, and that mortality and morbidity will escalate with further global warming.[111] Climate change also has important implications for psychological and mental health -- for example, repeat exposures to extreme events, and resulting damages (e.g., loss of homes and livelihoods, fracturing of communities, and displacement) can cause depression, anxiety, and post-traumatic stress disorder.[112]

Infrastructure and Services: Climate change poses a threat to critical infrastructure and services in Africa, including energy infrastructure, health systems, and transportation systems.[113] For example, longer and more severe heatwaves are placing additional stress on electrical systems and causing interruptions to power supplies. Precipitation variability and changes in streamflow are also adversely affecting hydroelectric power generation in some regions.[114]

Other societal and economic impacts: There are many other harmful social and economic effects linked to climate change in Africa, including decreases in labor productivity (e.g., due to heat and extreme weather), disruptions to education, and the exacerbation of inequality both within and across societies.[115] IPCC AR6 found, with *high confidence,* that climate change has already reduced economic growth across Africa, increasing income inequality between African countries and those in temperature northern hemisphere climates.[116] Climate change also contributes to human displacement conflict and humanitarian crises. Millions of Africans have been displaced

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Saharan Africa, 5 FRONTIERS IN SUSTAINABLE FOOD SYSTEMS 1 (2021); Samuel Kwasi Opoku et al., *Climate Change and Health Preparedness in Africa: Analysing Trends in Six African Countries,*18(9) International Journal of Environmental Research on Public Health 4672 (2021).

[111] IPCC AR6 WGII at 1291.

[112] *See* Lukoye Atwoli et al., *Mental health and climate change in Africa,* 19(4) BJPSYCH INTERNATIONAL 86 (2022); Monika Dos Santos, *Climate change and mental health within the African context,* 34(5) INT. REV. PSYCHIATRY 510 (2022); Enos Moyo et al., *Health effects of climate change in Africa: A call for an improved implementation of prevention measures,* 2(2) ECO-ENVIRONMENT & HEALTH 74 (2023); Usoro Udousoro Akpan et al., *Addressing the psychological impact of climate-induced disasters on young people in Africa: Challenges and pathways forward,* 12 GLOBAL MENTAL HEALTH e50 (2025).

[113] IPCC AR6 WGII at 1360-63.

[114] *Id.* at 1290.

[115] *See Id.* at 1291 (discussing effects of climate change on educational attainment)

[116] *Id.* at 1291.

by weather-related events such as droughts and floods in recent years, and researchers predict that climate hazards will be a significant driver of displacement and migration in the future.[117]

Compounding and cascading risks: The effects of climate change interact to create compounding and cascading risks for African communities. In many cases, the physical hazards of climate change can exacerbate underlying vulnerabilities to those hazards, thus amplifying the harm to people and ecosystems. For example, extreme heat and precipitation changes can lead to drought, causing crop failure and food insecurity, and ultimately increasing a population's vulnerability to other climate impacts. IPCC AR6 notes that "[m]ultiple African countries are projected to face compounding risks from reduced food production across crops, livestock and fisheries, increased heat-related mortality, heat-related loss of labour productivity, and flooding from sea level rise."[118]

D. Carbon Budgets, Emission Limits, and Fossil Fuel Production Horizons

Global GHG budgets define the maximum amount of GHGs that can be released into the atmosphere while still limiting global warming to pre-defined targets, such as 1.5°C or 2.0°C. Most of the research in this area deals with the global carbon budget, since CO_2 is the dominant source of anthropogenic warming and much is known about CO_2 emissions. Researchers have developed and are continuously updating estimates of the remaining global carbon budget based on assessments of carbon cycle sources and sinks on a global level, including estimates of anthropogenic emissions and land use changes.

Estimating carbon or GHG budgets involves several steps: (i) estimating the total amount of CO_2 and/or other GHGs that can be released into the atmosphere while limiting global warming to a specific temperature target, (ii) determining how much of the budget has already been utilized by historical emissions, and (iii) calculating the remaining share of the carbon budget for subsequent years (and how that budget may be allocated across those years). The global carbon budget is typically expressed in terms of a range of gigatons of CO_2 that can be emitted at a specified probability (e.g., 67%) of remaining within a temperature target.

IPCC AR6 synthesized research on the remaining carbon budget, and found that we would need to limit global CO_2 emissions to 400 billion tons from the start of 2020 in order to have a

[117] IPCC AR6 WGII at 1292, 1391.
[118] *Id.* at 1290.

67% probability of remaining within 1.5°C of warming, and 1150 billion tons in order to have a 67% probability of limiting warming to 2°C.[119] The carbon budget has decreased considerably since IPCC AR6 was published – the most recent assessment indicates that the remaining carbon budget for a 67% chance of limiting warming to 1.5°C was only 80 billion tons of CO_2 at the start of 2025, equivalent to less than two years of annual emissions.[120] Table I.C provides the full range of carbon budget estimates from that assessment.

Table I.C. Carbon Budget Estimates from Forster et al. (2025)

Temperature (°C)	Estimated remaining carbon budgets from the beginning of 2025 (Gt CO_2)				
Avoidance probability:	17 %	33 %	50 %	67 %	83 %
1.5	320	200	130	80	30
1.6	620	420	310	240	160
1.7	910	640	490	390	290
2.0	1790	1310	1050	870	690

Estimates of the remaining CO_2 budget are based on assumptions about historical and future emissions of non-CO_2 forcers, such as methane (CH_4), nitrous oxide (N_2O), and various short-lived climate forcers. The assumed future emissions of non-CO_2 emissions can be thought of as "budgets" as well, since any emissions in excess of those assumptions will result in additional warming.[121] Conversely, if countries are able to achieve more rapid reductions in non-CO_2 forcers, this would allow for a larger CO_2 budget. Most non-CO_2 forcers are also much more potent than CO_2 and reducing these highly potent GHGs can help limit near term warming.[122]

[119] IPCC WGI at 29. See also IPCC AR6 WGIII at 6-7.

[120] Piers M. Forster et al., *Indicators of Global Climate Change 2024: Annual Update of Large-Scale Indicators of the State of the Climate System and Human Influence,* 17(6) ESSD 2641 (2025), https://essd.copernicus.org/articles/17/2641/2025/.

[121] *See, e.g.,* Global Carbon Project, https://www.globalcarbonproject.org; Marielle Saunois et al., *The Global Methane Budget 2000-2017*, 12(3) EARTH SYST. SCI. DATA 1561 (2020), https://essd.copernicus.org/articles/12/1561/2020/; CSIRO, *Global Methane Budget*, https://www.csiro.au/en/research/environmental-impacts/emissions/global-greenhouse-gas-budgets/global-methane-budget. IPCC AR6 WGI, Ch. 5 ("Global Carbon and Other Biogeochemical Cycles and Feedbacks"); Ch. 6 ("Short-Lived Climate Forcers").

[122] For example, methane (CH_4) is 84 times more potent than CO_2 when measured on a 20-year timespan, and its atmospheric lifetime is approximately 12 years, whereas the atmospheric lifetime of CO_2 is 300-1,000 years.

IPCC AR6 also examines emission trajectories and reduction pathways in reference to temperature targets and carbon budgets. Key findings are that:

- Models suggest that existing policies, as of 2019, would lead to global warming of 3.2 [2.2-3.5] °C.[123] Existing policies could result in warming at or above 4°C if climate sensitivity[124] or carbon cycle feedbacks are larger than the best estimate.[125]
- Deep, rapid and sustained GHG emissions reductions, reaching net zero CO_2 emissions and including strong emissions reductions of other GHGs, in particular CH4, are necessary to limit warming to 1.5°C (>50%) or less than 2°C (>67%) by the end of century (*high confidence*).[126] Emission reductions must include deep reductions in energy system CO_2 and GHG emissions (*high confidence*), which will in turn require the rapid phase out of fossil fuels and increased production from low- and zero-emitting sources.[127]
- Projected cumulative CO_2 emissions over the lifetime of existing fossil fuel infrastructure are expected to exceed the total cumulative net CO_2 emissions for limiting warming to 1.5°C, and are approximately equal to the total cumulative net CO_2 emissions for limiting warming to 2°C with a likelihood of 83%."[128] This means that there will inevitably be stranded fossil fuel assets if warming is limited to 2°C.[129]
- Approximately 80% of coal, 50% of gas, and 30% of oil reserves must remain unused if warming is to be limited to 2°C, and significantly more reserves must remain unused if warming is to be limited to 1.5°C.[130] These figures could change through additional abatement – for example, the installation of carbon capture systems at power plants and industrial facilities – but current deployment of such systems is extremely limited.

The IPCC analysis is supplemented by biennial "Production Gap" reports, which examine the discrepancy between planned fossil fuel production and global production levels consistent with limiting warming to 1.5 or 2°C. The 2025 report found that governments, in aggregate, are planning to extract more than double the amount of oil, gas, and coal by 2030 than is consistent

[123] IPCC AR6 SYR at 57. A more recent assessment estimates that climate policies as of 2022 would likely result in 2.7°C [2.2-3.4°C] of warming. Climate Action Tracker, *Warming Projections Global Update: November 2022* (Climate Analytics & New Climate Institute, 2022), https://climateactiontracker.org/documents/1094/CAT_2022-11-10_GlobalUpdate_COP27.pdf.

[124] "Climate sensitivity" refers to the sensitivity of the climate system to radiative forcing, e.g., how much warming will occur in response in response to a doubling of atmospheric CO_2 concentrations.

[125] IPCC AR6 SYR at 57.

[126] *Id.*

[127] IPCC AR6 WGIII at 89.

[128] IPCC AR6 SYR at 58.

[129] IPCC AR6 WGIII at 698.

[130] *Id.*

with limiting warming to 1.5°C, and that governments are now planning even higher levels of coal production through 2035 and gas production through 2050, than they did in 2023.[131]

There is also research on the equitable allocation of the global carbon budget among different countries and sectors, consistent with the UNFCCC discussions on State's "common but differentiated" responsibilities and "fair share" obligations.[132] This area of research implicates physical climate science, but it also deals with ethical and normative questions – for example, how to account for historical emissions, population, development status, and other differences between countries when assigning responsibility for future emission reductions. The research identifies specific indicators or metrics that are relevant when assessing national fair shares (e.g., per capita emissions) and demonstrates how those indicators can be factored into quantitative assessments of GHG targets. The resulting estimates of "fair share obligations" depend on the weight assigned to these different metrics and the specific circumstances of the country being assessed.

E. Mitigation and Adaptation Pathways

As the global carbon budget for 1.5 and 2°C is rapidly shrinking, it is clear that governments and other decision-makers will need to pursue ambitious GHG reduction measures as well as adaptation programs to protect people from the harmful effects of climate change. There is a growing body of research on mitigation and adaptation pathways, some of which is summarized in IPCC reports. Some examples include: technical research on the efficacy, cost, availability, and feasibility of specific GHG reduction technologies for specific sectors and sources;[133] pathways to

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[131] DERIK BROEKHOFF & EMILY GHOSH, 2025 PRODUCTION GAP REPORT (SEI, IISD, & Climate Analytics 2025), https://productiongap.org/wp-content/uploads/2025/09/PGR2025_full_web.pdf.

[132] *See, e.g.,* K.W. Steininger et al., *Sectoral carbon budgets as an evaluation framework for the built environment*, 1(1) BUILDINGS AND CITIES 337 (2020); Kaylin Lee et al. *Fair distributions of carbon dioxide removal obligations and implications for effective national net-zero targets*, 16 ENVIRON. RES. LETT. 094001 (2021); Jan S. Fuglestvedt & Steffen Kallbekken, *Climate Responsibility: Fair Shares?* 6 NAT. CLIM. CHANGE 19 (2016); Lavanya Rajamani et al., *National 'fair shares' in reducing greenhouse gas emissions within the principled framework of international environmental law*, 21(8) CLIM. POLICY 983 (2021); Jason Hickel, *Quantifying National Responsibility for Climate Breakdown: An Equality-Based Attribution Approach for Carbon Dioxide Emissions in Excess of the Planetary Boundary,* 4(9) LANCET PLANETARY HEALTH E399 (2020); Yann Robiou du Pont, *Effect of discontinuous fair-share emissions allocations immediately based on equity,* 16 NATURE COMMUNICATIONS 8020 (2025); Mingyu Li et al., *A principle-based framework to determine countries' fair warming contributions to the Paris Agreement,* 16 NATURE COMMUNICATIONS 1043 (2025); Setu Pelz, *Entry points for assessing 'fair shares' in national mitigation contributions,* 20(2) ENVIRONMENTAL RESEARCH LETTERS 024012 (2025).

[133] See, e.g., A.S. Momodu et al., *Decarbonizing the electric power sectors in sub-Saharan Africa as a climate action: A systematic review,* 7 ENVIRONMENTAL CHALLENGES 100485 (2022).

economy-wide decarbonization;[134] and research on adaptation options for many different types of climate impacts.[135] Although this research is not the focus of our brief, it is still relevant to discussions about state responsibilities related to climate change as it provides insights on the viability of different options for achieving net zero emissions and adapting to climate change. For example, research on the energy transition in Africa suggests that there is significant potential for the deployment of clean energy technologies across the continent, particularly as the costs of clean energy technologies (e.g., solar and onshore wind) are rapidly declining and already cheaper than fossil fuels in some countries.[136] Another important finding is that African countries may be in a unique position to avoid (or "leapfrog") dependency on fossil fuels by utilizing clean energy technologies to meet existing and future energy demand.[137]

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[134] See, e.g., *Exploring Net-Zero Emissions Pathways for Africa Across Different Timelines: An Integrated Assessment Modeling,* Clean Air Task Force (September 18, 2025), https://www.catf.us/resource/exploring-net-zero-emissions-pathways-for-africa-across-different-timelines-an-integrated-assessment-modeling/; *Deep Decarbonization Pathways*, https://ddpinitiative.org; Deep Decarbonization Pathways in Africa (DDP-Africa), https://www.iddri.org/en/project/deep-decarbonization-pathways-africa-ddp-africa.

[135] *See, e.g.*, Portia Adade Williams et al., *Feasibility assessment of climate change adaptation options across Africa: an evidence-based review*, 16(7) ENVIRONMENTAL RESEARCH LETTERS 073004 (2021).

[136] *See, e.g.,* INTERNATIONAL ENERGY AGENCY (IEA), WORLD ENERGY INVESTMENT 2025: AFRICA, https://www.iea.org/reports/world-energy-investment-2025/africa. *See also* AFRICA ENERGY CHAMBER, THE STATE OF AFRICAN ENERGY 2025, https://energychamber.org/wp-content/uploads/The-State-of-African-Energy-2025_digital.pdf; THE RENEWABLE ENERGY TRANSITION IN AFRICA (IRENA 2021), https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/March/Renewable_Energy_Transition_Africa_2021.pdfl; Anne Louise Koefoed & Sujee Selvakkumaran, *Costly capital: Money for green megawatts in Sub-Saharan Africa* (DNV April 10, 2025), https://www.dnv.com/energy-transition/costly-capital-money-for-green-megawatts-in-sub-saharan-africa/.

[137] *See studies cited supra* note 136.

II. The Effect of Climate Change on Human Rights

The Request asks the Court to consider State's climate obligations in light of the human rights enumerated in the African Charter on Human and People's Rights and associated instruments, including the Maputo Protocol, the Kampala Convention, and the African Charter in the Rights and Welfare of the Child.[138] The Request asserts that climate change "exacerbates systematic injustices" and threatens many of the rights protected in these instruments, including the rights to life, health, food, water, housing, property, family life, and education; the right to live in a clean, healthy, and sustainable environment that is favorable to human development; collective rights to self-determination, peace and security, and economic, social, and cultural development; and the rights of vulnerable populations, including women, children, indigenous peoples, the elderly, people with disabilities, and internally displaced persons.[139]

Many treaty bodies, tribunals, and courts have recognized that climate change poses a threat to fundamental rights, including as the rights to life, health, food, water, housing, privacy and family life, culture, development, and a clean and healthy environment.[140] These legal findings are

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[138] The Request specifically invites the Court to consider State obligations in reference to Articles 2, 3, 4, 5, 8, 9, 10, 11, 12, 14, 16, 17, 18, 19, 20, 21, 22, 23, and 24 of the African Charter. Request for Advisory Opinion at ¶¶ 98-99.

[139] Request for Advisory Opinion at ¶¶ 4, 98-114.

[140] *See, e.g.,* International Court of Justice (ICJ), Advisory Opinion of 23 July 2025 on the Obligations of States in Respect of Climate Change, https://www.icj-cij.org/case/187; Inter-American Court of Human Rights (IACtHR), Advisory Opinion OC-32/25 (July 3, 2025), https://www.corteidh.or.cr/tablas/OC-32-2025/index-eng.html; International Tribunal for the Law of the Sea (ITLOS), Advisory Opinion No. 31 (May 21, 2024), https://www.itlos.org/fileadmin/itlos/documents/cases/31/Advisory_Opinion/C31_Adv_Op_21.05.2024_orig.pdf; European Court of Human Rights (ECtHR), Verein KlimaSeniorinnen Schweiz and Others v. Switzerland, Grand Chamber, Judgment of 9 April 2024, Application No. 53600/20, https://www.climatecasechart.com/document/klimaseniorinnen-v-switzerland-ecthr_e78f; ECtHR, Greenpeace Nordic and Others v. Norway, Grand Chamber, Judgment of 28 October 2025, Application No. 34068/21, https://www.climatecasechart.com/document/greenpeace-nordic-and-others-v-norway_0687; Inter-American Court of Human Rights, Advisory Opinion OC-23/17 (Nov. 15, 2017), https://www.corteidh.or.cr/docs/opiniones/seriea_23_ing.pdf; African Commission on Human and Peoples' Rights (ACHPR), *Resolution on Climate Change and Human Rights in Africa,* ACHPR/Res.342(LVIII)2016 (April 20, 2016), https://achpr.au.int/en/adopted-resolutions/271-resolution-climate-change-africa-achprres271lv2014; UN Human Rights Council (HRC), Res. A/HRC/RES/50/9 (July 14, 2022), https://www.ohchr.org/en/climate-change/human-rights-council-resolutions-human-rights-and-climate-change; UN Human Rights Committee (CCPR), *Billy et al. v. Australia*, Communication No. 3624/2019, Doc. No. CCPR/C/135/D/3624/2019 (Sept. 22, 2022), https://juris.ohchr.org/casedetails/3855/en-US; UN General Assembly, *The Human Right to a Clean, Healthy and Sustainable Environment,* A/RES/76/300 (July 28, 2022), https://digitallibrary.un.org/record/3983329; Inter-American Commission of Human Rights (IACHR), Resolution 3/2021, *Climate Emergency: Scope of Inter-American Human Rights Obligations* (2021), https://www.oas.org/en/iachr/decisions/pdf/2021/resolucion_3-21_ENG.pdf; South Korea Constitutional Court, *Do-Hyun Kim et al. v. South Korea*, No. 2020Huma389 (August 29, 2024); Land Court of Queensland, *Waratah Coal v. Youth Verdict Ltd. & Others* [No. 6], 21 QLCR 1 (2022), https://www.climatecasechart.com/document/youth-verdict-v-waratah-coal_7679; *Neubauer, et al. v. Germany,* Bundesverfassungsgericht [BVerfG] [Federal Constitutional Court], Mar. 24, 2021, Case No. BvR 2656/18/1, BvR 78/20/1, BvR 96/20/1, BvR 288/20, https://climatecasechart.com/non-us-case/neubauer-et-al-v-germany/; High Court

based on the overwhelming body of scientific evidence regarding the harms attributable to climate change, as detailed above. Here we focus on several important aspects of how legal bodies have characterized the effect of climate change on human rights, and specifically the recognition that: (i) climate change threatens a broad array of human rights for many people, and is one of the biggest human rights concerns of our time; (ii) the threat posed by climate change is both "actual" and "imminent", such that it provides a basis for immediate recognition of human rights violations and corresponding State obligations; and (iii) climate change disproportionately affects certain populations, including groups that are owed special protection under human rights law.

