
ANNEX B-1

**OFFICE OF THE UNITED NATIONS
HIGH COMMISSIONER FOR HUMAN RIGHTS**

SPECIAL PROCEDURES OF THE UNITED NATIONS HUMAN RIGHTS COUNCIL



The Effects of Climate Change on the Full Enjoyment of Human Rights

The United Nations Special Rapporteurs on the rights of persons with disabilities, Ms. Catalina Devandas Aguilar; the issue of human rights obligations relating to the enjoyment of a safe, clean, healthy, and sustainable environment, Mr. John H. Knox; extreme poverty and human rights, Mr. Philip Alston; the human right to safe drinking water and sanitation, Mr. Léo Heller; and the Independent Expert on human rights and international solidarity, Ms. Virginia Dandan

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This paper is provided to the Climate Vulnerable Forum in response to the invitation of its chair, the Philippines, to provide input on the potential implications for human rights endangerment of the current 2.0° C goal, and the difference between a 2.0° goal and a 1.5° C goal with respect to outcomes for human rights.

I. Introduction

1. It is now well understood that climate change can and does adversely affect the enjoyment of a broad range of human rights. The United Nations Human Rights Council has stated that “climate change poses an immediate and far-reaching threat to people and communities around the world and has adverse implications for the full enjoyment of human rights.”¹ In October 2014, 27 special rapporteurs and other independent experts issued a joint letter on the implications of climate change for human rights, which stated in part:

A safe, clean, healthy and sustainable environment is indispensable to the full enjoyment of human rights, including rights to life, health, food, water and housing, among many others.... The most recent report of the Intergovernmental Panel on Climate Change (IPCC) brings into sharp focus the grave harm that climate change is already causing, and will continue to cause, to the environment on which we all depend. There can no longer be any doubt that climate change interferes with the enjoyment of human rights recognised and protected by international law.²

2. On the most recent Human Rights Day, 10 December 2014, all of the UN human rights special mandate holders came together to issue a joint statement on climate change and human rights, which stated:

Climate change is one of the greatest challenges of our generation with consequences that transform life on earth and adversely impact the livelihood of many people. It poses great risks and threats to the environment, human health, accessibility and inclusion, access to water, sanitation and food, security, and economic and social development. These impacts of climate change interfere with the effective enjoyment of human rights. In particular, climate change has a disproportionate effect on many disadvantaged, marginalized, excluded and vulnerable individuals and groups, including those whose ways of life are inextricably linked to the environment.³

3. The following sections describe the effects of climate change on particular human rights and on the human rights of those in particularly vulnerable situations. It draws on the Fifth Assessment Report (AR5) of the Intergovernmental Panel on Climate Change (IPCC) to explain how the effects of increasing climate change will increase and exacerbate interference with human rights. It also draws on reports of UN human rights mandate holders relating to the

¹ Human Rights Council resolution 18/22.

² *A new climate change agreement must include human rights protections for all* (27 October 2014), <http://srenvironment.org/wp-content/uploads/2014/10/Letter-to-UNFCCC-FINAL.pdf>.

³ Statement of the UN Special Procedures Mandate Holders on the occasion of Human Rights Day (10 December 2014), <http://www.ohchr.org/EN/NewsEvents/Pages/DisplayNews.aspx?NewsID=15393&LangID=E>.

effects of climate change on rights within their purview, most of which predate the IPCC AR5 report, as well as the 2009 report of the Office of the High Commissioner for Human Rights (OHCHR) on the effects of climate change on human rights, which drew primarily on the Fourth Assessment Report.⁴

4. Based on these sources, the general conclusion remains the same as that of the 2009 OHCHR report: “an increase in global average temperatures of approximately 2° C will have major, and predominantly negative, effects on ecosystems across the globe, on the goods and services they provide,” with concomitant effects on the full enjoyment of a wide range of human rights.⁵ Many of these sources do not focus explicitly on the incremental effect of an additional 0.5° C increase in average global temperature, making it difficult to delineate precisely how such an increase would interfere with the enjoyment of each affected human right. Nevertheless, IPCC AR5 makes clear that:

Increasing magnitudes of warming increase the likelihood of severe, pervasive, and irreversible impacts. Some risks of climate change are considerable at 1°C or 2°C above preindustrial levels.... The precise levels of climate change sufficient to trigger tipping points (thresholds for abrupt and irreversible change) remain uncertain, but the risk associated with crossing multiple tipping points in the earth system or in interlinked human and natural systems increases with rising temperature (*medium confidence*).⁶

Such incremental increases in impacts and risks adversely affect the full enjoyment of a wide range of human rights, and make it correspondingly more difficult for States to fulfill their obligations under international law to respect, protect and promote human rights.