A. Climate change threatens a broad array of human rights

The scientific evidence summarized in Part I shows that there are many different ways in which climate change threatens to undermine the health and well-being of people and communities across the planet. Some of the most prevalent sources of injury include more frequent and severe extreme events, resulting in greater exposure to conditions that endanger lives, livelihoods, health, property, infrastructure, cultural practices, and community cohesion; food and water insecurity; the submergence of low-lying coastal areas and islands; pervasive impacts on ecosystems and disruption of critical ecosystem services; forced displacement due to drought, floods and storms, wildfires, sea level rise, and other climate drivers; increases in food-, water- and vector-borne disease; harm to physical and mental health; and the contribution of climate change-related hazards to humanitarian crises and conflict. These impacts have clear implications for the enjoyment, protection, and fulfillment of human rights.

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of South Africa, *Africa Climate Alliance et al. v. Minister of Mineral Resources & Energy et al.,* 2024 ZAGPPHC 1271 (2021), https://www.climatecasechart.com/document/africa-climate-alliance-et-al-v-minister-of-mineral-resources-energy-et-al-cancelcoal-case_a360; *Urgenda Foundation v. The State of The Netherlands* [2019] ECLI:NL:HR:2019:2006, https://climatecasechart.com/non-us-case/urgenda-foundation-v-kingdom-of-the-netherlands/; *Future Generations v. Ministry of the Environment and Others*, Corte Suprema de Justicia [C.S.J.] [Supreme Court], abril 5, 2018, M.P: L. Villabona, Expediente : 11001-22-03-000-2018-00319-01 (Colomb.), https://climatecasechart.com/non-us-case/future-generation-v-ministry-environment-others/; *Leghari v. Pakistan*, (2015) W.P. No. 25501/201, https://climatecasechart.com/non-us-case/ashgar-leghari-v-federation-of-pakistan/; UN Committee on the Rights of the Child, *Sacchi v. Argentina*, Communication No. 107/2019, Doc. No. CRC/C/88/D/104/2019 (Oct. 8, 2021), https://climatecasechart.com/non-us-case/sacchi-et-al-v-argentina-et-al/ (although Sacchi v. Argentina was dismissed for failure to exhaust remedies, the tribunal acknowledged the threat that climate change posed to petitioners' human rights); Brussels Court of First Instance, *VZW Klimaatzaak v. Kingdom of Belgium & Others*, 17 November 2021, https://climatecasechart.com/non-us-case/vzw-klimaatzaak-v-kingdom-of-belgium-et-al/; Municipal Court in Prague, *Klimatická žaloba ČR v. Czech Republic*, Judgment No. 14A 101/2021, 15 June 2022, https://climatecasechart.com/non-us-case/klimaticka-zaloba-cr-v-czech-republic/; Federal Supreme Court of Brazil, *PSB et al. v. Brazil (on Climate Fund)*, ADPF 708, 1 July 2022, https://climatecasechart.com/non-us-case/psb-et-al-v-federal-union/.

Due to the breadth and magnitude of harm attributable to climate change, the UN High Commissioner for Human Rights has characterized climate change as the biggest threat to human rights that the world has ever seen.[141] The International Court of Justice (ICJ), the Inter-American Court of Human Rights (IACtHR), the European Court of Human Rights (ECtHR), and other international and regional courts have likewise recognized the seriousness of the threat posed by climate change to human rights.[142] For example, in its recent *Advisory Opinion on the Climate Emergency and Human Rights*, the IACtHR concluded that "the adverse effects of climate change are, and will increasingly become, pervasive across all aspects of human life worldwide"[143] and that the damage caused by climate change posed a "serious threat" to many human rights, including the rights to life, health, food and water, and a healthy environment.[144] The ECtHR has similarly acknowledged that climate change "poses a serious current and future threat to the enjoyment of human rights."[145] Additionally, the ICJ found in its *Advisory Opinion on the Obligations of States in Respect of Climate Change* that the "degradation of the climate system and of other parts of the environment impairs the enjoyment of a range of rights", including rights to life, health, food, water, housing and a clean environment, and that "the full enjoyment of human rights cannot be ensured without protection of the climate system and other parts of the environment."[146]

There are many other legal documents and decisions recognizing the effect of climate change on a broad array of human rights. Table II.A (next page) provides a more comprehensive list of these rights, accompanied by descriptions of relevant climate impacts, and citations to legal authorities finding that climate change poses a threat to the specific right.

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[141] *See* e.g., U.N. Human Rights Committee, General Comment No. 36 on Article 6: Right to Life, para 62, CCPR/C/GC/36 (Sept. 3, 2019), https://www.ohchr.org/en/calls-for-input/general-comment-no-36-article-6-right-life (characterizing climate change as one of the most pressing and serious threats to the ability of present and future generations to enjoy the right to life); IACHR Resolution 3/2021 at 8 (stating that climate change "is one of the greatest threats to the full enjoyment and exercise of human rights of present and future generations").

[142] *See* ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, at ¶¶ 372-404; IACtHR, Advisory Opinion OC-32/25, *supra* note 140, ECtHR; Verein KlimaSeniorinnen Schweiz and Others v. Switzerland, *supra* note 140, ¶¶ 519, 552 (acknowledging the "serious adverse effects" of climate change on human rights).

[143] IACtHR Advisory Opinion OC-32/25, *supra* note 140, at ¶ 118.

[144] *Id.* at ¶ 478. With regards to the right to life, the IACtHR noted that the "damage caused by environmental degradation and climate change constitutes one of the most serious threats to the capacity and present and future generations to enjoy the right to life." *Id.* at ¶ 394.

[145] Greenpeace Nordic and Others v. Norway, *supra* note 140, ¶ 298. *See also* Verein KlimaSeniorinnen Schweiz v. Switzerland, *supra* note 140, ¶¶ 436, 499.

[146] ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, at ¶¶ 375-393, 403. The ICJ also acknowledged that the right to a "clean, healthy and sustainable environment" is a "precondition for the enjoyment of many human rights, such as the right to life, food, and housing." *Id.* at ¶ 393.

Table II.A. Human Rights Affected by Climate Change

Affected Right	Climate Impacts	Legal Authorities*
Right to life States have an affirmative obligation to protect the right to life from threats associated with climate change. (African Charter Art. 4.)	• Mortality and morbidity from heatwaves, floods, and other climate extremes • Increased exposure to vector-, water-, and food-borne diseases • Food and water insecurity • Destruction of ecosystem services that people depend on for subsistence and survival • Humanitarian crises, conflict, and forced displacement	• ICJ, Advisory Opinion of 23 July 2025 • IACtHR, Advisory Opinion OC-32/25; IACtHR Advisory Opinion OC-23/17; IACtHR, Advisory Opinion OC-32/25; IACHR Resolution 3/2021 • UN HRC, Human Rights and Climate Change, A/HRC/Res/10/4; UN Office of the High Commissioner for Human Rights (OHCHR), Report on the Relationship Between Climate Change and Human Rights, A/HRC/10/61; UN CCPR, General Comment No. 36 on Article 6: Right to Life, CCPR/C/GC/36; UN Committee on the Rights of the Child (CRC), General Comment No. 26 (2023) on children's rights and the environment, with a special focus on climate change, CRC/C/GC/26; UN CCPR, Billy et al. v. Australia • Urgenda v. Netherlands; Neubauer v. Germany; Waratah Coal v. Youth Verdict Ltd. & Others; VZW Klimaatzaak v. Belgium; Future Generations v. Ministry of Environment; Klimatická žaloba ČR v. Czech Republic
Right to a safe, clean, healthy and sustainable environment States have an obligation to ensure that activities under their control do not cause significant environmental damage. (African Charter Art. 24)	• Pervasive harm to terrestrial, marine, and freshwater ecosystems across the planet • Irreversible impacts on vulnerable ecosystems and species, including coral reefs, low-lying coastlines and islands, polar and mountain regions, biodiversity hotspots, endemic species, and many others • Destruction of coastal habitats as a result of sea level rise	• ICJ, Advisory Opinion of 23 July 2025 • IACtHR, Advisory Opinion OC-32/25; IACtHR Advisory Opinion OC-23/17; IACtHR, Advisory Opinion OC-32/25; IACHR Resolution 3/2021 • UN HRC, The Human Right to a Clean, Healthy, and Sustainable Environment, A/HRC/RES/38/13 • UN General Assembly, The Human Right to a Clean, Healthy and Sustainable Environment, A/RES/76/300; UN CRC, General Comment No. 26 (2023) on children's rights and the environment, with a special focus on climate change, CRC/C/GC/26 • Do-Hyun Kim et al. v. South Korea; Klimatická žaloba ČR v. Czech Republic; Greenpeace Mexico v. Ministry of Energy and Others (on the National Electric System Policies)
Right to health States must take measures to ensure that all people enjoy the highest level of physical, mental, and social well-being. (African Charter Art. 16)	• Mortality, injury, and trauma from extreme events (including mental trauma) • Exposure to vector- water- and food- borne diseases • Injury and mortality from food and water insecurity • Disruptions to livelihoods and cultural practices • Impaired ecosystem services • Humanitarian crises, conflict, and forced displacement	• ICJ, Advisory Opinion of 23 July 2025 • IACtHR, Advisory Opinion OC-32/25; IACtHR Advisory Opinion OC-23/17; IACtHR, Advisory Opinion OC-32/25; IACHR Resolution 3/2021 • UN HRC, Analytical Study on the Relationship Between Climate Change and the Human Right of Everyone to the Enjoyment of the Highest Attainable Standard of Physical and Mental Health, A/HRC/32/23; UN HRC, Resolution: Human Rights and Climate Change, A/HRC/Res/10/4; UN OHCHR, Report on the Relationship Between Climate Change and Human Rights, A/HRC/10/6; UN CRC, General Comment No. 26 (2023) on children's rights and the environment, with a special focus on climate change, CRC/C/GC/26 • Neubauer v. Germany; Klimatická žaloba ČR v. Czech Republic; Future Generations v. Ministry of Environment (Colombia)

Table II.A. Human Rights Affected by Climate Change (continued)

Right to food States must take measures to ensure that all people have access to nutrition which guarantees the possibility of enjoying the highest level of physical, emotional, and intellectual development. (Implied under other African Charter rights)	• Agricultural production is threated by extreme heat, drought, changes in precipitation, ecosystem degradation, and other impacts • Fishery productivity is threatened by ocean acidification, marine heatwaves, deoxygenation, and corresponding ecosystem impacts (e.g., coral reef destruction)	• ICJ, Advisory Opinion of 23 July 2025 • IACtHR, Advisory Opinion OC-32/25; IACtHR Advisory Opinion OC-23/17; IACtHR, Advisory Opinion OC-32/25; IACHR Resolution 3/2021 • UN HRC, Report of the Secretary General: The Adverse Impact of Climate Change on the Full Realization of the Right to Food, A/HRC/53/47 • UN HRC, Resolution: Human Rights and Climate Change, A/HRC/Res/10/4; UN OHCHR, Report on the Relationship Between Climate Change and Human Rights, A/HRC/10/61 • Future Generations v. Ministry of Environment
Right to water and sanitation States must make efforts to ensure access to safe drinking water and sanitation services for present and future generations. (Implied under other African Charter rights)	• Decreases in average precipitation and more severe droughts contribute to water shortages • Sea level rise causes saltwater intrusion into freshwater resources on islands and in other low-lying areas • Extreme events, including heavy precipitation and storms, pose hazards to water and sanitation systems	• ICJ, Advisory Opinion of 23 July 2025 • IACtHR, Advisory Opinion OC-32/25; IACtHR Advisory Opinion OC-23/17; IACtHR, Advisory Opinion OC-32/25; IACHR Resolution 3/2021 • UN HRC, Resolution: Human Rights and Climate Change, A/HRC/Res/10/4; UN OHCHR, Report on the Relationship Between Climate Change and Human Rights, A/HRC/10/61
Right to housing and shelter States must make efforts to ensure adequate housing for all sectors of the population. (Implied under other African Charter rights)	• Homes destroyed by extreme events such as floods, storms, and wildfires • Homes destroyed due to sea level rise • Access to shelter needed to protect people from extreme heat, storms, and other hazards associated with climate change	• ICJ, Advisory Opinion of 23 July 2025 • IACtHR, Advisory Opinion OC-32/25; IACtHR Advisory Opinion OC-23/17; IACtHR, Advisory Opinion OC-32/25; IACHR Resolution 3/2021 • UN HRC, Resolution: Human Rights and Climate Change, A/HRC/Res/10/4; UN OHCHR, Report on the Relationship Between Climate Change and Human Rights, A/HRC/10/61
Right to work and livelihoods States must protect and promote the right to work, which includes the opportunity to secure the means for living a dignified and decent existence, as well as access to just, equitable, and satisfactory conditions of work. (African Charter Art. 15)	• Climate change threatens the livelihoods of many people, particularly subsistence farmers, fishermen, and others who depend on local ecosystem services • Extreme heat and other extreme weather conditions threaten the safety and well-being of workers, particularly outdoor workers and indoor workers without access to A/C in hot climates	• UN OHCHR, Report on the Relationship Between Climate Change and Human Rights, A/HRC/10/61 • Klimatická žaloba ČR v. Czech Republic
Right to property States may not arbitrarily deprive people of their property. (African Charter Art. 14)	• Extreme events and slow-onset processes such as sea level rise threaten private property	• Neubauer v. Germany; Waratah Coal v. Youth Verdict Ltd. & Others; Klimatická žaloba ČR v. Czech Republic

Table II.A. Human Rights Affected by Climate Change (continued)

Rights to privacy and family life States may not arbitrarily interfere with private, family, and home life, and must take steps to safeguard the ability of people to form families and provide for children. (African Charter Art. 18)	• Most climate change-related injuries have the potential to affect private and family life • Key examples include people who are displaced or at risk of displacement, people whose health and livelihoods are adversely affected by climate change, and people who are unable to pursue cultural and spiritual practices due to the effects of climate change	• ICJ, Advisory Opinion of 23 July 2025 • IACtHR, Advisory Opinion OC-32/25 • ECtHR, KlimaSeniorinnen v. Switzerland; ECtHR, Greenpeace Nordic and Others v. Norway • UN CCPR, Billy et al. v. Australia • Urgenda v. Netherlands; Waratah Coal v. Youth Verdict Ltd. & Others; VZW Klimaatzaak v. Belgium; Klimatická žaloba ČR v. Czech Republic
Rights to culture, self-determination, and development States must take steps to safeguard the ability of all people to take part in cultural practices and community life, as well as the rights of people to self-determination and development. (African Charter Arts. 20, 22)	• Many Small Island States and indigenous peoples face severe threats to their culture, development, and self-determination due to the adverse effects of climate change • Some States and communities face existential risks due to climate change, e.g., low-lying coastal areas and islands are being inundated by sea level rise (and rapidly becoming uninhabitable) • Certain areas may become uninhabitable due to extreme heat, drought, and the destruction of food sources	• IACtHR, Advisory Opinion OC-32/25; IACtHR Advisory Opinion OC-23/17; IACtHR, Advisory Opinion OC-32/25; IACHR Resolution 3/2021 • UN HRC, Resolution: Human Rights and Climate Change, A/HRC/Res/10/4; UN OHCHR, Report on the Relationship Between Climate Change and Human Rights, A/HRC/10/61; UN CRC, General Comment No. 26 (2023) on children's rights and the environment, with a special focus on climate change, CRC/C/GC/26 • UN CCPR, Billy et al. v. Australia • Klimatická žaloba ČR v. Czech Republic
Right to freedom, non-discrimination, and equity States must guarantee human rights without discrimination. (African Charter Arts. 2, 3, 4, 5, 6)	• Climate change causes disproportionate harm to certain groups (e.g., indigenous peoples), typically those who are least responsible for it • State failures to reduce GHG emissions in the near-term place a disproportionate burden on young people and future generations • Many buildings and other places of cultural significance are destroyed by flooding	• Neubauer v. Germany (finding that Germany had violated petitioners' right to freedom by adopting insufficient GHG reduction targets through 2030, which would place a disproportionate mitigation burden on German residents after 2030) • UN OHCHR, Frequently Asked Questions on Climate Human Rights and Climate Change: Fact Sheet No. 38 (2021); UN CRC, General Comment No. 26 (2023) on children's rights and the environment, with a special focus on climate change, CRC/C/GC/26

Table II.A. Human Rights Affected by Climate Change (continued)

Rights of special groups States have special obligations regarding the protection of rights for certain groups. (African Charter Art. 18; African Charter on the Rights and Welfare of the Child)	Groups and individuals that are disproportionately affected by climate change include: • Children • Women • Older people • Indigenous peoples • Poor people and socially marginalized groups • Subsistence farmers and fishermen • People living on small islands and in low-lying coastal areas • Displaced people and migrants • Future generations	• ICJ, Advisory Opinion of 23 July 2025 • IACtHR, Advisory Opinion OC-32/25; IACtHR Advisory Opinion OC-23/17; IACtHR, Advisory Opinion OC-32/25 • UN HRC, The Impacts of Climate Change on the Human Rights of People in Vulnerable Situations, A/HRC/50/57; UN HRC, Analytical Study on the Promotion and Protection of the Rights of Older Persons in the Context of Climate Change, A/HRC/47/46; UN HRC, Analytical Study on the Promotion and the Protection of the Rights of Persons with Disabilities in the Context of Climate Change, A/HRC/44/30; UN HRC, Analytical Study on Gender-Responsive Climate Action for the Full and Effective Enjoyment of the Rights of Women, A/HRC/41/26; UN HRC, The Slow Onset Effects of Climate Change and Human Rights Protection for Cross-Border Migrants, A/HRC/37/CRP.4; Analytical Study on the Relationship Between Climate Change and the Full and Effective Enjoyment of the Rights of the Child, A/HRC/35/13; UN CRC, General comment No. 26 on children's rights and the environment with a special focus on climate change, CRC/C/GC/26; UN CCPR, Billy et al. v. Australia • Do-Hyun Kim et al. v. South Korea; Waratah Coal v. Youth Verdict Ltd. & Others; Africa Climate Alliance et al. v. Minister of Mineral Resources & Energy et al.