5. The following sections describe the effects of climate change on the enjoyment of human rights: (a) to life; (b) to the highest attainable standard of physical and mental health; (c) to adequate food; (d) to water and sanitation; (e) to adequate housing; (f) to self-determination; and (g) of those particularly vulnerable, including (1) women; (2) children; (3) persons with disabilities; (4) those living in extreme poverty; (5) indigenous peoples; and (6) displaced persons. It is important to emphasize that the following description of the effects on these rights and those in vulnerable situations is not exhaustive. Instead, this paper is intended to illustrate the range of such effects.

A. Right to Life

6. Article 3 of the Universal Declaration of Human Rights states that everyone has the right to life, and Article 6 of the International Covenant for Civil and Political Rights (ICCPR) states that “Every human being has the inherent right to life. This right shall be protected by law. No one shall be arbitrarily deprived of his life.”

7. As the 2009 OHCHR report notes, the Human Rights Committee, the body of independent experts appointed to review compliance with the ICCPR, has described the right to

⁴ Report of the Office of the United Nations High Commissioner for Human Rights on the relationship between climate change and human rights, A/HRC/10/61 (15 January 2009).

⁵ *Ibid.* ¶ 16.

⁶ IPCC AR5, Technical Summary, p. 62.

life as the “supreme right”, a right from which no derogation is permitted even in time of public emergency. “Moreover, the Committee has clarified that the right to life imposes an obligation on States to take positive measures for its protection, including taking measures to reduce infant mortality, malnutrition and epidemics.”⁷

8. Climate change will have many direct and indirect effects on the full enjoyment of the right to life. The 2009 report states:

IPCC AR4 projects with high confidence an increase in people suffering from death, disease and injury from heatwaves, floods, storms, fires and droughts. Equally, climate change will affect the right to life through an increase in hunger and malnutrition and related disorders impacting on child growth and development; cardiorespiratory morbidity and mortality related to ground-level ozone. Climate change will exacerbate weather-related disasters which already have devastating effects on people and their enjoyment of the right to life, particularly in the developing world. For example, an estimated 262 million people were affected by climate disasters annually from 2000 to 2004, of whom over 98 per cent live in developing countries. Tropical cyclone hazards, affecting approximately 120 million people annually, killed an estimated 250,000 people from 1980 to 2000.⁸

9. IPCC AR 5 provides more information about these types of effects. For example, it states that increased malnutrition from decreased food production will lead to increased risks of mortality, particularly in sub-Saharan Africa and south Asia.⁹ The rise in extreme weather-related events due to climate change, such as increased precipitation and flooding, contribute to an oral-faecal contamination pathway in water sources that is difficult to manage and that increases the number of cases of disease and fatalities.¹⁰ In addition, IPCC AR5 has determined with high confidence that climate change since the middle of the 20th century has already resulted in an increase in warm temperature extremes,¹¹ which has in turn likely resulted in an increase in a number of heat-related deaths.¹² Studies have found that the mortality rate from extreme heat events outweigh the gains from less cold days, and in this respect AR5 concludes that “the increase in heat-related mortality by mid-century will outweigh gains due to fewer cold periods, especially in tropical developing countries with limited adaptive capacities and large exposed populations,” as well as in temperate zones.¹³

B. Right to Health

10. Article 12 of the International Covenant on Economic, Social and Cultural Rights (ICESCR) recognizes “the right of everyone to the enjoyment of the highest attainable standard of physical and mental health,” and states that the steps to be taken by the States Parties to achieve the full realization of the right shall include those necessary for the “improvement of all

⁷ 2009 OHCHR report, ¶ 21 (citing Human Rights Committee General Comments 6 and 14).

⁸ Ibid. ¶¶ 22, 23 (footnotes omitted).

⁹ AR5, WGII Report, p. 1056.