* The "legal authorities" listed in this table are limited to decisions and declarations from human rights bodies, tribunals, and courts that explicitly recognize the threat posed by climate change to each specific right.

B. The threat to human rights is both "actual" and "imminent"

The scientific research also shows that the threat posed by climate change to human rights is both "actual" and "imminent", and not merely a future or hypothetical threat. As discussed above, IPCC AR6 found that climate change has already caused "widespread adverse impacts and related losses and damages" to people and ecosystems across the planet, and the harmful impacts will become more severe and widespread with each additional increment of warming.[147] In particular, climate change has already caused widespread changes in terrestrial, freshwater, and ocean ecosystems at a global scale; and has had adverse impacts on human settlements and infrastructure, water and food security, physical and mental health, cities, and infrastructure.[148] Some of these impacts are irreversible and others are rapidly approaching irreversibility.[149]

[147] IPCC AR6 WGII at 9.

[148] *Id.* at 10-11.

[149] *Id.* at 9.

Many legal authorities have recognized the actual and imminent nature of the climate crisis. The ICJ Advisory Opinion, for example, characterized climate change as an "urgent and existential threat" with "severe and far-reaching impacts" that are already affecting ecosystems and human populations.[150] Accordingly, courts and tribunals have found that the harms attributable to climate change are sufficiently concrete and urgent to qualify as legally cognizable injuries under human rights law.[151] Even future harms may give rise to legally cognizable injuries and provide a basis for recognizing state obligations. For example, in *KlimaSeniorinnen Schweiz and others v. Switzerland,* the ECtHR recognized that States have a "primary duty to adopt, and to effectively apply in practice, regulations and measures capable of mitigating the existing and potentially irreversible, future effects of climate change."[152] Similarly, in *Urgenda v. Netherlands,* the Supreme Court of the Netherlands found that the Dutch government had obligations to protect its citizens from future climate impacts, such as sea level rise, as those impacts posed a risk of harm that was sufficiently imminent and severe.[153]

The UN Human Rights Committee also confronted and rejected arguments about the "hypothetical" nature of future climate impacts[154] in *Billy et al. v. Australia,* where it held that the government of Australia had violated the rights of the indigenous Melanesian people of the Torres Strait Islands due to inadequate action on climate change.[155] The Committee's decision was significant and highly relevant to this Request because it specifically dealt with State obligations to protect people from climate-related harms through adaptation (see Box II.A.2, next page).

[150] ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, ¶ 73.

[151] *See, e.g.,* Verein KlimaSeniorinnen Schweiz and Others v. Switzerland, *supra* note 140; *Urgenda Foundation v. The State of The Netherlands*, *supra* note 140.

[152] Verein KlimaSeniorinnen Schweiz and Others v. Switzerland, *supra* note 140, ¶ 545.

[153] *Urgenda Foundation v. The State of The Netherlands*, *supra* note 140, ¶ 5.6.2.

[154] Courts encounter these types of disputes when adjudicating standing as well as the merits of claims. To guarantee access to justice, States and courts should ensure that petitioners have adequate opportunities to submit evidence in support of injury and causation before courts reach a definitive decision on standing. *See infra* § III.F.3 ("Access to Justice").

[155] *Billy et al. v. Australia*, *supra* note 140.

Box II.A.2. The UN Human Rights Committee's Decision in *Billy et al. v Australia*

In 2019, the Committee received a communication from indigenous Torres Strait Islanders alleging that the government of Australia had violated their rights to life, culture, privacy, home, and family life due to inadequate action on climate change. The authors described numerous ways in which climate change is affecting and will continue to affect their lives – e.g., sea level rise is causing flooding and erosion, property and ecosystem damage, inundating ancestral grave sites, and interfering with traditional gardening practices; higher temperatures and ocean acidification are causing coral bleaching, reef death, and the decline of sea-grass beds and other nutritionally and culturally important marine species; and changes in precipitation, temperature, and monsoon seasons have made it harder to pass on and subsist on their traditional ecological knowledge.[156] The islanders also face an imminent threat of forced and permanent displacement, as scientists predict that some islands are at "serious risk of becoming unfit for human habitation" in the near future (e.g., the next ten years) due to sea level rise and compounding storm surge events.[157]

Despite this information, the State of Australia insisted that the authors were merely asserting "future hypothetical violations" of rights because "the alleged adverse effects of climate change have yet to be suffered, if at all, by the authors."[158] The Committee rejected Australia's position and found that the Torres Strait Islanders had provided adequate evidence of "real predicaments that they have personally and actually experienced owing to disruptive climate events and slow-onset processes such as flooding and erosion… [that] have already compromised their ability to maintain their livelihoods, subsidence, and culture."[159] The Committee subsequently found that Australia had violated the authors' rights to privacy, home, and family life, and the right to indigenous culture, primarily due to the state's "failure to adapt" and protect the authors and their communities from harmful climate change impacts.[160]

C. Climate change disproportionately affects certain groups and individuals

IPCC AR6 and other scientific authorities have found that climate change has disproportionate effects on certain individuals and groups, including children, women, the elderly, poor people, disabled people, indigenous peoples, subsistence farmers and fishermen, people living in informal settlements, and people who are already face social marginalization or vulnerability due to pre-

[156] Communication Under the Optional Protocol to the International Covenant on Civil and Political Rights, *Billy et al. v. Australia*, CCPR/C/135/D/3624/2019 (13 May 2019).

[157] *Id.* at ¶¶ 77-79; Annex 14 (full report).

[158] State Party's Submission on Admissibility and Merits, *Billy et al. v Australia*, CCPR/C/135/D/3624/2019 (29 May 2020) at ¶¶ 24, 41.

[159] *Billy et al. v. Australia, supra* note 140, at ¶ 7.10.

[160] *Id.* at ¶ 9. The Committee did not find an imminent violation of the right to life in this particular case because the authors had not "indicated that they have faced or presently face adverse impacts to their own health or a real and reasonably foreseeable risk of being exposed to a situation of physical endangerment or extreme precarity that could threaten their right to life." *Id.* at para 8.6. It did, however, acknowledge that the authors' right to life would be violated if and when their islands become uninhabitable, but that there was time for Australia to implement adaptation measures that *may* be sufficient to protect that right. *Id.* at para 8.7 Several committee members published independent opinions in which they stated that they would have also found a violation of the right to life. *See* Annex III: Joint opinion by Committee Members Arif Bulkan, Marcia V.J. Kran and Vasilka Sancin (partially dissenting); Opinión individual del miembro del Comité Hernán Quezada (parcialmente disidente).

existing inequalities and discrimination.[161] In many cases, those who suffer the greatest harms from climate change are also those who have contributed the least to this problem through GHG emissions, and who have fewer resources at their disposal for adaptation and resilience measures.[162] Some of examples of those who are disproportionately affected include:

- **Indigenous peoples:** Many indigenous communities are uniquely affected by changes in weather patterns, extreme events, and ecological disruptions due to their close connection to and dependence on local ecosystems and natural processes for subsistence, cultural practices, and livelihoods.[163] Some indigenous communities face the risk of forced displacement due to sea level rise, food and water insecurity, and other climate change-related phenomena.[164] This adversely affects indigenous peoples' rights to culture, self-determination, and territorial integrity, as well as those rights shared by all people (e.g., the rights to life and health).[165]
- **Children:** Children are uniquely vulnerable to many of the adverse health effects associated with climate change, including extreme heat, infectious diseases, food and water insecurity, and increases in air pollution (e.g., from wildfire smoke and increased ground level ozone during hot temperatures).[166] In addition, children are uniquely vulnerable to stress and trauma from extreme events, displacement, and other harmful impacts. Children will also experience increasingly severe impacts from climate change during their lifetimes, as compared with adults. These impacts threaten children's rights to survival and

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[161] See, e.g., IPCC AR6 WGII at 1692, 1765; E.B. Barbier & J.P. Hchard, *The Impacts of Climate Change on the Poor in Disadvantaged Regions,* 12(1) REV. ENVIRON. ECON. POLICY 26 (2018), https://www.journals.uchicago.edu/doi/full/10.1093/reep/rex023.

[162] "Vulnerable communities who have historically contributed the least to current climate change are disproportionately affected (high confidence)." IPCC AR6 SYR SPM at page 5, para A.2.

[163] For example, increased ocean temperature and acidity are dominant drivers of coral reef death, which has enormous implications for the subsistence needs and cultural practices of many coastal communities. One recent study found that 50% of the world's coral reef ecosystems have been lost since 1950. Tyler D. Eddy et al., *Global Decline in Capacity of Coral Reefs to Provide Ecosystem Services,* 4(9) ONE EARTH P1278 (2021), https://www.sciencedirect.com/science/article/pii/S2590332221004747.

[164] *See* Rights of Indigenous People in Addressing Climate-Forced Displacement, Complaint Submitted to U.N. Special Rapporteurs (January 15, 2020), https://climatecasechart.com/non-us-case/rights-of-indigenous-people-in-addressing-climate-forced-displacement/.

[165] *See* African Charter on Human and People's Rights, Arts. 20-22; U.N. Declaration on the Rights of Indigenous Peoples. *See also* Maria Antonia Tigre, *Climate Change and Indigenous Groups: The Rise of Indigenous Voices in Climate Litigation*, 9(3) E-PUBLICA 214 (2022) (discussing how indigenous people have used rights-based litigation to address climate-related threats to their rights, including rights to culture, self-determination, land, health, and life, as well as risks of displacement and loss of territory).

[166] *See* Council on Environmental Health, *Global Climate Change and Children's Health,* 136(5) Pediatrics 992 (2015), https://pubmed.ncbi.nlm.nih.gov/26504130/; EPA, *Climate Change and Children's Health and Well-Being in the United States* (2023), https://www.epa.gov/cira/climate-change-and-childrens-health-and-well-being-united-states-report. *See also* Maria Antonia Tigre, *"Small" Voices, Big Wins: Analyzing Remedies in Children's Climate Cases,* 82 WASHINGTON AND LEE LAW REVIEW 1009 (2025) (discussing how courts have operationalized children's rights in response to climate-related threats).

development, health and adequate nutrition, and all other core human rights.[167] The UN Committee on the Rights of the Child (CRC) has characterized climate change as a form of "structural violence against children" and a significant threat to children's rights, and has recognized a corresponding obligation on the part of States to ensure a clean, healthy and stable environment (and climate system) to respect, protect, and fulfill children's rights.[168]

- **Women and mothers:** Climate change also poses unique risks to the health and safety of women, especially mothers. For example, research has shown that women and girls are more likely to die in heatwaves, tropical cyclones, and other extreme events in certain countries, and they are more likely to suffer poor mental health, partner violence, and food insecurity following extreme weather and other environmental shocks.[169] Pregnant and breastfeeding mothers are also uniquely vulnerable to environmental hazards such as extreme heat and wildfire smoke. Climate change thus threatens women's general right to gender equity as well as rights to health (including but not limited to reproductive health) and economic and social welfare, among others.[170]

- **Future generations:** Future generations will suffer more extreme impacts as a result of climate change, and will also experience a much greater burden with regards to future GHG emissions reductions and adaptation if States do not undertake ambitious action now to control climate change. Future generations are entitled to human rights protections on the basis of international law, customary law, and treaty law.[171]

- **Intersecting vulnerabilities:** Many people experience compounded risks and disadvantages due to the ways in which vulnerabilities may intersect or overlap (e.g., age,

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[167] African Charter on the Rights and Welfare of the Child (November 29, 1999). *See also* UN Committee on the Rights of the Child (UN CRC), General Comment No. 26 (2023): Children's rights and the environment with a special focus on climate change, https://www.ohchr.org/en/documents/general-comments-and-recommendations/general-comment-no-26-2023-childrens-rights-and.

[168] UN CRC, General Comment No. 26 (2023), *supra* note 167. *See also* Held v. Montana, CDV-2020-307 (Mont. Dist. Ct. Aug. 14, 2023), https://climatecasechart.com/case/11091/ (finding that children are "uniquely vulnerable to the consequences of climate change, which harms their physical and psychological health and safety, interferes with family and cultural foundations and integrity, and causes economic deprivations," Findings of Fact, ¶ 104; that the "physical and psychological harms are both acute and chronic" and accrue from many different types of climate change impacts, Findings of Fact, ¶ 108; that youth plaintiffs had proven that they were disproportionately harmed by climate impacts such that they had standing to sue the State of Montana for its climate policies; Conclusions of Law, ¶ 8; and that the State had violated the plaintiffs' rights to a clean and healthy environment by enacting a statute that prohibited analysis and disclosure of GHG emissions under the State's environmental review procedures, Order, ¶ 6).

[169] Carbon Brief, *How Climate Change Disproportionately Affects Women's Health* (October 29, 2020), https://www.carbonbrief.org/mapped-how-climate-change-disproportionately-affects-womens-health/ (discussing findings from 130 studies on the gendered aspects of climate change).

[170] Protocol to the African Charter on Human and Peoples' Rights on the Rights of Women in Africa (July 1, 2003). *See also* Olalekan John Okensanya et al., *The intersectional impact of climate change and gender inequalities in Africa,* 3(1) PUBLIC HEALTH CHALLENGES e169 (2024); Micahel Addaney & Chantelle Gloria Moyo, *Women's Rights, Gender and Climate Change Law in Africa; Advancing an Equity Agenda,* 5(1) JOURNAL OF LAW, SOCIETY AND DEVELOPMENT 2313 (2020).

[171] Maastrict Principles on the Human Rights of Future Generations (adopted February 3, 2023).

race, gender, disability, and/or indigenous status). These people may be uniquely affected by climate change, potentially bearing disproportionate burdens on multiple fronts.[172]

Many legal authorities, including the ICJ and IACtHR, have recognized that climate change is causing disproportionate harm to protected groups and vulnerable populations, and that States have obligations to address and mitigate those disproportionate impacts.[173]

[172] *See* Angela Hefti, *Intersectional Victims as Agents of Change in International Human Rights-Based Climate Litigation*, 13(3) TRANSNATIONAL ENVIRONMENTAL LAW 610 (2024) (discussing the unique status of intersectional victims and also identify opportunity for such parties to bring climate cases on the basis of disproportionate burdens); Maria Antonia Tigre et al., eds., Climate Litigation and Vulnerabilities (2025), *supra* note 1.

[173] *See* Table II.A above for a full list of legal authorities.

III. State Obligations to Protect Human Rights in the Context of Climate Change

The Request raises questions about the nature of State obligations to protect people from the harmful effects of climate change within the framework of human rights law, particularly the African Charter and related instruments.[174] It also invites the Court to take cognizance of international treaties such as the United Nations Framework Convention on Climate Change.[175] This section describes how climate science can factor into the Court's assessment of State obligations related to: (a) climate change mitigation, (b) climate change adaptation, (c) international cooperation and climate finance, (d) compensation for loss and damage, and (e) equity and transparency in government decision-making related to climate change.[176]

There are a number of principles from human rights law, international law, and treaty law that are relevant to this assessment (see Table III, next page). The ICJ clarified the relationship between these different areas of law in its recent advisory opinion on climate change, where it adopted the view that international human rights law, climate change treaties, other environmental treaties, and international law all "inform each other" and States must therefore account for all of these sources of law in their responses to climate change.[177] With regards to States obligations under human rights law, the ICJ concluded that:

> "[T]he full enjoyment of human rights cannot be ensured without the protection of the climate system and other parts of the environment. In order to guarantee the effective enjoyment of human rights, States must take measures to protect the climate system and other parts of the environment. These measures may include, *inter alia,* taking mitigation and adaptation measures, with due account given to the protection of human rights, the adoption of standards and legislation, and the regulation of the activities of private sector. Under international human rights law, States are required to take necessary measures in this regard."[178]

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[174] Request for Advisory Opinion at ¶ 98-101.

[175] *Id.* at ¶ 90.

[176] The Request also raises questions about the protection of vulnerable groups and addressing third party (i.e., non-governmental) conduct. The protection of vulnerable groups is a cross-cutting theme that informs our recommendations on how the Court should interpret other State obligations, as is particularly relevant to discussions about adaptation and loss and damage. The question of how States should address third party conduct is primarily addressed in the discussion of mitigation obligations and the regulation of GHG emitting activities.

[177] ICJ Advisory Opinion at ¶ 404. *See also* Corina Heri, *Human Rights in the ICJ's Climate Opinion: A Comparative Evaluation,* CLIMATE LAW BLOG (Aug. 1, 2025), https://blogs.law.columbia.edu/climatechange/2025/08/01/human-rights-in-the-icjs-climate-opinion-a-comparative-evaluation/.

[178] ICJ Advisory Opinion at ¶ 393.

The IACtHR also affirmed this connection between human rights law, treaty law, and international law in its recent *Advisory Opinion on the Climate Emergency and Human Rights*,[179] as did the European Court of Human Rights in recent decisions on State climate obligations.[180]

Table III. Sources of Law Relevant to Assessing State Obligations and Climate Change

Source of Law	Nature of State Duties	Legal Authorities
Obligations to Respect, Protect and Guarantee Human Rights	In accordance with their customary and treaty obligations to respect and protect human rights, States must take action to limit their contributions to climate change, and otherwise safeguard human rights from threats associated with climate change. States are responsible for harm attributable to their GHG emissions, including extraterritorial harm.	See Table II.A: Human Rights Affected by Climate Change
United Nations Framework Convention on Climate Change (UNFCCC) (and see below)	State parties have agreed to "preserve the climate system for the benefit of present and future generations" and to "prevent dangerous anthropogenic interference with the climate system" by limiting global warming to "well below" 2°C or 1.5°C above pre-industrial levels. Accordingly, State parties have made commitments related to GHG mitigation, adaptation, information collection and disclosure, and international cooperation (including support to developing countries).	UNFCCC; Paris Agreement; UNFCCC COP Decision Documents; State-specific commitments articulated in Nationally Determined Contributions (NDCs); ICJ Advisory Opinion of 23 July 2025, §IV(A)(2),(B)
Principle of Common but Differentiated Responsibilities and Respective Capabilities (CBDR)	This principle recognizes that State obligations with regards to collective problems like climate change should be interpreted in light of: (i) the State's specific contribution to the problem, and (ii) the State's capacity to respond to the problem. Accordingly, wealthier countries that have contributed more to climate change should take the lead in combating climate change and its adverse effects. The CBDR principle underpins discussions about States' "fair share" obligations with regards to GHG emission reductions and climate finance.	UNFCCC Art 3(1); Paris Agreement Art. 4; Stockholm Declaration of the United Nations Conference on the Human Environment (1972); Rio Declaration on Environment and Development (1992), Principle 15; ICJ Advisory Opinion of 23 July 2025, §IV(A)(7)(C); IACtHR Advisory Opinion OC-32/25, §VI
The "No Harm" Rule and Duty to Prevent Transboundary Harm	States must undertake due diligence to ensure that activities carried out within their jurisdiction or under their effective control do not harm the environment and territory of other States. This obligation extends to GHG emissions and their extraterritorial effects.	UNFCCC; Paris Agreement; Stockholm Declaration; Rio Declaration Principles 12 and 19; ICJ Advisory Opinion of 23 July 2025, §IV(A)(5); IACtHR Advisory Opinion OC-23/17 §C; IACtHR Advisory Opinion OC-32/25, §VI

[179] IACtHR Advisory Opinion OC-32/25, *supra* note 140, at ¶¶ 35, 152-159, 290-294.

[180] Greenpeace Nordic and Others v. Norway, *supra* note 140; Verein KlimaSeniorinnen Schweiz v. Switzerland, *supra* note 140.

Table III. Sources of Law Relevant to Assessing State Obligations and Climate Change (cont'd)

Precautionary Principle	States should take a precautionary approach in the context of scientific uncertainty. In the context of climate change, this means that States should take actions to reduce GHG emissions in order to prevent or minimize potential harms from climate change even where there is uncertainty about the precise scope, nature, or timing of those harms.	UNFCCC Art. 3; Rio Declaration Principle 15; IACtHR Advisory Opinion OC-23/17 § B.2; IACtHR Advisory Opinion OC-32/25, §VI; ICJ Advisory Opinion of 23 July 2025, §IV(A)(7)(e)
Duty to Cooperate and Principle of Solidarity	States have a duty to cooperate when implementing international agreements and addressing international problems. States also have an obligation to assist other States without expectations of reciprocity, in order to address shared problems such as climate change. These two principles are closely related to the CBDR principle – i.e., wealthier nations have an obligation to provide financial assistance to those who are disproportionately affected by climate change, without expectation of reciprocity.	UNFCCC Art 3; Paris Agreement Art. 6; Rio Declaration Principle 5; American Convention, Art. 26; UN General Assembly, Resolution 3281 (XXIX): Charter of Economic Rights and Duties of States (12 December 1974), Art. 3; IACtHR Advisory Opinion OC-23/17 § B.3; IACtHR Advisory Opinion OC-32/25, §VI; ICJ Advisory Opinion of 23 July 2025, §IV(A)(5)(b)
Equity Under International Environmental Law	The principle of equity means that decisionmakers should account for considerations of justice and fairness in the establishment, operation or application of a rule of law. Again, this is closely related to the CBDR principle – e.g., the Paris Agreement shall "be implemented to reflect equity and the principle of common but differentiated responsibilities and respective capabilities, in the light of different national circumstances." Art. 2(2).	UNFCCC Art. 3; Paris Agreement Arts. 2.2 & 4; Stockholm Declaration, Principles 1 & 12; Rio Declaration Principles 6 & 3; Johannesburg Declaration on Sustainable Development (2022); IACtHR Advisory Opinion OC-32/25, §VI; ICJ Advisory Opinion of 23 July 2025, §IV(A)(7)(c)
Intergenerational Equity and Rights of Future Generations	This principle holds that there should be equity in the distribution of development benefits and burdens between different generations. Accordingly, legal scholars have recognized that future generations are legally entitled to human rights in accordance with international and humanitarian legal norms.	UNFCCC Art. 3, Paris Agreement preamble, Stockholm Declaration Principle 1; Rio Declaration Principle 3; Inter-American Democratic Charter (2001), Art. 15; IACtHR Advisory Opinion OC-23/17 ¶ 59; Maastricht Principles (2023); IACtHR Advisory Opinion OC-32/25, §VI; ICJ Advisory Opinion of 23 July 2025, §IV(A)(7)(d)

Note: This table is adapted from the Sabin Center's *Status Report on Principles of International and Human Rights Law,* which contains a more comprehensive discussion of each principle and relevant legal authorities.[181]

A. Mitigation Obligations

The Request seeks clarification on the nature of State duties with regards to climate change mitigation.[182] A number of legal authorities have found that States have an obligation to control and reduce GHG emissions from sources under their jurisdiction to prevent harm and protect fundamental human rights.[183] This obligation is rooted in principles of human rights law, international law, and treaty law, as well as domestic constitutional law, and is often assessed in relation to standards articulated in UNFCCC agreements. For example, courts have held that States must adopt GHG mitigation policies that reflect a fair share of the mitigation effort required to limit global warming to 1.5°C or well below 2°C, consistent with the principle of common but differentiated responsibilities and respective capabilities (CBDR), and that State GHG reduction measures must be at least as ambitious as State commitments made pursuant to the UNFCCC, Paris Agreement, Nationally Determined Contributions (NDCs), and regional climate agreements.[184]

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[181] Katelyn Horne, Maria Antonia Tigre, and Michael B. Gerrard, *Status Report on Principles of International Law and Human Rights Law Relevant to Climate Change* (Sabin Center for Climate Change Law, 2023), https://scholarship.law.columbia.edu/faculty_scholarship/3924/.

[182] Request for Advisory Opinion at ¶ 93(d).

[183] *See, e.g.,* ICJ, Advisory Opinion of 23 July 2025, *supra* note 140; Verein KlimaSeniorinnen Schweiz and Others v. Switzerland, *supra* note 140; IACtHR Advisory Opinion OC-32/25, *supra* note 140; IACHR Resolution 3/2021, *supra* note 140; *Urgenda v. Netherlands*, *supra* note 134; *Future Generations v. Ministry of the Environment and Others*, *supra* note 140; *Neubauer, et al. v. Germany*, *supra* note 140; *VZW Klimaatzaak v. Kingdom of Belgium & Others*, *supra* note 140; *Klimatická žaloba ČR v. Czech Republic*, *supra* note 140; *PSB et al. v. Brazil, supra* note 140; UN CRC, General Comment No. 26 (2023), *supra* note 167.

[184] *See, e.g.,* Verein KlimaSeniorinnen Schweiz and Others v. Switzerland, *supra* note 140 (holding that the Swiss government had violated plaintiffs' right to family and private life because it had not adopted or implemented GHG mitigation policies that were consisted with the "currently required 1.5°C limit"); Greenpeace Nordic and others v. Norway, *supra* note 140, ¶¶ 298, 314 (holding that a "State's primary duty is to adopt, and to effectively apply in practice, regulations and measures capable of mitigating the existing and potentially irreversible, future effects of climate change" and citing the 1.5 ºC target as a metric for assessing the adequacy of State mitigation efforts); *Urgenda v. Netherlands*, *supra* note 140 (ordering the Dutch government to limit GHG emissions to 25% below 1990 levels by 2020, consistent with UNFCCC and European Union (EU) targets, in order to protect rights to life and privacy); *Neubauer v. Germany*, *supra* note 140 (ordering the German government to enact policies aimed at achieving, at minimum, a 65% reduction in GHGs from 1990 levels by 2030, consistent with UNFCCC and EU targets, to protect rights to life, health, property, freedom, and intergenerational equity); *Future Generations v. Colombia*, *supra* note 134 (ordering the Colombian government to reduce deforestation in the Amazon, consistent with its NDC commitments); *VZW Klimaatzaak v. Belgium*, *supra* note 140 (finding that the Belgium government had breached its duty to protect rights to life and privacy due to inadequate ambition in GHG mitigation, but declining to set a GHG reduction target) (currently on appeal); *Klimatická žaloba ČR v. Czech Republic*, *supra* note 140 (ordering the Czech government to reduce GHGs by 55% in 2030 compared to 1990, based on the Paris Agreement and EU climate law) (remanded on appeal for additional clarification on the nature of plaintiffs injuries, and reconsideration of remedy); *PSB v. Brazil (on Climate Fund)*, *supra* note 140 (holding that the Brazilian government must execute and allocate its Climate Fund to mitigate GHG emissions and protect the right to a healthy environment, that it must avoid the

Drawing on an extensive review of international, human rights, and treaty law, the ICJ Advisory Opinion characterized State obligations in relation to GHG mitigation as follows:

(1) States have an obligation to exercise due diligence to prevent significant harm to the climate system, which is to be assessed in relation to whether a State has "employed best efforts by using all the means at its disposal" in performance of this obligation.[185]

(2) Due to the seriousness of the threat posed by climate change, the standard of due diligence for State responses to climate change is "stringent."[186] For example, NDCs must represent the "highest possible ambition" to achieve the objectives set forth in the Paris Agreement.[187]

(3) All States contribute to climate change through GHG emissions, and thus all States share in this obligation.[188] However, the respective capabilities and resources of individual States would be taken into account when assessing whether a State has used "all means at its disposal", consistent with the principle of CBDR.[189]

(4) A State may be legally responsible for climate related harms if it does not exercise due diligence with respect to climate change by taking necessary regulatory and legislative measures to control GHG emissions from both public and private sources under its jurisdiction.[190] Moreover, the failure of a State to protect the climate system from GHG emissions associated with fossil fuel production, consumption, exploration, licensing, and subsidies may qualify as an "internationally wrongful act" that is attributable to the State.[191]

We discuss these standards and their implications for the Court's decision in further detail below (sections III(A)(1)-(3)).

Climate science provides the foundation for characterizing State obligations with regards to GHG emission reductions and determining whether States have breached those obligations. As detailed below, the science provides core factual support for the general finding that states share responsibility for climate change and therefore have a "common" obligation to reduce GHG emissions. It also provides insights on the speed and scale at which GHG emissions must be reduced in order to limit global warming to 1.5 or "well below" 2°C and the emission sources that States must regulate in order to achieve these targets. Finally, the research provides insights on the relative contributions of States to climate change and injuries attributable to climate change, which

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regression of environmental protection, and that domestic laws must be consistent with the Paris Agreement and Brazil's NDC).

[185] ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, ¶ 229.

[186] *Id.* ¶ 138.

[187] *Id.* ¶ 246.

[188] *Id.* ¶¶ 290-291.

[189] *Id.*

[190] *Id* ¶ 428.

[191] *Id* ¶ 427.

is relevant when assessing States' "differentiated responsibilities" (i.e., "fair share" obligations) with respect to GHG mitigation.

1. All States share responsibility for climate change

It is generally understood, as a matter of both human rights law and international environmental law, that States have responsibility for GHG emissions from sources that are under their jurisdiction or control.[192] This basic understanding is at the heart of the CBDR principle as well as legal decisions finding that States have an obligation to reduce GHG emissions, and eventually reach net zero emissions, in order to protect human rights.[193] It is also consistent with the general principle that States are responsible for transboundary environmental harm originating from sources under their jurisdiction or control.[194]

Some States have argued that it is not possible, as a legal matter, to attribute climate change to any particular State due to the collective and cumulative nature of the problem.[195] This position is at odds with legal precedent as well as the basic science of climate change, which shows that there is a causal nexus between the emissions attributable to a State and the harmful effects of climate change. Every unit of GHGs that is emitted into the atmosphere contributes to climate change, and although no one State can totally prevent climate change, every State measure that results in GHG reductions will help mitigate the harmful effects of climate change. Accordingly, the ICJ and other courts have squarely rejected the argument that any one State cannot be held responsible for its contributions to climate change.[196]

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[192] ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, ¶¶ 421-438.

[193] *See* cases cited *supra* FN 165.

[194] ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, ¶ 440; IACtHR Advisory Opinion OC-23/17 (15 November 2017), § VII.C ("Obligations regarding transboundary damage"). *See also The South China Sea Arbitration (The Republic of Philippines v. The People's Republic of China)*, PCA Case No. 2013-19, Award (July 12, 2016), https://pca-cpa.org/en/cases/7/, ¶ 941 ("The corpus of international law relating to the environment… requires that States ensure that activities within their jurisdiction and control respect the environment of other States or of areas beyond national control.")

[195] For example, in response to the complaint filed by Torres Strait islanders, the government of Australia claimed that there was no "meaningful causation or connection between the alleged violations of their rights and the State party's measures or alleged failure to take measures." *Billy et al. v. Australia, supra* note 134, at ¶ 4.2. Australia even went so far as to claim, as a general matter, that "it is not possible under international human rights law to attribute climate change to a state party. As a legal matter, it is not possible to trace causal links between the State party's contribution to climate change, its efforts to address climate change, and the alleged effects of climate change on the enjoyment of other's rights." *Id.* at ¶ 4.3

[196] *See, e.g.,* ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, ¶¶ 429-438.

As discussed in Part I, scientists and economists have even developed techniques for quantifying State contributions to certain types of climate impacts – these include social cost of GHG metrics, and attribution techniques that can be used to quantify contributions to specific events, impacts, and processes. However, courts have never required that level of granularity or precision to support a determination of State responsibility for climate change mitigation. Rather, courts have found that responsibility exists based on the general causal link between GHG emissions and climate change, the State's contribution to GHG emissions, and the extensive evidence of harmful impacts that are occurring as a result of climate change.[197]

Climate science thus provides support for the legal determination that all States share responsibility for climate change, as a result of GHG emissions under their effective control, and therefore have a common obligation to prevent climate change-related injuries by taking action to limit and reduce those emissions. The fact that climate change is a collective and cumulative problem does not in any way relieve States of that responsibility. Rather, this fact reinforces another dimension of State responsibility in this area – specifically, that States have an obligation to cooperate in order to reduce global GHG emissions, consistent with the principle of solidarity. Indeed, legal authorities have recognized that States have a general duty to cooperate to address environmental harm, particularly transboundary harm like that associated with climate change.[198]

States also have an obligation to protect the human rights of people both within and outside of their territories.[199] Thus, State responsibility for GHG emissions – and the corresponding duty to mitigate – should be understood in relation to the full scope of harm attributable to those emissions, including harm that occurs outside of the State's territory. This is important considering when assessing a State's "fair share" obligations.[200]

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[197] *See, e.g., Urgenda v. Netherlands, supra* note 134; *Neubauer v. Germany, supra* note 134. *See also* Held, *supra* note 156 (finding that the emissions attributable to the state of Montana contributed to climate change-related injuries incurred by plaintiffs, that the State had the authority to "alleviate and avoid climate impacts by limiting fossil fuel activities that occur in Montana", *Conclusions of Law* ¶14, and thus the plaintiffs had standing to sue the State for prohibiting consideration of GHG emissions in state environmental reviews).

[198] ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, at IV(A)(5)(b); ¶ 364; IACtHR Advisory Opinion OC-32/25, *supra* note 140, § VI.A.5; IACtHR Advisory Opinion OC-23/17, *supra* note 140, § VIII.B.3 ("Obligation of Cooperation").

[199] IACtHR Advisory Opinion OC-32/25, *supra* note 140, at ¶¶ 229, 296, 337; IACtHR Advisory Opinion OC-23/17, *supra* note 140, at § VII.C.

[200] *See infra* § III(A)(3).

2. States must achieve deep and rapid GHG reductions in the next five years to limit global warming to 1.5°C or "well below" 2°C

It is clear that the window of opportunity to limit global warming to 1.5°C or "well below" 2°C is rapidly closing.[201] Meeting these temperature targets will require "rapid and deep and in most cases immediate GHG emission reductions across all sectors."[202] For example, based on emissions generated through 2019, IPCC AR6 found that emissions must peak before 2025 and then be reduced by roughly half by 2030 in order to have a >50% chance of limiting global warming to 1.5°C.[203] This is almost certainly an understatement of the ambition required to achieve the 1.5°C target, due to the fact that emissions have continued to grow since 2019, and the most recent carbon budget assessment found that the remaining carbon budget for a >50% chance of limiting global warming to 1.5°C was only 130 gigatons of carbon dioxide ($GtCO_2$) at the start of 2025, equal to approximately three years of current CO_2 emissions.[204] If these targets are exceeded, the impacts of climate change will be significantly worse, there will be an even greater need to rapidly reduce GHG emissions to protect human rights, some irretrievable tipping points will be crossed, and both mitigation and adaptation will become more costly.[205]

These findings support the conclusion that States have an obligation to "adopt and implement policies aimed at reducing [GHG] emissions that reflect the *greatest possible ambition*"[206] – in other words, states must adopt policies and regulations aimed at reducing GHG emissions to net zero as quickly as possible, taking into account their respective capabilities and resources. This is consistent with the more general principle that states should guarantee human rights to the maximum extent possible,[207] as well as the precautionary principle, the "no harm" rule, the duty

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[201] *See infra* § I(B)(C). *See also* INTERNATIONAL ENERGY AGENCY, NET ZERO ROADMAP: A GLOBAL PATHWAY TO KEEP THE 1.5 °C GOAL IN REACH, 2023 UPDATE (September 2023), https://www.iea.org/reports/net-zero-roadmap-a-global-pathway-to-keep-the-15-0c-goal-in-reach.

[202] IPCC AR6 WGIII at 24.

[203] IPCC AR6 SYR Summary for Policymakers at ¶ B.6.1, Table SPM.1.

[204] Forster et al. (2025), *supra* note 8.

[205] *See, e.g.,* Benjamin M. Sanderson & Brian C. O'Neill, *Assessing the Costs of Historical Inaction on Climate Change*, 10 SCI. REP. 9173 (2020), https://www.nature.com/articles/s41598-020-66275-4 (finding that each year of delay in GHG mitigation can substantially increase the costs of mitigation).

[206] *See* ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, ¶ 146; IACHR Resolution 3/2021 at 11.