¹⁰ World Health Organization and World Meteorological Organization, *Atlas of Health and Climate*, 2012, p. 12, http://www.who.int/iris/bitstream/10665/76224/5/9789241564526_eng.pdf.

¹¹ AR5, WGI Report, p. 209.

¹² AR5, WGII Report, p. 720.

¹³ Ibid. p. 721.

aspects of environmental and industrial hygiene.” The expert committee tasked with overseeing the Covenant has stated that the right to health extends to “the underlying determinants of health, such as access to safe and potable water and adequate sanitation, an adequate supply of safe food, nutrition and housing, healthy occupational and environmental conditions, and access to health-related education and information, including on sexual and reproductive health.”¹⁴

11. The effects of climate change on the full enjoyment of the right to health will be profound. IPCC AR5 states that “climate change may affect the future social and environmental determinants of health, including clean air, safe drinking water, sufficient food, and secure shelter.”¹⁵ It states with high confidence that “throughout the 21st century, climate change is expected to lead to increases in ill-health in many regions and especially in developing countries with low income, as compared to a baseline without climate change.”¹⁶ According to AR5, examples include:

greater likelihood of injury, disease, and death due to more intense heat waves and fires (*very high confidence*); increased likelihood of under-nutrition resulting from diminished food production in poor regions (*high confidence*); risks from lost work capacity and reduced labor productivity in vulnerable populations; and increased risks from food- and water-borne diseases (*very high confidence*) and vector-borne diseases (*medium confidence*).¹⁷

12. One of the main impacts on human health from climate change will result from malnutrition due to decreased food production. For example, one study that modeled the effect of climate change on future under-nutrition in five regions in South Asia and sub-Saharan Africa in 2050 using the Special Report on Emissions Scenarios (SRES) A2 (this translates into a temperature increase of 2°C-5.4°C temperature change in the period from 2090-2099)¹⁸ suggests “an increase in moderate nutritional stunting, an indicator linked to increased risk of death and poor health, of 1 to 29%, depending of the region assessed, compared to a future without climate change, and a much greater impact on severe stunting for particular regions, such as 23% for central sub-Saharan Africa and 62% for south Asia.”¹⁹

13. Climate change will also likely result in significant loss of biodiversity, which has severe consequences for a wide-range of ecosystem services that assist in the promotion of the right to health and other human rights, such as food and water, as well as the rights of indigenous peoples to their natural resources and traditional way of life. For example, one study found that approximately “20 to 30% of plant and animal species assessed so far (in an unbiased sample) are likely to be at increasingly high risk of extinction as global mean temperatures exceed a warming of 2 to 3°C above preindustrial levels (medium confidence).”²⁰ Another study of 50,000 species at a global level has found that with an increase of 3.5°C from preindustrial levels “the range sizes of 57 ± 6% of widespread and common plants and 34 ± 7% of widespread and

¹⁴ Committee on Economic, Social and Cultural Rights, General Comment 14, ¶ 11.

¹⁵ AR5, WGII Report, p. 556.

¹⁶ AR5, WGII Summary for Policy Makers, p. 19; AR5 WGII Report, p. 713.

¹⁷ AR5, WGII Summary for Policy Makers, pp. 19-20.

¹⁸ See IPCC, https://www.ipcc.ch/publications_and_data/ar4/wg1/en/spmsspmp-projections-of.html.

¹⁹ AR5, WGII Report, p. 1056 (internal citations omitted).

²⁰ *Ibid.* 1053 (internal citation omitted).

common animals are projected to decline by more than 50% by the 2080s.”²¹ With respect to the right to health, for example, IPCC WGII explains that biodiversity loss “can lead to an increase in the transmission of infectious diseases such as Lyme, schistosomiasis, and hantavirus in humans.”²²

14. The Special Rapporteur on the right to health, Anand Grover, has also linked the impacts of climate change to the right to health, stating: “Those living in poverty are disproportionately affected by the adverse effects of global warming. Not only has global warming led to a decline in dependable access to water, it has also led to a disruption in natural ecosystems.”²³ He added, “Warmer and wetter conditions resulting from climate change are increasing the range and season of vectors, such as mosquitoes and tsetse flies, which spread diseases such as malaria, dengue and yellow fever, and encephalitis.”²⁴

15. Grover has also stated that increased flooding and droughts from climate change also pose a threat to the right to health. He explained that: “As clean water sources evaporate, people resort to more polluted alternatives that may lead to epidemics of water-borne diseases. Likewise, floods not only increase the risk of drowning and destroying crops, they also spread disease by extending the range of vectors and by washing agricultural pollutants into drinking water supplies.”²⁵

C. Right to Food

16. Article 11(1) of the ICESCR provides that “States Parties to the present Covenant recognize the right of everyone to an adequate standard of living for himself and his family, including adequate food.”