[207] *See* IACtHR Advisory Opinion OC-23/17 at ¶ 118 (recognizing that "the obligation to ensure rights" means that States must take "all appropriate steps to protect and preserve" those rights).

to prevent transboundary environmental harm, the duty to cooperate, and the CBDR principle.[208] Moreover, a principle of non-regression can be inferred from the obligation to pursue the "greatest possible ambition" in GHG mitigation – i.e., States should not weaken mitigation policies unless there are compelling humanitarian circumstances requiring such action.[209]

As detailed below, scientific research also provides insights on how States can achieve GHG emission reductions at speed and scale, which is relevant when determining whether State policies reflect the greatest possible ambition with regards to climate change mitigation.

i. States must reduce emissions across all sectors and activities

To meet climate targets, States will need to reduce emissions across all sectors and sources, eventually achieving economy-wide net zero emissions. State mitigation policies must address GHG emissions from government activities as well as the private sector. As the ICJ noted in its advisory opinion, it is an "well-established rule of international law that the conduct of any organ of a State must be regarded as an act of that State" and thus the failure of a State to take "appropriate action to protect the climate system from GHG emissions – including through fossil fuel production, fossil fuel consumption, the granting of fossil fuel exploration licenses or the provision of fossil fuel subsidies—may constitute an internationally wrongful act which is attributable to that State."[210] The ICJ explicitly rejected the argument that the "conduct of private actors… is not attributable to States" and observed that States may be liable if it "has failed to exercise due diligence by not taking the necessary regulatory and legislative measures to limit the quantity of emissions caused by private actors under its jurisdiction."[211] The IACtHR similarly recognized that States have obligations to adopt legislative and other measures to regulate GHG emissions and otherwise prevent human rights violations from private enterprises.[212]

State mitigation obligations therefore encompass duties to reduce emissions from government activities, regulate emissions from private actors, and conserve and enhance carbon sinks and

[208] Preventative action is particularly warranted when confronting a problem like climate change, where there is ample evidence of foreseeable harm despite scientific uncertainty about some aspects of future impacts

[209] *PSB v. Brazil*, *supra* note 140.

[210] ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, at ¶ 427.

[211] *Id.* at ¶ 428.

[212] IACtHR Advisory Opinion OC-32/25, *supra* note 140, ¶¶ 323-351; Section VII (Opinion), ¶ 10.

reservoirs, such as forests and coastal ecosystems.[213] Fossil fuel combustion for energy, transportation, and industrial use is by far the largest source of GHG emissions and should be a focal point of mitigation policies. Other major sources of emissions include agriculture, livestock production, waste and wastewater treatment, deforestation and land use change, and industrial process emissions. There are many actions that States can undertake to address emissions from these source categories, e.g.:[214]

- Adopting emission limits, performance-based standards, and/or price-based mitigation policies to control and reduce GHGs from fossil fuel-based energy and other sectors
- Ending fossil fuel subsidies, financing for fossil fuel projects, and other sources of public support for fossil fuel production, transportation, and consumption
- Investing in renewable energy, and accelerating approvals for renewable energy projects and associated electricity storage and transmission infrastructure
- Adopting regulatory standards for or investing in energy efficiency
- Increasing access to low-carbon transportation options
- Ending deforestation and restoring and conserving habitats that serve as carbon sinks
- Establishing GHG control standards for agricultural and livestock practices
- Waste reduction and diversion strategies

State mitigation policies should be comprehensive, addressing all major emission sources within the country, based on the best available source attribution data (including data on carbon sinks and land use emissions). State mitigation policies should also be designed to achieve the maximum level of emission reduction (i.e., the greatest level of ambition), to the extent feasible and consistent with the CBDR principle, taking into account the best available research on the efficacy, feasibility, and cost of different mitigation technologies and policy pathways available to the State.

Finally, with regards to the regulation of private enterprises, the former U.N. Special Rapporteur on Human Rights and the Environment issued a report in 2024 describing how States should fulfill their duty to protect human rights from environmental harm caused by businesses.[215]

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[213] *See, e.g., Future Generations v. Ministry of Environment* (Colombia), *supra* note 140, at ¶ 11.3 (finding that the government of Colombia had violated fundamental rights by allowing deforestation in the Amazon and abrogating its NDC commitment to reduce deforestation in the Colombian Amazon to zero by 2020 to prevent 44 megatons of GHGs from entering the atmosphere). *See also* Paris Agreement Art. 5.

[214] This list is based on recommendations from multiple legal and scientific sources, including the Deep Decarbonization Reports, *supra* note 133 (included as an attachment to this brief).

[215] *Business, planetary boundaries, and the right to a clean, healthy and sustainable environment,* Report of the Special Rapporteur on the issue of human rights obligations related to the enjoyment of a safe, clean, healthy, and sustainable environment, David R. Boyd, Doc. A/HRC/55/43 (Human Rights Council, Jan. 2, 2024).

The report specifically addresses the duty of "due diligence", as recognized in the ICJ opinion. It directs States to: (i) set "clear expectations for businesses" by enacting strong climate, environmental, and human rights laws; (ii) supervise and monitor businesses that may foreseeably cause significant environmental harm; (iii) provide for effective enforcement by ensuring that institutions have the capacity, resources, and processes to prevent, investigate, punish, and redress climate and environmental impact son human rights.[216] The report also critiques state practices that are "aiding and abetting" human rights violations, including fossil fuel subsidies (which "turn the polluters pays principle upside down") and other policies that "encourage, enable, and subsidize destructive business activities" or allow for corporate capture of environmental and climate policy decisions.[217]

ii. States should reduce non-CO_2 emissions in order to limit near-term warming

Although CO_2 is the dominant cause of global warming, other GHG emissions have a more immediate and potent warming effect on a per ton basis. Methane, for example, has a global warming potential (GWP) of 82.5 over 20 years, meaning that one ton of methane causes 82.5 more warming than a ton of CO_2 in the 20 years after it is emitted.[218] Nitrous oxide (N_2O), hydrofluorocarbons (HFCs), and chlorofluorocarbons (CFCs) are also highly potent GHGs.[219]

Especially given the very real prospect of overshooting the 1.5°C target, states should aim to achieve reductions in these non-CO_2 pollutants in order to limit near-term warming to the maximum extent possible. Methane, in particular, plays a major role in short-term warming because methane emissions are so abundant.[220] Researchers have identified many different actions that states can undertake to reduce these more potent non-CO_2 emissions across sectors, including

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[216] *Id.* at ¶ 32. The report contains many additional recommendations for State action to regulate businesses and prevent environmental harm, including, e.g., comprehensive human rights and environmental due diligence legislation that addresses all business sectors and establishes comprehensive duties of care for environmental and human rights protection (¶ 36); legislation requiring mandatory disclosure of businesses' climate and environmental performance, as well as political activities such as donations and lobbying (¶ 42); ensuring opportunities for inclusive, equitable, and effective public participation in climate and environmental decision-making (¶ 43), and access to justice and remedies (¶ 44).

[217] *Id.* at ¶¶ 31-34.

[218] IPCC AR6 WGI at 1017, Table 7.15

[219] The 20-year GWPs for these pollutants are: N2O (273), HFC-32 (2693), HFC (4144), CFC-11 (8231), PFC-14 (5301). IPCC AR6 WGI at 1017, Table 7.15 (note that these are average estimates).

[220] *See* IPCC AR6 WGIII at 23 (recognizing the potential to reduce peak warming through methane reductions).

energy, agriculture, industry, and waste management.[221] Some of the most effective ways to reduce methane emissions include: (i) phasing out fossil fuel production and consumption; (ii) requiring the use of technologies and operational practices to limit methane emissions from fossil fuel production and transportation systems; (ii) establishing standards for and/or making public investments in practices and technologies to reduce methane from livestock and agriculture (e.g., using anaerobic digestion to control methane from manure, daily spreading of manure and reducing long-term storage of manure), and reducing demand for livestock products; (iv) establishing standards for and/or making investments in practices and technologies to reduce methane from landfills and wastewater treatment facilities, and reducing waste production; and (v) implementing conservation and nature-based strategies to limit the release of biogenic methane from wetlands and other ecosystems.[222]

iii. States should pursue mitigation approaches that deliver co-benefits to marginalized and vulnerable populations

The Request also asks the Court to consider State obligations in regards to the protection of vulnerable populations in the context of climate change. As discussed below, adaptation approaches will be needed to reduce and prevent harm to vulnerable populations, even with ambitious GHG mitigation measures. In addition, States can pursue GHG mitigation measures that provide important co-benefits for vulnerable groups, in some cases even offsetting harmful impacts associated with climate change. For example, research on mitigation pathways indicates that the following measures would yield substantial co-benefits for vulnerable populations:

- Reducing fossil-fuel based road travel would help reduce mortality and illness associated with air pollution exposure, which disproportionately affects poor and marginalized communities in urban areas.[223]

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[221] *See, e.g.,* Richard Ferris, Gabrielle Dreyfus, & Durwood Zaelke, *A Primer on Cutting Methane: The Best Strategy for Slowing Warming in the Decade to 2030* (Institute for Governance & Sustainable Development 2023), https://www.igsd.org/wp-content/uploads/2022/09/IGSD-Methane-Primer_2022.pdf (identifying technologies that can be used to achieve substantial reductions in methane emissions from the energy production, waste, and agriculture sectors).

[222] *See* Ferris et al. (2023), *supra* note 217; E.G. Nisbet et al., *Methane Mitigation: Methods to Reduce Emissions, on the Path to the Paris Agreement,* 58(1) REV. GEOPHYS. e2019RG000675 (2020), https://agupubs.onlinelibrary.wiley.com/doi/full/10.1029/2019RG000675.

[223] INTEGRATED ASSESSMENT OF AIR POLLUTION AND CLIMATE CHANGE FOR SUSTAINABLE DEVELOPMENT IN AFRICA (CLEAN AIR AND CLIMATE COALITION, UNITED NATIONS ENVIRONMENT PROGRAMME, AND AFRICAN UNION, 2022), HTTPS://WWW.CCACOALITION.ORG/CONTENT/INTEGRATED-ASSESSMENT-AIR-POLLUTION-AND-CLIMATE-CHANGE-SUSTAINABLE-DEVELOPMENT-AFRICA.

- Providing access to clean cooking, heating, and household energy technologies, and reducing the use of traditional cookstoves that use charcoal, firewood, and other biomass would also help reduce mortality and illness associated with air pollution exposure that disproportionately affects people living in rural areas without access to electricity and/or modern appliances..[224]
- Nature- and ecosystem-based measures can enhance GHG sequestration while also providing environmental and adaptation benefits. For example, the protection of carbon sequestering ecosystems, such as forests, mangroves, and coastal wetlands, often improves resiliency to climate change-related hazards (e.g., forests provide cooling benefits, mangroves and coastal wetlands reduce storm-related damages).[225] Planting trees and adding green surfaces to urban areas also sequesters carbon while mitigating the effects of extreme heat, storms, and floods, and providing air quality benefits.

Part III(B) provides additional insights on the environmental, social, and economic co-benefits associated with clean energy transitions more generally.

3. States' differentiated obligations should be interpreted in light of climate attribution research and carbon budget analyses

Climate science also provides insights on States' "differentiated" responsibilities with respect to GHG mitigation.[226] In particular, source attribution data and other areas of attribution research can be used to evaluate States' historical and present contributions to climate change and corresponding damages. This, in turn, can inform decisions about the equitable allocation of carbon budgets and what qualifies as a State's "fair share" of global mitigation efforts (as well as, e.g., climate finance and compensation for loss and damage). For reasons discussed below, courts have generally recognized that more "developed" or wealthier states that are responsible for a larger share of cumulative GHG emissions should take the lead in combating climate change through

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[224] *Id.*

[225] *See* P. Menéndez et al., *The Global Flood Protection Benefits of Mangroves*, 10 SCI. REP. 4404 (2020), https://www.nature.com/articles/s41598-020-61136-6; Frances Seymour et al., *Not Just Carbon: Capturing All the Benefits of Forests for Stabilizing the Climate from Local to Global Scales* (WRI 2022), https://www.wri.org/research/not-just-carbon-capturing-benefits-forests-climate; US National Ocean Service, *Coastal Blue Carbon*, https://oceanservice.noaa.gov/ecosystems/coastal-blue-carbon/.

[226] The ICJ advisory opinion does not go into detail regarding the differentiated obligations of States, particularly those that have contributed the most to climate change, or issues of accountability or redressability for historical contributions to climate change. *See* Dina Lupin, *Looking for an African Perspective on the ICJ's Climate Advisory Opinion,* CLIMATE LAW BLOG (Oct 2., 2025). However, the opinion does recognize, as a general matter, that States are responsible for harm caused by emissions from sources under their jurisdiction, and that the failure to undertake due diligence to prevent such harm may constitute an internationally wrongful act. ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, at ¶¶ 421-454.

mitigation, consistent with the legal principles of equity, justice, and common but differentiated responsibilities.[227]

We recognize that the Court has not been asked to characterize specific GHG reduction obligations for individual states. However, the Request does seek clarification on the nature of State duties with respect to GHG mitigation – as well as compensation for loss and damage arising from those emissions – and it is possible to articulate some general principles for assessing State's differentiated responsibilities with regards to GHG emissions and how scientific research may inform those responsibilities. Based on a review of both scientific evidence and past litigation, we recommend the following general principles.

i. State responsibility for climate change should be predicated on a holistic assessment of GHG emissions attributable to the State

There are a number of different ways to attribute GHG emissions to a State. State responsibility for climate change is typically measured in reference to the State's territorial emissions (i.e., emissions from sources within the state). This has been the approach taken within the UNFCCC framework, and it has also underpinned various legal decisions on state responsibility for GHG mitigation.[228] However, different GHG accounting approaches provide valuable insights on the nature of State contributions to climate change, and the sufficiency or reasonableness of State mitigation measures. For example, data on consumption-based emissions provide insights on whether States are outsourcing carbon intensive products,[229] and data on fossil fuel production and extraction-based emissions provide insights on whether States are pursuing policies and development pathways that accord with the scientific consensus on the need to rapidly phase out fossil fuels and leave most remaining reserves in the ground.[230] It is also informative to look at estimates of per capita emissions when assessing State mitigation obligations, since this metric

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[227] *See, e.g.,* ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, at ¶ 457(3)(b).

[228] *See* UNFCCC Reporting Requirements, https://unfccc.int/process-and-meetings/transparency-and-reporting/reporting-and-review-under-the-convention/greenhouse-gas-inventories-annex-i-parties/reporting-requirements.

[229] *See, e.g.,* Zhan-Ming Chen et al., *Consumption-Based Greenhouse Gas Emissions Accounting with Capital Sock Highlights Dynamics of Fast-Developing Countries,* 9 NAT. COMMUN. 3581 (2018), https://www.nature.com/articles/s41467-018-05905-y; Michael Jakob & Robert Marschinski, *Interpreting Trade-Related CO_2 Emission Transfers,* 3 NAT. CLIM. CHANGE 19 (2013).

[230] *See, e.g., Held v. Montana*, Findings of Fact, ¶¶ 210-237 (estimating emissions attributable to fossil fuel extraction, processing, and transportation in Montana, and finding that these emissions were substantial enough to support State responsibility for plaintiff's climate-related injuries). *See also* Erickson & Lazarus (2013), *supra* note 69.

accounts for differences in population among States and is relevant when considering what qualifies as an "equitable" distribution of emissions and mitigation effort. Granted, there are contexts where one accounting approach must prevail (e.g., when setting numeric GHG targets), but outside of those contexts, using multiple accounting methods provides more holistic insights on State responsibility for climate change.

State responsibility should also be assessed in light of the State's cumulative emissions (which can be measured in reference to territorial and/or per capita emissions), as this provides the best estimate of a State's total contribution to climate change and associated threats to human rights. States with larger emission contributions bear greater responsibility for climate injuries, and therefore have a greater obligation to control and reduce GHG emissions as quickly as possible, consistent with the CBDR principle.[231] This notion underpins much of the legal and technical discourse on whether States are doing their "fair share" to mitigate GHG emissions – although there is not a uniform definition of "fair share", it is clear that this concept refers to what "each country *should* be doing to reduce and reverse" its contribution to climate change, drawing on notions of equity and climate justice, and a State's cumulative emissions are clearly relevant to this analysis.[232] Granted, as discussed below, cumulative emissions are not the *only* factor that is relevant when framing fair share obligations (e.g., wealth and development status are also relevant). Moreover, States may be viewed as having greater responsibility with regards to recent and future emissions due to factors such as the foreseeability of harm from newer emissions, the ability of States to control current and future emissions, and the fact that more recent emissions may cause greater damage as they are less likely to be absorbed by ocean and terrestrial systems, and may cause the climate system to reach certain thresholds and tipping points.

Due to the rapidly depleting global carbon budget – and the likelihood of surpassing the 1.5°C threshold – some legal scholars have argued that developed States also have an obligation to contribute to emission reductions outside of their territories, in addition to pursuing the highest

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[231] *See* Paris Agreement Art. 4(4) (recognizing that "[d]eveloping country Parties should continue taking the lead by undertaking economy-wide absolute emission reduction targets").

[232] Maria Antonia Tigre, *The 'Fair Share' of Climate Mitigation: Can Litigation Increase National Ambition for Brazil*, JOURNAL OF HUMAN RIGHTS PRACTICE (September 6, 2023), https://academic.oup.com/jhrp/advance-article-abstract/doi/10.1093/jhuman/huad032/7261647. *See also infra* § III.A.3.iii.

possible ambition with GHG reductions within their territories.[233] In particular, States that are responsible for a disproportionately high share of emissions should pursue extraterritorial emission reductions (e.g., by financing mitigation projects) in order to close the gap between their "fair share" budgets and the most ambitious feasible GHG reduction pathways. This would be consistent with the principles of equity and common but differentiated responsibilities.

ii. State obligations are constantly evolving

States' "fair share" obligations are constantly evolving due to continued human interference with the climate system, the increasing urgency of GHG emission reductions, and new scientific information about the scope of harmful impacts attributable to climate change. In particular, as noted in Part I, it is possible that we will hit critical warming thresholds even faster than previously anticipated (e.g., exceeding the 1.5°C target within the next few years). Impacts may also be more harmful than anticipated, particularly if the world surpasses tipping points that result in cascading and compounding impacts, such as the melting of ice sheets. This means that GHG reduction targets need to be periodically re-assessed in light of new data about cumulative GHG emissions and the impacts attributable to those emissions.

For example, based on current emissions trajectories and scientific research on climate impacts, it is clear that emission reduction targets in UNFCCC documents and NDCs are not sufficiently protective of human rights.[234] These should therefore be viewed as a "floor" for state obligations – i.e., States must, at minimum, comply with NDC commitments and GHG reduction targets articulated in UNFCCC documents. Some States, particularly those that have made larger contributions to climate change, will need to pursue more ambitious GHG reduction targets in order to fulfill their human rights obligations. Of course, the adequacy of NDC commitments will vary depending on the level of ambition and the unique circumstances of the State.