17. “All aspects of food security are potentially affected by climate change, including food access, utilization, and price stability.”²⁶ According to the IPCC AR5, at medium confidence, “for the major crops (wheat, rice, and maize) in tropical and temperate regions, climate change without adaptation will negatively impact production for local temperature increases of 2°C or more above late-20th-century levels, although individual locations may benefit.”²⁷ After 2050, the risks of more severe impacts increase.²⁸ Global temperature increases of 4°C or more above late-20th-century levels, combined with increasing food demand, would pose large risks to food security globally and regionally.²⁹

18. South Asia and southern Africa are two regions that are most at risk from the effects of climate change in the absence of adaptation, with one study finding an expected 8% negative

²¹ *Ibid.*

²² *Ibid.* p. 1054.

²³ Report of the Special Rapporteur on the right of everyone to the enjoyment of the highest attainable standard of physical and mental health, 8 August 2007, U.N. Doc. A/62/214, ¶ 100.

²⁴ *Ibid.*

²⁵ *Ibid.* ¶ 101.

²⁶ AR5, WGII Report, p. 488.

²⁷ *Ibid.*, p. 489.

²⁸ *Ibid.*

²⁹ *Ibid.* p. 488.

yield impact in both regions by 2050 averaged over crops, with wheat, maize, sorghum, and millets more affected than rice, cassava, and sugarcane.³⁰ For example, one study found “the impact of climate-induced drought and precipitation changes in Mali include the southward movement of drought-prone areas which would result in a loss of critical agriculturally productive land by 2025 and increase food insecurity.”³¹

19. Moreover, climate impacts on biodiversity can also negatively affect the right to food. AR5 provides a number of examples of projected yield losses in the agricultural sector due to increased prevalence of pest species under climate change.³² AR5 also notes that climate change “has caused, or is projected to cause, range expansion in weeds that have the potential to become invasive” and which can damage agriculture.”³³

20. The former Special Rapporteur on the right to food, Olivier de Schutter, reviewed various impacts of climate change on the enjoyment of the right to food. For example, he noted that “climate change, which translates in more frequent and extreme weather events, such as droughts and floods and less predictable rainfall, is already having a severe impact on the ability of certain regions and communities to feed themselves.”³⁴ He warned that an estimated 600 million people could be at a risk of hunger by 2080 as a direct result of climate change.³⁵

21. De Schutter explained that climate change will have an impact on agricultural production. The change in climate is predicted to prevent entire regions from maintaining their levels of agricultural production due to rainfall decline. He further noted that “[l]ess fresh water will be available for agricultural production, and the rise in sea level is already causing the salinization of water in certain coastal areas, making water sources improper for irrigation purposes.”³⁶ De Schutter stated that agricultural production is expected to decline worldwide at least 3% by the 2080s, and could decline “up to 16% if the anticipated carbon fertilization effects (incorporation of carbon dioxide in the process of photosynthesis) fail to materialize.”³⁷ Sub-Saharan Africa will be particularly impacted. According to the Special Rapporteur, in “Sub-Saharan Africa, arid and semi-arid areas are projected to increase by 60 million to 90 million hectares, while in Southern Africa, it is estimated that yields from rain-fed agriculture could be reduced by up to 50

³⁰ Ibid. p.505.

³¹ Ibid. 1056 (internal citation omitted).

³² Ibid. p. 1054.

³³ Ibid.

³⁴ Report submitted by the Special Rapporteur on the right to food, Olivier De Schutter, 20 December 2010, U.N. Doc. A/HRC/16/49, ¶ 9.

³⁵ Ibid.

³⁶ Ibid.