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[233] Dennis van Berkel et al., *Quantifying a 1.5°C Fair Share Carbon Budget: Human Rights Obligations on Climate Change After KlimaSeniorinnen,* Amsterdam Law School Legal Studies Research Paper No. 2025-11 (2025), file:///Users/jessicawentz/Downloads/ssrn-5265958.pdf.

[234] *See* UNEP, EMISSIONS GAP REPORT 2022, https://www.unep.org/resources/emissions-gap-report-2022.

iii. Carbon budget and "fair share" research can be used to assess the adequacy of state ambition

In prior rights-based litigation, courts and litigants have used attribution data to establish a causal connection between a state's GHG emissions, climate change, and adverse effects on specific human rights.[235] However, courts have primarily relied on political documents, such as UNFCCC decisions, EU climate targets, and government-derived carbon budgets, when evaluating the sufficiency of GHG reduction targets and mitigation policies adopted by a State.[236] Courts have also referred to UNFCCC decisions and treaty commitments when evaluating the reasonableness of specific elements of State climate policies (e.g., policies related to the prevention of deforestation) and State obligations to implement existing policies..[237]

Due to the aforementioned considerations – particularly the ongoing depletion of the carbon budget, the increasing severe impacts of climate change, and the need to re-evaluate emission targets – courts may need to look beyond NDCs, UNFCCC documents, and other political agreements when assessing the adequacy of State ambition with regards to GHG reductions. As noted in Part I, there is a growing body of research on the equitable allocation of the global carbon budget that courts can refer to in order to determine whether a State is doing its fair share to reduce GHG emissions.[238] The research generally recognizes that historical responsibility (as measured by cumulative emissions), current levels of per capita emissions, and development status are all relevant when evaluating fair share obligations. State obligations should also be assessed in light of the overarching goal of harm prevention, i.e., they should reflect emission reduction pathways that have a reasonable chance of limiting global warming to 1.5°C or well below 2.0°C.

There is tension between the goals of harm prevention and international equity. The CBDR principle addresses this by acknowledging that States have a "common" obligation to reduce GHG emissions as rapidly as possible in order to mitigate the human rights consequences of climate

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[235] *See, e.g., Urgenda v. Netherlands, supra* note 140; *Neubauer v. Germany, supra* note 140; *VZW Klimaatzaak v. Belgium, supra* note 140; *Held v. Montana, supra* note 167*;* Verein KlimaSeniorinnen Schweiz and Others v. Switzerland, *supra* note 140.

[236] *Id.*

[237] *See, e.g., Future Generations v. Ministry of Environment* (Colombia); *supra* note 140; *PSB v. Brazil, supra* note 140.

[238] *See, e.g.,* Rajamani et al. (2021), *supra* note 132; Hickel et al. (2020), *supra* note 132; Maria Antonia Tigre (2023), *supra* note 232; *Fair Shares: A Civil Society Equity Review of NDCs* (Civil Society Review 2015), https://policy-practice.oxfam.org/resources/fair-shares-a-civil-society-equity-review-of-indcs-579848/; Climate Action Tracker, *Fair Share*, https://climateactiontracker.org/methodology/cat-rating-methodology/fair-share/.

change, but they also have "differentiated" obligations with regards to GHG reduction due to varying levels of responsibility for climate change as well as differences in wealth and development status. Courts will need to account for both types of considerations when evaluating fair share obligations for specific States.

Rajamani et al. (2021) demonstrate how fair share obligations can be assessed using the principles of international environmental law, including the principles of harm prevention, precaution, sustainable development, special circumstances, equity (inter- and intra-generational), CBDR, public participation, international cooperation and good faith.[239] The authors evaluate nationally determined contributions (NDCs) to the Paris Agreement in light of these principles, and find that NDCs are often predicated on a combination of indicators that both are and are not supported by the equitable principles of international environmental law (see Box III.A.3, next page). The authors also present a framework for quantifying fair-share contributions based on their assessment of legal principles and NDC indicators, and in accordance with a global emissions pathway that have a reasonable prospect of limiting warming to well below 2°C.

Importantly, even where a court lacks jurisdiction to establish numeric GHG reduction targets for a State, it can use carbon budget and fair share research to evaluate the sufficiency of existing targets and policies, and to determine whether more ambitious measures are needed to protect human rights.[240] For example, the framework articulated by Rajamani et al. could be used in qualitative assessments of NDC commitments and GHG reduction targets.

[239] Rajamani et al. (2021), *supra* note 132.

[240] *See, e.g.,* Brussels Court of First Instance, *VZW Klimaatzaak v. Kingdom of Belgium & Others*.

Box III.A.3. Evaluation of NDC Indicators and Consistency with International Environmental Law in Rajamani et al. (2021)

Indicators supported by principles of international environmental law:

- Emissions per capita (73)
- Classification as small island developing states (SIDS) or least developed countries (LDCs) (61)
- Small share of global emissions, to the extent this overlaps with special circumstances (ie., LDCs and/or SIDs) (59)
- Historic responsibility (37)
- GDP per capita (27)

Indicators not supported by principles of international environmental law:

- Small share of global emissions for countries that are not LDCs or SIDs (52)
- Progression of own effort (55)
- In line with own targets (26)
- Emissions per GDP (24)
- Peak year (10)
- Least cost pathways (8)

Notes:

- The (##) next to each indicator refer to the number of NDCs that contained each indicator (specifically, NDCs submitted through December 31, 2020).
- These indicators are based on the text of NDCs. The authors identify a number of other indicators that would also be consistent with the principles of international environmental law, including cumulative GHG emissions, current and projected harm, and GDP per capita adjusted for development.

iv. GHG reduction targets are not the only way to characterize State obligations with regards to GHG emissions

It is important to recognize that State obligations with regards to GHG emissions do not need to be exclusively framed in reference to numeric GHG reduction targets. The adequacy of a state's GHG reduction measures can also be assessed by evaluating the nature of state climate policies in light of the state's resources, development status, capacity constraints, and other considerations. For example, a court could evaluate whether a State is making its best efforts to transition its energy system away from fossil fuels and to reduce emissions from other key sectors, such as agriculture and land use. This would be generally consistent with how courts approach many legal disputes involving human rights – assessments of whether States are fulfilling their human rights obligations are often predicated on a more qualitative analysis of State measures and whether they reflect, e.g., "the greatest possible ambition," taking into account the respective capabilities of the

State.[241] Research on the efficacy, cost, and availability of mitigation technologies and policies would be relevant to such an analysis, as would source attribution research on GHG emissions from different sectors and activities under the State's jurisdiction or effective control.

A more qualitative or functional analysis of State action may also be necessary when courts are tasked with assessing the legality of policies and government decisions that contribute to climate change in ways that are not reflected in territorial emission budgets, e.g., decisions about fossil fuel extraction and export, land use decisions with difficult-to-quantify emissions impacts, or policies that may affect consumption-based emissions. In that context, courts can refer to available emissions data to understand the magnitude of the impact on climate change, but the legality of the action would ultimately need to be assessed in reference to something other than a territorial emissions budget (e.g., whether the State is taking reasonable measures or making "best efforts" to transition away from dependency on fossil fuel exports, mitigate emissions from deforestation or other land use decisions, prevent carbon leakage, etc.).

B. Clean Energy Transition

The Request asks the Court to consider the obligations of States to facilitate a just, transparent, equitable, and accountable transition in the context of climate change in Africa.[242] Many of the obligations discussed in this brief are relevant to this question.[243] Here we focus on a core element of an equitable and just transition, specifically State duties to facilitate the deployment of clean energy systems and to promote equitable access to the benefits of these systems.

The transition to clean energy offers significant promise for Africa's social and economic development.[244] Africa has a vast endowment of clean energy resources, including abundant solar, wind, hydro, and geothermal resources, only a small fraction of which have been developed.[245] Clean energy technology costs are rapidly declining, and the levelized costs of solar PV and

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[241] *See, e.g., Future Generations v. Colombia, supra* note 140; *PSB v. Brazil, supra* note 140.

[242] Request for Advisory Opinion at ¶ 93(c).

[243] *See, e.g., infra* Part III(C) ("Adaptation Obligations"); III(F) ("Good Governance, Public Participation, Access to Information, and Access to Justice").

[244] *See generally* YOUBA SOKONA ET AL., JUST TRANSITION: A CLIMATE, ENERGY AND DEVELOPMENT VISION FOR AFRICA, A report by the Independent Expert Group on Just Transition and Development (2023), https://justtransitionafrica.org/wp-content/uploads/2023/05/Just-Transition-Africa-report-ENG_single-pages.pdf.

[245] The Africa Center, *Africa's Green Energy Transition* (May 29, 2025), https://theafricacenter.org/news/detail/Africa-s-Green-Energy-Transition.

onshore wind are now lower than that of fossil fuels in many African countries.[246] Private sector investments in clean energy have tripled from approximately USD 17 billion in 2019 to almost USD 40 billion in 2024.[247] African countries are also uniquely poised to "leapfrog" fossil fuel dependence as they meet growing energy demand due to the abundance of untapped renewable energy resources, the declining costs of clean energy technologies, and the lack of extensive legacy fossil fuel infrastructure.[248]

Clean energy technologies offer substantial environmental, economic, and social benefits, all of which are relevant to advancing the underlying goals of equity and justice, and the realization of human rights for all people. These include:

- **Environmental and public health benefits:** Clean energy technologies mitigate and avoid environmental harms associated with the production, transportation, and utilization of fossil fuels, including GHG emissions, air pollution, water pollution, and soil pollution. As discussed in Part III(A), transitioning to clean energy resources delivers significant benefits for both climate and human health outcomes.

- **Energy access and independence:** African communities are disproportionately affected by energy poverty, i.e., they lack access to adequate, reliable, and affordable energy. Efforts to supply energy through centralized fossil fuel systems have encountered problems due to the high cost of building and operating fossil fuel-fired power plants; poor grid infrastructure and high transmission costs, particularly to remote areas; the cost and availability of fuels; poor utility performance; and inadequate economic incentives.[249] Clean energy technologies allow for the deployment of decentralized renewable energy systems, such as solar PV and microgrids, that do not require extensive transmission

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[246] INTERNATIONAL ENERGY AGENCY (IEA), WORLD ENERGY INVESTMENT 2025: AFRICA, https://www.iea.org/reports/world-energy-investment-2025/africa. *See also* AFRICA ENERGY CHAMBER, THE STATE OF AFRICAN ENERGY 2025, https://energychamber.org/wp-content/uploads/The-State-of-African-Energy-2025_digital.pdf; THE RENEWABLE ENERGY TRANSITION IN AFRICA (IRENA 2021), https://www.irena.org/-/media/Files/IRENA/Agency/Publication/2021/March/Renewable_Energy_Transition_Africa_2021.pdfl; Anne Louise Koefoed & Sujee Selvakkumaran, *Costly capital: Money for green megawatts in Sub-Saharan Africa* (DNV April 10, 2025), https://www.dnv.com/energy-transition/costly-capital-money-for-green-megawatts-in-sub-saharan-africa/.

[247] *Id.*

[248] *See* POWER SHIFT AFRICA, AFRICAN ENERGY LEADERSHIP: THE CASE FOR 100% RENEWABLE ENERGY (2025), https://www.powershiftafrica.org/publications/african-energy-leadership-report; THE RENEWABLE ENERGY TRANSITION IN AFRICA (IRENA 2021), *supra* note 246; Jakkie Cilliers, *Technological Innovation and the Power of Leapfrogging,* in THE FUTURE OF AFRICA (Palgrave Macmillan 2021).

[249] Gracelin Baskaran & Sophie Coste, *Achieving Universal Energy Access in Africa amid Global Decarbonization* (Center for Strategic and International Studies, January 31, 2024), https://www.csis.org/analysis/achieving-universal-energy-access-africa-amid-global-decarbonization.

infrastructure, are less vulnerable to external shocks (e.g., fossil fuel price volatility), and avoid other problems associated with centralized fossil fuel generation.

- **Democratic energy governance:** Clean energy technologies also have the transformative potential to "democratize" the management of energy resources. Under the traditional centralized generation paradigm, energy resources and electricity production are primarily controlled by government officials, large utilities (often state-owned), and foreign investors. Decentralized renewable energy systems can be deployed at a scale and cost that allows for community ownership and management. As such, these have been identified as useful tools for empowering communities and promoting energy democracy.[250]

- **Energy Resilience:** Decentralized renewable energy systems can also improve resilience to disasters by providing more reliable, localized energy generation that is less vulnerable to the failure of centralized grids during floods, heatwaves, and other extreme events. The deployment of clean energy technologies is thus integral to climate change adaptation as well as mitigation in Africa.

In sum: the clean energy transition provides an opportunity for African countries to expand energy access and improve socioeconomic development while also mitigating climate change and other environmental problems associated with fossil fuel use.

There is also a compelling legal rationale for recognizing obligations on the part of African governments to support the deployment of clean energy systems, and to avoid policies and investments that contribute to fossil fuel dependency. As discussed above, the ICJ has recognized that States must exercise "due diligence" to avert significant harm to the climate system, that this standard is "stringent" due to the seriousness of climate change, and thus a State must use "all means at its disposal" in the performance of this obligation.[251] This obligation is shared by all States, but must be interpreted in light of each State's respective capabilities and available resources, consistent with the principle of CBDR. The ICJ also made it clear that State obligations of due diligence with regards to climate change encompass decisions related to fossil fuel production, consumption, licensing, and subsidies.[252] Based on the ICJ's reasoning, any State that has the capability to pursue clean energy technologies rather than fossil fuels to meet energy demand should use "all means" available at its disposal to do so.

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[250] Joy Nneamaka Obi et al., *Decentralised renewable energy in sub-Saharan Africa: A critical review of pathways to equitable and sustainable energy transitions,* 9 UNCONVENTIONAL RESOURCES 100267 (2025).

[251] *See supra* Part III(A); ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, ¶¶ 229, 246, 290.

[252] ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, ¶ 427.

Accordingly, the Court should recognize obligations on the part of African States to support the deployment of clean energy technologies to the maximum extent possible and to transition away from reliance on fossil fuels as rapidly as possible, taking into account their differentiated responsibilities, respective capabilities, and rights to development.[253] African States should also seek to ensure equitable access to the benefits of the clean energy transition, especially for vulnerable groups and communities that currently lack energy access, consistent with their human rights obligations.

States can pursue these goals through changes in domestic regulatory frameworks as well as direct investments and other forms of support for clean energy projects. In particular, many commentators have highlighted the need for regulatory changes to promote investment and remove barriers for clean energy projects,[254] to ensure that these projects are being deployed in communities that lack access to reliable and affordable electricity,[255] and to allow for community participation in and ownership of decentralized renewable energy projects.[256]

This is not to suggest that African countries should shoulder all of the responsibility for the clean energy transition. Other countries have obligations to provide international assistance (e.g., financial support, technology cooperation, and capacity building) to help support this transition. In particular, wealthier countries that have contributed more to climate change –and have more resources at their disposal – have obligations to provide such support that are rooted in treaty law, international law, and human rights law.[257] Moreover, as discussed above, all countries have

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[253] As part of this obligation, African States must act with due diligence to redirect investments away from new fossil fuel exploration and development to clean energy projects. *See* Elsabé Boshoff & Samrawit Getaneh Damtew, *Can Africa Still Drill? What the ICJ Climate Opinion Means for Oil and Gas Exploration in Africa,* CLIMATE LAW BLOG (Aug. 28, 2025), https://blogs.law.columbia.edu/climatechange/2025/08/28/can-africa-still-drill-what-the-icj-climate-opinion-means-for-oil-and-gas-exploration-in-africa/.

[254] *See e.g.,* Sidique Gawusu & Abubakari Ahmed, *Africa's Transition to Cleaner Energy: Regulatory Imperative and Governance and Dynamics,* in ENERGY REGULATION IN AFRICA: DYNAMICS, CHALLENGES, AND OPPORTUNITIES (ISHMAEL CKAH & CHARLY GATETE EDS., 2024); Goodness Esom, *How legislation can help boost renewable energy investments in Africa,* World Economic Forum (Oct. 23, 2024), https://www.weforum.org/stories/2024/10/legislation-drive-renewable-energy-investments-africa/;

[255] *See, e.g.,* Joy Nneamaka Obi et al., *Decentralised renewable energy in sub-Saharan Africa: A critical review of pathways to equitable and sustainable energy transitions,* 9 UNCONVENTIONAL RESOURCES 100267 (2026); Paola Casati et al., *Clean energy access as an enabler for social development: A multidimensional analysis for Sub-Saharan Africa,* 72 ENERGY FOR SUSTAINABLE DEVELOPMENT 114 (2023).

[256] *See, e.g.,* Nneamaka et al., *supra* note 250; Jessica Wentz & Chiara Pappalardo, *Scaling up Local Solutions: Creating An Enabling Legal Environment for the Deployment of Community-Based Renewable Microgrids*, in ENERGY, GOVERNANCE AND SUSTAINABILITY (EDWARD ELGAR PUBLISHING) (IUCN ACADEMY OF ENVIRONMENTAL LAW 2016).

[257] ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, ¶¶ 260-270.

obligations to phase out fossil fuel subsidies that distort global energy markets and hinder the economic competitiveness and deployment of clean energy technologies. Ultimately, the green energy transition in Africa will need to be a global effort. But African States must do their part to facilitate this transition through the enactment of enabling laws and other available means.

C. Adaptation Obligations

The Request also raises questions about the scope of state duties with regards to adaptation, resilience, and the protection of vulnerable populations.[258] Human rights law recognizes an obligation on the part of States to take reasonable measures to protect and guarantee human rights in the face of foreseeable environmental risks and natural hazards, even where the State did not cause such hazards through its own actions.[259] Accordingly, States must prepare for and respond to the effects of climate change, particularly those that pose a foreseeable threat to human rights, and this "duty of adaptation" is independent from State responsibility for GHG emissions and the duty of mitigation. The ICJ and IACtHR both recognized State duties to protect human rights through adaptation in their advisory opinions on climate change.[260] Attribution research and

[258] Request for Advisory Opinion at ¶¶ 93(b), 93(d).

[259] For example, there are several decisions from the European Court of Human Rights (ECtHR) that provide insights on the nature of a state's positive obligation to protect the right to life in the context of natural disasters. In *Budayeva and Others* v. *Russia*, the ECtHR determined that Russian authorities had violated the right to life when those authorities knew that there was a risk of a mudslide but did not implement land planning and emergency relief policies or adequately inform the public about the risk, and eight citizens died as a result of the mudslide. *Budayeva and Others* v. *Russia*, App. Nos. 15339/02, 21155/02, 20058/02, 11673/02 and 1543/02, Eur. Ct. H.R. (March 20, 2008). Similarly, in *Kolyadenko* v. *Russia*, the ECtHR determined that Russian authorities violated the rights to life, respect for private and family life, and protection of property when they released a large amount of water from a reservoir during an exceptionally heavy rain event, thus causing a flash flood immediately downstream of the reservoir. *Kolyadenko and Others* v. *Russia*, Eur. Ct. H.R. (Judgment, February 28, 2012). Notably, the court did not find that authorities were negligent in their operation of the dam at the time of the flood – rather, the problem was that the government authorities (i) knew for many years that such an event was foreseeable and failed to take action to mitigate the risk, (ii) failed to adopt planning restrictions and take other necessary steps to protect people living downstream of the reservoir, and (iii) did not take all possible measures to alert residents of the risks prior to or during the storm. There are also a number of human rights decisions affirming that governments have a positive obligation to protect citizens from other environmental hazards that threaten human rights, including wholly man-made hazards. For example, in *Öneryildiz* v. *Turkey*, the ECtHR found that the government of Turkey had violated the rights to life and property arising from a methane explosion at a landfill when governmental authorities knew of the risk of explosion but failed to issue any regulations or take measures to mitigate that risk. *Öneryildiz* v. *Turkey*, Eur. Ct. H.R. (Judgment, 2004) at 1. *See also The Environment & Human Rights*, Advisory Opinion OC-23/17, Inter-Am. Ct. H.R. (ser. A), No. 23 (holding that governments have a positive obligation to prevent foreseeable harms arising from their conduct).

[260] ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, at ¶¶ 381, 403, 457(3)(h); IACtHR Advisory Opinion OC-32/25, *supra* note 140, § F.1.2 ("Climate Adaptation Requirements").

climate projections provide insights on foreseeable hazards and risks associated with climate change and are therefore relevant when assessing State obligations to adapt.

1. Greater ambition in adaptation will be needed to protect human rights from the harmful impacts of climate change

The findings from IPCC AR6 and other scientific authorities indicate that ambitious adaptation measures will be needed to protect human rights from foreseeable threats associated with climate change, even if warming is limited to 1.5 or 2°C, and adaptation requirements will increase with each additional increment of warming. IPCC AR6 and other authorities have also found that current investments in adaptation are insufficient and "adaptation gaps" will continue to grow under current policies.[261] States will therefore need to enhance their ambition with regards to adaptation to protect people and ecosystems from climate change-related hazards that pose an imminent risk to life, health, environmental health, and other fundamental rights.

Courts have recognized the need for more ambitious adaptation measures in recent advisory opinions and legal decisions, particularly insofar as adaptation is needed to protect vulnerable groups from climate change-related harms. For example, the IACtHR concluded in its advisory opinion that both "mitigation and adaptation measures must be increased rapidly" in order to protect human rights, and that "[d]elays in this regard mean transferring an extraordinary responsibility to future generations, an increase the risk of suffering the negative effects of climate change, particularly for the most vulnerable."[262] The ICJ similarly recognized in its advisory opinion that "adaptation is a particularly pressing challenge" and that States have adaptation obligations as a matter of international law, treaty law, and human rights law.[263] The ICJ stated that the fulfillment of adaptation obligations should be assessed against a "standard of due diligence", i.e., States "must use their best efforts, in line with the best available science" to enact measures that will enhance adaptive capacity, strengthen resilience, and reduce vulnerability to climate

[261] *See* IPCC AR6 SYR at ¶ A.3 ("Despite progress, adaptation gaps exist, and will continue to grow at current rates of implementation. … Current global financial flows for adaptation are insufficient for, and constrain implementation of, adaptation options, especially in developing countries (*high confidence*)."). *See also* UNEP, ADAPTATION GAP REPORT 2022 (Nov. 1, 2022).

[262] IACtHR Advisory Opinion OC-32/25, *supra* note 140, at ¶ 194.

[263] ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, at ¶ 258 (specifically discussing adaptation in relation to treaty obligations). *See also id.* at ¶ 282 (discussing adaptation in relation to customary international law); ¶ 381 (noting that the failure to implement timely and adequate adaptation measures may also result in a violation of human rights).

change.[264] With regards to the "best available science", the ICJ specifically cited IPCC AR6 in finding that "adaptation options exist that are effective in reducing climate risks in certain contexts, such as the restoration of ecosystems, the creation of early warning systems, and resilience-enhancing infrastructure" as well as "regenerative farming, crop diversification, weatherproofing of buildings, and managing land to reduce wildfire risk."[265]

Courts are also beginning to weigh in on the scope of state adaptation duties in the context of specific legal disputes.[266] For example, courts in Colombia and Pakistan have generally found that governments have an obligation to undertake adaptation measures in order to protect fundamental rights, such as the rights to life and environmental health.[267] The UN Human Rights Committee's decision in *Billy et al. v. Australia* is perhaps the strongest decision to date on State adaptation obligations under human rights law. The Committee specifically found that Australia had violated the Torres Strait Islanders' rights to indigenous culture and family, home, and private life because it "fail[ed] to discharge its positive obligation to implement adequate adaptation measures" to protect the authors and their communities.[268] Based on this holding, the Committee found that the State had obligations to, *inter alia,* "take measures necessary to secure the communities' continued

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[264] *Id.* at ¶ 258

[265] *Id.*

[266] *See, e.g., Billy et al. v. Australia, supra* note 140*; Leghari v. Pakistan, supra* note 140. There are also a number of pending cases and petitions involving adaptation-oriented claims. For example, the US tribal petition to the UN Special Rapporteurs alleges that the US government and the state governments of Louisiana and Alaska violated the collective and individual rights of Indigenous tribes by (i) undertaking maladaptive activities that contributed to coastal erosion, land loss, and flooding along the coastlines where the tribes reside, thus exacerbating the effects of sea level rise and extreme storms; and (ii) failing to take affirmative measures to protect the tribes from sea level rise, extreme storms, and land loss and, in particular, failing to implement a "relocation governance framework" for these tribes. See Rights of Indigenous Peoples in Addressing Forced Displacement, supra note 152.

[267] *Future Generations v. Ministry of Environment & Others* (Colombia), *supra* note 140; Leghari v. Pakistan, *supra* note 140.

[268] The implications of the Committee's decisions for state mitigation obligations are unclear. Although the decision specifically referred to *adaptation* measures in the two paragraphs finding a violation of those rights, it did not explicitly reject the Islanders' claims with respect to mitigation, and some of the state obligations identified later in the decision could be interpreted as requiring both GHG mitigation and adaptation (e.g., the duty to prevent future harm). One committee member published an independent opinion expressing the view that the HRC should have linked the State obligation more clearly to mitigation measures, because adaptation will eventually become impossible for the islands in the absence of effective mitigation. (Annex II: Individual Opinion by Committee Member Gentian Zyberi (concurring), para 6). The committee member also noted that a "higher standard of due diligence applies in respect to those States with significant total emissions or very high per capita emissions (whether these are past or current emissions), given the greater burden that those emissions place on the global climate system, as well as to States with higher capacities to take high ambitious mitigation action." (id. at para 5).

safe existence on their respective islands," "provide adequate compensation, to the authors for the harm they have suffered," and "take steps to prevent similar violations in the future."[269]

Because petitioners do not need to prove that the government defendant caused or contributed to climate change in a failure-to-adapt case, the factual analysis is different from that in failure-to-mitigate cases. Petitioners need not grapple with questions about source attribution or related defenses. Instead, the focus is on the reasonableness of the government's response to climate change (or lack thereof), which is based, at least in part, on the nature of climate change impacts and whether they are (or were) foreseeable. The question of whether a State has exercised "due diligence" in adaptation would also depend on the availability, cost, and feasibility of adaptation measures.

2. Climate science provides actionable information on foreseeable climate hazards

Attribution research and climate projections provide insights on the effects of climate change that are already underway, likely future effects under different warming scenarios, and the extent to which specific climate change-related risks are foreseeable and should therefore be taken into account by decision-makers. Although attribution research is most often invoked in legal discussions about responsibly for climate change, its ultimate aim is to "further scientific understanding of causal links between elements of the Earth system and society" and thus the research also supports "management of climate-related risks through improved understanding of drivers of relevant hazards, or more widely, vulnerability and exposure."[270]

For example, the research shows that certain natural hazards, which might be characterized as "unlikely" or "unforeseeable" in a world without climate change, are becoming much more prevalent, thus posing foreseeable risks that should be accounted for in government planning and decision-making processes.[271] The research also provides insights on the prominent climate change-related hazards in Africa, and suggests that adaptation measures are needed to: (i) mitigate the adverse effect of climate change on agricultural systems, food security, and water security; (ii) reduce exposure and vulnerability to extreme heat, storms, flooding, and landslides; (iii) conserve

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[269] *Billy et al. v. Australia*, *supra* note 140, ¶ 11.

[270] Rachel A. James et al., *Attribution: How is it Relevant for Loss and Damage Policy and Practice?,* CLIMATE RISK MANAGEMENT, POLICY AND GOVERNANCE (2018), https://link.springer.com/chapter/10.1007/978-3-319-72026-5_5.

[271] For example, the "recurrence interval" for climate-related extremes is increasing in many regions, such that events which were previously viewed as very rare (e.g., 1-in-500 year storms) are now occurring much more frequently.

and restore key ecosystems, such as forests, mangroves, and coastal wetlands, in order to reduce ecological damage and preserve ecosystem services; (iv) expand health services and protective measures to address the increased prevalence of communicable diseases; and (v) address the effects of sea level rise and other coastal hazards on small islands and low-lying coastlines.

The IPCC reports are a useful starting point for identifying foreseeable climate impacts and appropriate adaptation measures, but it will typically be necessary to consult other scientific resources, such as regional climate impact and vulnerability assessments, for more granular data on the effects of climate change on specific communities, locations, sectors, and activities.[272]

3. Adaptation should be "mainstreamed" in government planning processes

Government decision-makers should account for climate change-related hazards and adaptation options across a wide array of decisions related to natural resource management, ecosystem and biodiversity protection, urban and rural planning, food and water security, public health, and much more. States and sub-state actors should therefore seek to integrate or "mainstream" adaptation planning into existing planning processes across these different areas of decision-making. For example, the legal frameworks for environmental impact assessments should be updated, where needed, to ensure that decision-makers are accounting for climate impacts and opportunities to mitigate risks or environmental hazards associated with climate change.[273]

D. International Cooperation and Climate Finance

The Request seeks clarification on the obligations of African States with regards to international cooperation and climate action.[274] The ICJ, IACtHR and other legal authorities have recognized State duties to cooperate in good faith with other States to prevent significant harm to the environment, including the climate system, pursuant to their obligations under human rights law as well as treaty law and customary international law.[275] The IACtHR specifically noted in its

[272] *See supra* § I(C).

[273] *See infra* § III(E).

[274] Request for Advisory Opinion, at ¶ 93(g)

[275] *See* ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, at ¶ 457(3)(h); IACtHR Advisory Opinion OC-32/25, *supra* note 140, § VI.A.5. *See also* IACHR Resolution 3/2021, Section C.II, para 10 ("States have an obligation to cooperate in good faith in order to prevent pollution of the planet, which entails reducing their emissions to ensure a safe climate that enables the exercise of rights. This involves exchanging resources, technology, knowledge and capacities to build societies that operate in a low-emission environment, move towards a clean and just energy transition, and protect people's rights. States that are in a position to do so should contribute to covering the costs of

advisory opinion that this obligation "must be interpreted in light of the principles of equity and common but differentiated responsibilities" and that it "encompasses all the measures required to respond integrally to the climate emergency."[276]

The duty of international cooperation thus encompasses obligations related to climate finance and international support, as well as obligations related to mitigation, adaptation, and good faith participation in international negotiations. Generally speaking, States with greater financial capacity and greater responsibility for climate change have obligations to provide financial, technical, and logistical assistance for mitigation and adaptation activities in States that are most affected by climate change and have fewer resources to respond to it. Accordingly, the IACtHR determined that this obligation entails a duty on the part of developed or wealthier States to provide assistance to other States, specifically: (i) financial and economic aid to the least developed countries to contribute to a just transition, (ii) technical and scientific cooperation involving communication and common enjoyment of the benefits of progress; (iii) implementation of mitigation, adaptation, and reparation actions that can benefit other states; and (iv) establishment of international forums and formulation of collaborative international policies."[277] The IACtHR noted that these duties are related to UNFCCC and Paris Agreement obligations, but they also exist as standalone human rights obligations. The ICJ also recognized that developed States have obligations to provide financial assistance, technology transfers, and capacity building support to developing States as part of the duty of international cooperation, but it focused on treaty obligations (e.g., the Paris Agreement) as the primary legal basis for these obligations.[278]

As noted above, State obligations related to climate finance and international support are based on and should be interpreted in accordance with the principles of equity and common but differentiated responsibilities.[279] These obligations are also related to State obligations to mitigate

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mitigation and adaptation of States prevented from doing so, in accordance with the principle of common but differentiated responsibilities. In general, the fundamental principles of climate justice should serve as a guide for international cooperation."); UNHRC, Report of the Special Rapporteur on the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy and sustainable environment, A/74/161 (2019), ¶¶ 26 and 68 (recognizing that "wealthy States must contribute their fair share towards the costs of mitigation and adaptation in low income countries," through grants and not loans, given that basic principles of justice are violated when poor countries are forced to pay for "the costs of responding to climate change when wealthy countries caused the problem.").

[276] IACtHR Advisory Opinion OC-32/25, *supra* note 140, ¶¶ 258-259.

[277] *Id.* at ¶ 264.

[278] *See, e.g.,* ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, at ¶ 264.

[279] See Table III, *supra* page 45-46.

environmental harm arising from activities under their effective control, insofar as financial assistance for adaptation can serve as a form of mitigation for damages attributable to a State's GHG emissions.[280] In other words, there is considerable overlap between State obligations related to climate finance and State obligations related to loss and damage.

Climate finance obligations should therefore be assessed in light of both the State's contributions to climate damages and the State's capacity to provide assistance. As discussed above, climate science, particularly detection and attribution research, provides critical insights on the first issue (State contributions to climate change) and can therefore inform assessments of whether State commitments to climate finance reflect an adequate level of ambition – e.g., finance commitments could be compared to estimates of economic damages attributable to the State. The scientific research also provides insights on where financial resources should be directed in order to achieve the greatest level of harm reduction and the greatest benefit to human rights – e.g., source attribution data can be used to determine where financial investments in GHG mitigation will deliver the largest GHG reductions at the lowest cost, and impact attribution data can be used to determine whether adaptation investments will yield the greatest benefits.

E. Compensation for Loss and Damage

The Request raises questions about State obligations to compensate for loss and damage caused by climate change.[281] Courts have recognized that there are circumstances in which States may be required to pay reparation for environmental damages, as a matter of both international law and human rights law.[282] In particular, States may have an obligation to provide redress for extraterritorial or transboundary environmental damage if it is caused by activities under their effective control or jurisdiction.[283] There are still open questions about the nature of State obligations to provide compensation for loss and damage in the context of climate change, and

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[280] *See* IACtHR Advisory Opinion OC-23/17 at ¶¶ 145, 172-173.

[281] Request for Advisory Opinion at ¶ 93(g).

[282] *See, e.g.,* ICJ, Case Concerning Armed Activities on the Territory of the Congo (Democratic Republic of Congo v. Uganda), Request for the Indication of Provisional Measures, Order, 2000 I.C.J. Rep. 111, ¶¶ 216-217 (July 1); *Lhaka Honhat (Our Land) Association v. Argentina*, Inter-Am. Ct. H.R. (ser. C.) No. 400 (Feb. 6, 2020); La Oroya Population v. Peru, Inter-Am. Ct. J.R. (ser. C.) No. 511 (Nov. 27, 2023).

[283] Democratic Republic of Congo v. Uganda, *supra* note 282. *See also* IACtHR Advisory Opinion OC-23/17; Alexandra Tarzikhan, *The Role of International Human Rights Law in Climate Reparations,* CLIMATE LAW BLOG (Oct. 15, 2025), https://blogs.law.columbia.edu/climatechange/2025/10/16/the-role-of-international-human-rights-law-in-climate-reparations/.

there has not yet been a court decision requiring a State to pay compensation to another State for climate-related losses and damages.[284] However, the ICJ explicitly recognized in its advisory opinion that a State which breaches its legal obligations with regards to climate change may be required to provide "full reparation to injured States in the form of restitution, compensation, and satisfaction" providing that a "sufficiently direct and certain causal nexus can be shown between the wrongful act and injury."[285]

In addition, as noted above, the UN Human Rights Committee recently held in *Billy et al v. Australia* that the government of Australia had an obligation to pay damages to indigenous Torres Strait islanders due to the State's failure to protect the islanders from harmful effects of climate change, but this was premised on Australia's failure to adapt, rather than loss and damage deriving from Australia's contribution to climate change.[286] If a State's failure to adapt can give rise to a duty to compensate injured parties, then presumably a State's contribution to climate change can also give rise to such a duty.

Loss and damage claims deal specifically with impacts and injuries that have already occurred as a result of climate change, and so attribution science is most relevant to such claims, as it can be used to calculate and attribute certain types of damages to specific sources. Some of the top-level findings from IPCC AR6 with regards to losses and damages are that: (i) human-induced

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[284] At this time, the question of state obligations to provide compensation for climate change-related loss and damage is primarily being addressed through political channels, particularly negotiations under the UNFCCC. In 2022, the UNFCCC COP established a loss and damage fund, providing further legitimacy to the notion that States with greater responsibility for climate change should compensate other States for climate change-related losses and damages. States may also have a legal obligation to provide compensation for climate change-related loss and damage based on principles of human rights law and international environmental law, particularly the obligation to provide restitution for environmental harm caused to another country. *See* Audrey Chapman & A. Karim Ahmend, *Climate Justice, Human Rights, and the Case for Reparations,* 23(2) HEALTH HUM. RIGHTS 81 (2021), https://pubmed.ncbi.nlm.nih.gov/34966227/; Margaretha Wewerinke-Singh, *Remedies for Human Rights Violations Caused by Climate Change*, 9 CLIM. LAW 224 (2019), https://brill.com/view/journals/clla/9/3/article-p224_224.xml.

[285] ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, at ¶ 457(E)4(c). *See also* Maria Antonia Tigre et al., *A Panoply of Consequences? Remedies and Reparations in the ICJ's Climate Opinion,* CLIMATE LAW BLOG (Aug. 13, 2025), https://blogs.law.columbia.edu/climatechange/2025/08/13/a-panoply-of-consequences-remedies-and-reparations-in-the-icjs-climate-opinion/.