³⁷ Ibid; see also Report of the Special Rapporteur on the right to food, Olivier De Schutter, Addendum, Large-scale land acquisitions and leases: A set of minimum principles and measures to address the human rights challenge, 28 December 2009, U.N. Doc. A/HRC/13/33/Add.2, ¶ 21 (“Assuming a 4.4° C increase in temperature and a 2.9 per cent increase in precipitation, it has been estimated that by 2080, global agricultural output potential is likely to decrease by about 6 per cent (or 16 per cent without carbon fertilization, the impacts of which are disputed). The decline will vary between 10 and 25 per cent across regions, but it is projected that by 2080, agricultural output potential may be reduced by up to 60 per cent for several African countries, and on average 16 to 27 per cent for others in Africa, dependent upon the effect of carbon fertilization” (internal citation omitted)).

per cent between 2000 and 2020.”³⁸ He further cautioned that water shortages represent a threat “for agriculture, particularly in sub-Saharan Africa, Eastern Asia and South Asia, where climate change will affect rain, increase the frequency of droughts, raise average temperatures, and threaten the availability of fresh water for farming.”³⁹

22. The former Special Rapporteur also noted the impacts from climate change on fisheries. He explained that the many direct threats to the sustainability of fish production systems are magnified by the impacts of climate change.⁴⁰ The rise in ocean temperatures threatens many calcifying organisms, including mollusks, plankton, and the coral reefs. This reduces dependent fish populations and is exacerbated by unsustainable fishing practices. Warmer sea temperatures may also lead to increased outbreaks of algal blooms, which can have a devastating impact on fish populations. As de Schutter explained, warming oceans cause marine species to move to “colder waters, which includes shifting their latitudinal range or moving to greater depths. Some fish will gradually move away from rich tropical waters, resulting in localized extinctions and the invasion of some species into waters where they were previously not found.”⁴¹

23. De Schutter also mentioned the potential impacts of climate change during some country visits. For example, in his visit to Cameroon, he observed that coastal regions and the Sahel regions in the North are particularly hard hit by climate change.⁴² In his report on Canada, he noted impacts of climate change on migratory patterns of animals and on the mobility of those hunting them, which had an effect on access to traditional food supplies of indigenous populations.⁴³

24. In his report on China, he noted that climate change may cause agricultural productivity to drop 5-10% by 2030 (in the absence of any mitigation actions), which would principally affect wheat, rice, and maize.⁴⁴ He stated:

Already today, droughts affect between 200 million and 600 million mu of farmland in China every year. Indeed, while the Special Rapporteur was on mission in China, an unprecedented drought developed, affecting 35.1 per cent of wheat crops (to be harvested in June 2011) on a surface of 96.11 million mu (6.4 million hectares). This represents 21.7 per cent of total farmland in the eight provinces concerned, including Shandong, Jiangsu,

³⁸ Report submitted by the Special Rapporteur on the right to food, Olivier De Schutter, 20 December 2010, U.N. Doc. A/HRC/16/49, ¶ 9.

³⁹ Report of the Special Rapporteur on the right to food, Olivier De Schutter, Building resilience: a human rights framework for world food and nutrition security, 8 September 2008, U.N. Doc. A/HRC/9/23, Annex II, ¶ 11.

⁴⁰ Interim report of the Special Rapporteur on the right to food, August 2012, U.N. Doc. A/67/268, ¶ 16.

⁴¹ *Ibid.*

⁴² Report of the Special Rapporteur on the right to food, Olivier De Schutter, Addendum, Mission to Cameroon, 18 December 2012, U.N. Doc. A/HRC/22/50/Add.2, ¶ 54.

⁴³ Report of the Special Rapporteur on the right to food, Olivier De Schutter, Addendum, Mission to Canada, 24 December 2012, U.N. Doc. A/HRC/22/50/Add., ¶ 64.

⁴⁴ Report of the Special Rapporteur on the right to food, Olivier De Schutter, Addendum, Mission to China, 20 January 2012, U.N. Doc. A/HRC/19/59/Add.1, ¶ 24.