[286] *Daniel Billy and others v. Australia*, *supra* note 140 (finding that Australia had violated the rights of indigenous Torres Strait Islanders by failing to take timely and adequate measures to protect them from climate change-related harms, and asking Australia to compensate the islanders for harm suffered and to take measures to secure their safe existence in the future). There are a number of other climate cases where plaintiffs are seeking restitution for losses and damages, but most of these cases involve non-state defendants (e.g., fossil fuel companies). *See, e.g., Lliuya v. RWE*, Az. 2 O 285/15 Essen Regional Court [2015], https://climatecasechart.com/non-us-case/lliuya-v-rwe-ag/; *Asmania et al., v. Holcim* (Switzerland 2022), https://climatecasechart.com/non-us-case/four-islanders-of-pari-v-holcim/.

climate change is already causing losses and damages to nature and people across the planet, (ii) losses and damages are unequally distributed across different countries, (iii) losses and damages will escalate with each increment of warming, (iv) losses and damages will continue to increase even with adaptation.[287] AR6 thus provides general support for the establishment of legal structures to address loss and damage.

As discussed in Part I, researchers have developed techniques for estimating losses and damages at different scales and for attributing those damages to specific States. For example, Callahan & Mankin (2022) provide estimates of each country's responsibility for temperature-driven income changes in all other countries. This type of data could be used to assess loss and damage claims between States. However, it is more difficult to estimate State contributions to climate damages incurred by individual rights-holders and communities. Generally speaking, confidence in attribution tends to be higher when evaluating changes and impacts at larger geographic and temporal scales, and there are additional complexities involved in "downscaling" attribution analyses to the level of an individual or community. At that scale, "there are multiple factors that contribute to a specific loss or damage, and the signal from climate change is more difficult to detect relative to the many other potential influences on hazard occurrence, exposure, and vulnerability."[288] Thus, although it is clear that State-level emissions contribute to local losses and damages from climate change, it may not be possible to assign a monetary value to all or most elements of that contribution, due to uncertainty about the influence of climate change at that scale, and the fact that many types of losses that cannot be readily be translated to a damage value.

Perhaps due to these challenges, the plaintiffs and petitioners in climate damage cases have sought compensation to help cover adaptation costs, in lieu of calculating actual damages attributable to climate change. This has been the approach in lawsuits filed against private companies, primarily fossil fuel companies, seeking to establish liability based on the companies' contributions to climate change.[289] Such lawsuits can be characterized as "loss and damage" claims insofar as they seek compensation from emitters for climate-related injuries (adaptation costs) on the basis of the emitter's contribution to climate change.[290] The advantage of this approach is that

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[287] IPCC AR6 SYN SPM.

[288] James et al. (2018), *supra* note 266, at 115.

[289] *See, e.g.,* Lliuya v. RWE, *supra* note 282; Asmania et al., v. Holcim, *supra* note 282.

[290] Some UN documents define "loss and damage" as the residual losses from climate change that are not avoided through mitigation and adaptation. *See, e.g., Non-economic Losses in the Context of the Work Programme on Loss*

adaptation costs can be more readily calculated based on planned or implemented adaptation measures. As discussed above, State obligations with regards to climate finance, including adaptation finance, are partially rooted in State responsibility for GHG emissions, and thus the provision of funding or resources for adaptation can be viewed as a form of restitution for GHG emissions and the losses and damages attributable to those emissions.

F. Good Governance, Public Participation, Access to Information, and Access to Justice

As discussed above, State obligations to facilitate a just, transparent, equitable, and accountable transition are multifaceted, and encompass obligations related to clean energy deployment, adaptation, and the protection of vulnerable groups, among others.[291] States must also adhere to human rights norms related to good governance, including respect for participatory and procedural rights. Here, we focus on State obligations related to science-based decision-making, environmental impact assessment, public participation, access to information, and access to justice. Our goal is to demonstrate how these obligations can be characterized in a way that will simultaneously promote scientific integrity in government decision-making and also advance goals related to equity, justice, accountability, and transparency.

1. Science-Based Decision-Making and Adaptive Management

Climate change and scientific knowledge of climate change are constantly evolving. Thus, in order to effectively respond to climate change-related risks, government decision-makers and planners will need to frequently re-evaluate many different types of planning and regulatory decisions and adjust course in light of new information. The Court should therefore recognize obligations on the part of States to utilize the "best available science" and incorporate adaptive management procedures into government decision-making. In particular, adaptive management procedures should ensure that government decision-making is an iterative process that incorporates: (i) periodic monitoring and review of climate actions as well as planning decisions that may be affected by climate change; (ii) specific mechanisms for assessing the results and

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and Damage, Technical Paper FCCC/TP/2013/2 (Oct. 9, 2013), https://unfccc.int/resource/docs/2013/tp/02.pdf. Even under this framing, the costs of adaptation would still qualify as loss and damage, since these are residual economic damages that cannot be avoided through mitigation and adaptation. *See also* Maria Antonia Tigre & Margaretha Wewerinke-Singh, *Beyond the North-South Divide: Litigation's Role in Resolving Climate Change Loss and Damage Claims,* REVIEW OF EUROPEAN, COMPARATIVE & INTERNATIONAL ENVIRONMENTAL LAW (2023) (recognizing that the requested remedies in such cases may include compensation for adaptation costs).

[291] Request for Advisory Opinion at ¶ 93(c).

efficacy of government decisions in light of new scientific data; (iii) mechanisms for adjusting course based on such assessments, and (iv) mechanisms for public participation, particularly in regards to the collection of scientific data.[292]

Recognizing State obligations to pursue adaptive management in the context of climate change would be consistent with existing legal authorities, including UNFCCC and Paris Agreement provisions related to stocktaking (which recognize State obligations to periodically re-assess and revise GHG mitigation commitments), as well as more general legal obligations related to monitoring, environmental assessment, and contingency planning.[293]

2. Access to Information and Public Participation

The African Charter and other human rights instruments recognize that access to information and public participation in government decision-making are fundamental human rights.[294] There are several types of information related to climate change that State authorities should be compiling and disclosing in public documents. These include:

- **GHG Emissions Data:** Consistent with the requirements of the Escazú Agreement, other human rights instruments, and UNFCCC instruments, States should prepare and periodically update GHG emissions inventories that provide a detailed account of GHG sources under their jurisdiction. States should also disclose GHG emissions attributable to specific State actions, such as new policies or administrative approvals, and should provide the public with an opportunity to provide feedback on how and whether to proceed with those actions in light of climate change. For example, GHGs should be routinely disclosed as part of existing environmental impact assessment (EIA) procedures. In addition to data on territorial emissions, States should also provide data on extraction-based emissions (i.e., emissions from fossil fuel production, transportation, and processing, even for fuels that are exported to other jurisdictions).[295] To the extent possible, States should also endeavor to provide information on carbon leakage and consumption-based emissions.
- **GHG Mitigation Measures:** States should carefully track their progress on GHG mitigation and periodically publish reports with detailed information about the nature and scope of GHG reduction measures and the effect that those measures are having on actual emissions. Such reports can be coordinated with the UNFCCC stocktaking process for

[292] For example, in the context of river basin management, a government plan could specify thresholds for conservation measures based on monitored flow levels.

[293] *See* ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, at ¶¶ 295-298; IACtHR Advisory Opinion OC-23/17 at § B.1.c (recognizing state obligations to regulate, supervise and monitor, require and approve environmental impact assessments, and prepare contingency plans, as part of broader obligations to prevent environmental harm).

[294] *See* African Charter, Arts. 9, 13.

[295] *See Held v. Montana, supra* note 167 (holding that a state law prohibiting analysis and disclosure of GHG emissions from fossil fuel extraction and other activities violated plaintiffs' right to a clean and healthful environment).

NDCs. The public should also be given an opportunity to review and provide feedback on the efficacy and adequacy of the State's mitigation measures, and that feedback should also be made available to the public along with information about how government decision-makers have incorporated the feedback into climate policies.

- **Climate impact assessments**: States should conduct periodic assessments of climate impacts, exposure, and vulnerability within their territory in order to help inform adaptation planning as well as discussions related to climate finance and loss and damage.[296] Such assessments should be conducted in close coordination with scientists and affected communities, with ample opportunities for public input.
- **Adaptation measures:** States should track their progress on adaptation planning and periodically publish reports with detailed information about the actions that they have undertaken to protect people and ecosystems from the harmful effects of climate change. Again, there should be an opportunity for public review and feedback, and the State should be transparent regarding how it has responded to public feedback.

States should provide ample opportunities for public participation when conducting these activities and in other aspects of decision-making on climate change. Public participation can improve the quality of decision-making because decision-makers have more complete information – e.g., citizens can share local environmental and scientific knowledge to help inform climate impact assessments and adaptation decisions.[297] Public participation mechanisms can also be structured to enhance accountability – e.g., by requiring decision-makers to justify decisions in light of public feedback. Participatory mechanisms thus play an important role in science-based decision-making.

3. Access to Justice

States also have an obligation to guarantee access to justice in relation to their environmental protection obligations, including opportunities to contest actions that violate or could violate obligations under environmental and human rights law.[298] Thus, States must ensure that individuals and communities can use judicial procedures to challenge decisions related to climate policy and actions that violate human rights norms related to climate change. Access to justice is vitally

[296] It is now considered a a requirement under general international law and human rights law to conduct EIA for activities that may have significant transboundary environmental impacts. *See* ICJ, Advisory Opinion of 23 July 2025, *supra* note 140, ¶¶ 295-298; ECtHR, Greenpeace Nordic and Others v. Norway, *supra* note 140.

[297] *See* Victoria Reyes-García, *Local Indicators of Climate Change: The Potential Contribution of Local Knowledge to Climate Research*, 7(1) WILEY INTERDISCIP. REV. CLIM. CHANGE 109 (2016), https://www.ncbi.nlm.nih.gov/pmc/articles/PMC5023048/.

[298] African Charter Art. 7; IACtHR Advisory Opinion OC-32/25, *supra* note 140; IACtHR Advisory Opinion OC-23/17.

important in this context due to the scope and severity of harms attributable to climate change, the inequitable nature of those harms, and the imperative of ensuring human rights for all people – including vulnerable groups and individuals that are disproportionately affected by climate change.[299]

One potential barrier to accessing justice through court systems is that prospective plaintiffs are sometimes denied access to judicial procedures and remedies on the grounds that they lack standing to pursue claims based on climate change-related injuries. For example, courts may determine that plaintiffs cannot establish a particularized injury on the basis of climate change,[300] or that plaintiffs cannot establish a sufficient causal nexus between emissions and specific climate change-related injuries.[301] Such dismissals often occur before a full trial or investigation of facts.

In order to guarantee access to justice in the context of climate change, States should ensure that judicial procedures allow plaintiffs adequate opportunities to present scientific evidence in support of standing claims.[302] Some jurisdictions recognize that organizations and groups may file lawsuits on behalf of the public interest, in which case standing can be established based on public harm or endangerment.[303] In other cases, plaintiffs may need to demonstrate that they have

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[299] *See, e.g.,* Muhammed Tawfiq Ladan & Nkiruka Chidia Maduekwe, *A human rights approach to environmental protection (HRAEP) as a tool for fostering climate resilience for the Nigerian woman*, in CLIMATE LITIGATION AND VULNERABILITIES (Maria Antonia Tigre et al., eds. 2025), *supra* note 1.

[300] *See, e.g., Verein KlimaSeniorinnen Schweiz v. Bundesrat*, No. A-2992/2017, https://climatecasechart.com/non-us-case/union-of-swiss-senior-women-for-climate-protection-v-swiss-federal-parliament/; *Armando Ferrão Carvalho and Others v. The European Parliament and the Council,* No. T-330/18, https://climatecasechart.com/non-us-case/armando-ferrao-carvalho-and-others-v-the-european-parliament-and-the-council/; *Citizens' Committee on the Kobe Coal-Fired Power Plant v. Japan* (2018), https://climatecasechart.com/non-us-case/citizens-committee-on-the-kobe-coal-fired-power-plant-v-kobe-steel-ltd-et-al/.

[301] *See, e.g., Washington Environmental Council v. Bellon*, 732 F.3d 1131 (9th Cir. 2013), https://climatecasechart.com/case/washington-environmental-council-v-bellon/; *Native Village of Kivalina v. ExxonMobil Corp.*, 663 F.Supp.2d 863 (N.D. Cal. 2009), https://climatecasechart.com/case/native-village-of-kivalina-v-exxonmobil-corp/.

[302] The IACtHR provided a more comprehensive overview of what the right of access to justice should entail in its advisory opinion on climate change. *See* IACtHR Advisory Opinion OC-32/25, *supra* note 140, § VI(C)(5). The IACtHR emphasized that "procedural rules must not unjustifiably prevent or hinder a court from hearing and ruling on the claims submitted to it in accordance with the law" and thus "judicial bodies must interpret and apply the relevant rules in such a way as to effectively guarantee access to substantive justice for those who require it in the context of the climate emergency." *Id.* at ¶ 543.

[303] *See, e.g., Urgenda v. Netherlands, supra* note 134 (recognizing that non-governmental organizations have standing to sue on behalf of the public interest). *See also Nuestros Derechos al Futuro y Media Ambiente Sano et al., v. Mexico*, Amparo No. 204/2021 (First Circuit Collegiate Tribunal, April 7, 2021), https://climatecasechart.com/non-us-case/nuestros-derechos-al-futuro-y-medio-ambiente-sano-et-al-v-mexico-unconstitutionality-of-the-reform-to-the-electric-industry-law/ (recognizing that non-governmental organizations have legal standing to file amparo lawsuits (constitutional challenges) to defend the right to a healthy environment). *Cf. Julia Habana et al. v. Mexico* (Unconstitutionality of the reform to the Electricity Industry Law*),* Amparo No. 210/2021 (Supreme Court of Mexico Dec. 7, 2022), https://climatecasechart.com/non-us-case/julia-habana-et-al-v-mexico-unconstitutionality-of-the-

experienced a particularized injury (or risk of injury) due to the defendant's conduct or inaction in order to have standing to sue.[304] In such cases, questions of injury and causation are closely intertwined with the merits of the case, such that it may be prudent for courts to evaluate both issues in the same factual investigation. The UN Human Rights Committee recently recognized this very point when it affirmed the admissibility of the Torres Strait islanders' claims in *Daniel Billy et al. v. Australia,* where it noted that "whether the authors' Covenant rights were breached cannot be dissociated from the merits of the case").[305]

There are also a number of other regional and domestic cases in which courts have found that plaintiffs have standing to bring rights-based claims on the basis of their unique climate change-related injuries.[306] For example, in two recent decisions, the ECtHR held that organizations representing vulnerable individuals (e.g., elderly women and children) had standing to pursue climate-related claims.[307] These decisions can be contrasted to a 2021 judgment from the European Court of Justice (ECJ) holding that individuals lack standing to challenge European Union climate policies of general application on the basis of climate-related injuries because climate change affects all individuals in one manner or another.[308] If the ECJ's reasoning were extended to other legal systems and rights-based claims, it would preclude essentially all individuals from enforcing fundamental rights in the context of climate change. Thus, the approach taken by the UN Human Rights Committee and other courts is more consistent with human rights law and State obligations to ensure access to justice.

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reform-to-the-electricity-industry-law/ (to have standing, individual plaintiffs must show that they have a personal, qualified, current, real and legally relevant interest in the case); *Jóvenes v. Gobierno de México,* Amparo No. 1854/2019 (District Court on Administrative Matters, May 20, 2021), https://climatecasechart.com/non-us-case/youth-v-government-of-mexico/ (to have standing, individual plaintiffs must establish that they are in a situation that differentiates them from the rest of society).

[304] *See, e.g., Jóvenes v. Gobierno de México, supra* note 300; Julia Habana et al. v. Mexico, *supra* note 300.

[305] *Daniel Billy et al. v. Others, supra* note 140, at para 7.3

[306] *See, e.g., Held v. Montana, supra* note 167; *Future Generations v. Ministry of* Environment (Colombia)*, supra* note 140.

[307] ECtHR, Verein KlimaSeniorinnen Schweiz and Others v. Switzerland, *supra* note 140; ECtHR, Greenpeace Nordic and Others v. Norway, *supra* note 140. The ECTHR specifically noted that the applicant organizations must demonstrative that their members are "subject to specific threats or adverse effects of climate change on their lives, health, or well-being" to have standing to bring climate-related claims. *See* Greenpeace Nordic and Others, ¶ 288.

[308] *Armando Ferrão Carvalho and Others v. The European Parliament and the Council*, *supra* note 300.

Conclusion

As detailed above, the scientific evidence shows that climate change poses a real and pervasive threat to a broad array of human rights, and that States must undertake ambitious mitigation and adaptation measures in order to prevent and mitigate harm to people and ecosystems. Scientific research can also be used to assess the relative responsibility of different States for climate change and attributable harms, thus informing legal determinations on States' differentiated responsibilities with respect to climate change mitigation, climate finance, and loss and damage. Climate science thus provides evidentiary support for recognizing and characterizing a wide array of State obligations related to the protection of human rights in the context of climate change.

Appendix: List of Attachments

Attachment 1: KATELYN HORNE, MARIA ANTONIA TIGRE, & MICHAEL GERRARD, STATUS REPORT ON PRINCIPLES OF INTERNATIONAL AND HUMAN RIGHTS LAW RELEVANT TO CLIMATE CHANGE (Sabin Center for Climate Change Law, 2023)

Attachment 2: MARIA ANTONIA TIGRE & MARGARET BARRY, CLIMATE LITIGATION REPORT 2025 - CLIMATE CHANGE IN THE COURTROOM: TRENDS, IMPACTS AND EMERGING LESSONS (Sabin Center for Climate Change Law, Columbia Law School & United Nations Environment Programme, 2025)

Attachment 3: Michael Burger, Jessica Wentz, & Radley Horton, *The Law and Science of Climate Change Attribution,* 45(1) COLUM. J. ENVTL. L. 57 (2020)

Attachment 4: JESSICA WENTZ, CLIMATE CHANGE AND HUMAN HEALTH: A SYNTHESIS OF SCIENTIFIC RESEARCH AND STATE OBLIGATIONS UNDER INTERNATIONAL LAW (Sabin Center for Climate Change Law, 2024)

Attachment 5: YOUBA SOKONA ET AL., JUST TRANSITION: A CLIMATE, ENERGY AND DEVELOPMENT VISION FOR AFRICA, A report by the Independent Expert Group on Just Transition and Development (2023)

Attachment 6: THE RENEWABLE ENERGY TRANSITION IN AFRICA (IRENA 2021)

Attachment 7: WMO, STATE OF THE CLIMATE IN AFRICA 2024, WMO No. 1370 (2025)