Henan, Hebei and Shanxi, which together account for more than 80 per cent of the wheat production of China.⁴⁵

25. In his report on Syria, the former Special Rapporteur discussed the severe droughts that have resulted from climate changes in the region.⁴⁶ He stated that the “effects of climate change in the country are already evident from the cycles of drought, which have shortened from a cycle of 55 years in the past to the current cycle of seven or eight years.”⁴⁷ Syria suffered four consecutive droughts between 2006 and 2011, which have caused significant losses of crops in the drought zones.⁴⁸ The crop failures led to difficulties in feeding animals, which led farmers to, among other things, slaughter their livestock.⁴⁹ The inability for farmers to sustain their livelihood from crops and livestock led to various human rights impacts. He stated:

The impact of successive droughts has been dramatic for both small-scale farmers and herders. In the affected regions, the income of these groups dropped by as much as 90 per cent. Many families were forced to reduce food intake: 80 per cent of those affected were reported to live on bread and sugared tea. Families sold productive assets, reducing their ability to restore their livelihoods in the future. Children were removed from schools because education became unaffordable and because their work was needed by the family as a source of revenue.⁵⁰

D. Right to Water and Sanitation

26. The right to water and sanitation falls within the rights indispensable for the realization of the right to an adequate standard of living under Article 11 of the ICESCR.⁵¹

27. The 2009 OHCHR report, drawing on IPCC AR4, described a range of effects of climate change on the enjoyment of the right to water. It stated:

Loss of glaciers and reductions in snow cover are projected to increase and to negatively affect water availability for more than one-sixth of the world’s population supplied by meltwater from mountain ranges. Weather extremes, such as drought and flooding, will also impact on water supplies. Climate change will thus exacerbate existing stresses on water resources and compound the problem of access to safe drinking water, currently denied to an estimated 1.1 billion people globally and a major cause of morbidity and disease. In this regard, climate change interacts with a range of other causes of water stress, such as

⁴⁵ Ibid.

⁴⁶ See Report of the Special Rapporteur on the right to food, Olivier De Schutter, Addendum, Mission to the Syrian Arab Republic, 27 January 2011, U.N. Doc. A/HRC/16/49/Add.2, ¶ 21.

⁴⁷ Ibid.

⁴⁸ Ibid. ¶ 11.

⁴⁹ Ibid. ¶ 12.

⁵⁰ Ibid. ¶ 13.

⁵¹ Committee on Economic, Social and Cultural Rights, General Comment No. 15 (2002) on the right to water (arts. 11 and 12), ¶ 2, and Statement on the Right to Sanitation, E/C.12/2010/1.

population growth, environmental degradation, poor water management, poverty and inequality.⁵²

28. IPCC AR5 predicts with high confidence a very high risk at a 2°C temperature increase for “reduced access to water for rural and urban poor people due to water scarcity and increasing competition for water” from 2080-2100.⁵³ A 2°C increase is also projected to reduce renewable water resources significantly in most dry subtropical regions.⁵⁴ Moreover, about 8% of the global population would see a severe reduction in water resources with a 1°C rise in global mean temperature (compared to the 1990s), rising to 14% at 2°C and 17% at 3°C.⁵⁵ A decrease in surface water availability can also have a negative impact on groundwater resources. According to one study, the incremental increase in temperature rise between 0°C and 3°C correlates to an increased depletion of groundwater resources and “for each degree of global mean temperature rise, an additional 4% of the global land area is projected to suffer a groundwater resources decrease of more than 30%, and an additional 1% to suffer a decrease of more than 70%.”⁵⁶

29. Climate change will also have impacts on sewage systems, particularly in urban areas. For example, one study has found that a projected increase of 10% to 60% in short-duration rainfall events up to 2100 may have significant impacts on urban drainage systems, and in particular more problems with sewer sub-charging, sewer flooding, and more frequent combined sewer overflow spills.⁵⁷

30. The former Special Rapporteur on the human right to safe drinking water and sanitation, Catarina de Albuquerque, endorsed the contents of a position paper on climate change and the human right to water and sanitation, which concluded that climate change is an obstacle to the realization of the right.⁵⁸ In particular, the paper states that climate change has a number of deleterious effects on humans and their environmental surroundings because of its impact on water resources. According to the paper:

Water is a key medium through which climate change impacts upon human populations and ecosystems, particularly due to predicted changes in water quality and quantity. The impacts of climate change need to be seen in light of its direct effects on water resources as well as its indirect influence on other

⁵² 2009 OHCHR report, ¶ 29 (citations omitted).

⁵³ AR5, WGII Report, p. 811.

⁵⁴ Ibid. p. 256.

⁵⁵ Ibid. p.250.

⁵⁶ Ibid. p. 251 (citing Portmann, F.T., P. Döll, S. Eisner, and M. Flörke, 2013: Impact of climate change on renewable groundwater resources: assessing the benefits of avoided greenhouse gas emissions using selected CMIP5 climate projections. *Environmental Research Letters*, 8(2), 024023, doi:10.1088/1748-9326/8/2/024023).

⁵⁷ Ibid. p. 556 (citing Willems, P., J. Olsson, K. Arnbjerg-Nielsen, S. Beecham, A. Pathirana, I.B. Gregersen, H. Madsen, and V.T.V. Nguyen, 2012: *Impacts of Climate Change on Rainfall Extremes and Urban Drainage Systems*. International Water Association (IWA) Publishing, London).

⁵⁸ *Climate Change and the Human Rights to Water and Sanitation, Position Paper* (undated), available at http://www.ohchr.org/Documents/Issues/Water/Climate_Change_Right_Water_Sanitation.pdf.

external drivers of change, in particular increasing population pressures and changing consumption patterns.⁵⁹

31. The paper also asserts that it has become clear that “climate change will increase water stress in already dry areas, and will undermine water quality in areas flooded either by rain or by sea water. Areas particularly sensitive to climate change are coastal zones and cities, estuaries and deltas, watersheds, mountains, small islands and arid regions.”⁶⁰ Moreover, the paper predicts that “the overall availability of water will be seriously impacted by climate change mainly through drought, the decline in water supplies stored in glaciers and snow cover, and flooding.”⁶¹ In already arid areas, climate models predict a major decrease in water availability due to climate change.⁶²

32. Furthermore, the paper ties climate change to increasing rates of water pollution and salinization, and this decline in water quality will reduce the availability of potable drinking water. It specifies that “[i]ncreasing water temperatures, higher or lower groundwater levels, floods and droughts raise the threat of heightened micro-organisms, chemical substances and radiological hazards in drinking water,” and that “[f]loods and droughts will exacerbate many forms of water pollution such as sediments, nutrients, organic carbon, pathogens and pesticides, and may distribute human excreta and its attendant health risks across entire neighbourhoods and communities.”⁶³ Moreover, sea-level rise will lead to increased salinization of groundwater.⁶⁴

33. In general, although the paper acknowledges that meeting a human right to water and sanitation is a function of power, poverty, and inequality, and a failure of governments to prioritize water allocation, it nevertheless concludes that “the goal of improved safe access to drinking water will certainly be much harder to achieve in regions where runoff and groundwater recharge decrease as a result of climate change.”⁶⁵

E. Right to Housing

34. The right to housing is an element of the right to an adequate standard of living under Article 11 of the ICESCR. The Committee on Economic, Social and Cultural Rights has defined the main elements of the right to housing to include legal security of tenure; availability of services, materials, facilities and infrastructure; affordability; habitability; accessibility; location; and cultural adequacy.⁶⁶

35. According to the 2009 OHCHR climate change report, human rights guarantees in the context of climate change include:

⁵⁹ Ibid. p. 2.

⁶⁰ Ibid. p. 16.

⁶¹ Ibid. p. 18.

⁶² Ibid.

⁶³ Ibid. pp. 20-21.

⁶⁴ Ibid. p. 21.

⁶⁵ Ibid. pp. 20-21.

⁶⁶ Committee on Economic, Social and Cultural Rights, General Comment 4 (1991), ¶ 8.

(a) adequate protection of housing from weather hazards (habitability of housing); (b) access to housing away from hazardous zones; (c) access to shelter and disaster preparedness in cases of displacement caused by extreme weather events; (d) protection of communities that are relocated away from hazardous zones, including protection against forced evictions without appropriate forms of legal or other protection, including adequate consultation with affected persons.⁶⁷

36. Absent adaptation, there are significant risks to human settlements from coastal impacts from climate change, including exposure to sea level rise or extreme water levels or on the physical impacts of flooding, submergence, and erosion.⁶⁸ The new IPCC estimates for global mean sea level rise are for between 26 and 98 cm by 2100; this is higher than the 18 to 59 cm projected in AR4.⁶⁹ One study estimates that without adaption measures, “72 to 187 million people would be displaced due to land loss due to submergence and erosion by 2100 assuming [sea level rise] of 0.5 to 2.0 m by 2100. Upgrading coastal defenses and nourishing beaches would reduce these impacts roughly by three orders of magnitude.”⁷⁰ Another study has estimated that the “number of people flooded annually in 2100 to reach 117 to 262 million per year in 2100 without upgrading protection and two orders of magnitude smaller with dike (levee) upgrades, given [sea level rise] of 0.6 to 1.3 m by 2100.”⁷¹

37. AR5 has also predicted with high confidence that there will be a high degree of risk associated with urban housing with a 2°C rise by 2080-2100, as poor quality and inappropriately located urban housing is often most vulnerable to extreme events.⁷² Lowland areas in coastal cities such as Lagos, Mombasa, or Mumbai are usually more at risk of flooding, particularly when there is less drainage infrastructure.⁷³

38. The former Special Rapporteur on adequate housing, Raquel Rolnik, linked climate change with many human rights impacts.⁷⁴ According to the Special Rapporteur, climate change-induced extreme weather events pose risks to the right to adequate housing in urban settlements, smaller settlements, and small islands.⁷⁵ She cautioned that the implications of

⁶⁷ 2009 OHCHR report, ¶ 38.

⁶⁸ AR5, WGII Report, pp. 381, 555.

⁶⁹ Ibid. p. 555.

⁷⁰ Ibid. pp. 381-2 (citing Nicholls, R.J., N. Marinova, J.A. Lowe, S. Brown, P. Vellinga, D. de Gusmão, J. Hinkel, and R.S.J. Tol, 2011: Sea-level rise and its possible impacts given a ‘beyond 4°C world’ in the twenty-first century. *Philosophical Transactions of the Royal Society*, 161-181).

⁷¹ Ibid, p. 382 (citing Hinkel, J., D.P. van Vuuren, R.J. Nicholls, and R.J.T. Klein, 2013: The effects of mitigation and adaptation on coastal impacts in the 21st century. *An application of the DIVA and IMAGE models. Climatic Change*, 117(4), 783-794).

⁷² AR5, WGII Report, pp. 559, 562.

⁷³ AR5, WGII Report, p. 555.

⁷⁴ See generally Report of the Special Rapporteur on adequate housing as a component of the right to an adequate standard of living, and on the right to non-discrimination in this context, 6 August 2009, U.N. Doc. A/64/25.

⁷⁵ Ibid. ¶¶ 13, 30-32.

climate change will be severe, particularly for low-income groups and those living in countries that lack the resources, infrastructure, and capacity necessary to protect their populations.⁷⁶

39. Rolnik also noted the impacts of climate change on groups in vulnerable situations, such as women and children and the poor. Rolnik explained that poor communities can be especially vulnerable to climate change-related impacts, “in particular those concentrated in unplanned and unserviced settlements within urban areas, which tend to be built on hazardous sites and to be susceptible to a number of climate change-related disasters.”⁷⁷ She states, “Living in a situation of poverty and exclusion, they lack adequate resources to protect themselves. Climate change-related effects aggravate existing risks and vulnerabilities.”⁷⁸

40. For example, she explained that slums are usually located in the most hazardous areas within cities and lack the resources necessary to have the basic infrastructure and services required to protect dwellers from environmental disasters.⁷⁹ Thus, Rolnik stated that among the urban dwellers, those that are impoverished are at the greatest risk from the direct and indirect impacts of climate change.⁸⁰

41. She also stated that the decrease in water supply due to climate change will have a disproportionate impact on woman and girls. She explained:

Increased water stress results in decreased access to water and sanitation and as water sources dry out, people are forced to move further in search of water for drinking, cooking and hygiene. This has a particular impact on women and girls, who are usually responsible for fetching water, with their health and access to education often suffering as a result.⁸¹

42. Rolnik also stated that increased water stress caused by extreme weather events results in decreased access to water and sanitation.⁸² As water sources dry out, people are forced to travel further distances in search of water for drinking, cooking, and hygiene. Rolnik noted that this has a much greater impact on women and girls because they are usually responsible for fetching water, with their health and access to education suffering as a result.⁸³

43. When climate change-induced disasters force resettlement, the former Special Rapporteur warned that women encounter greater responsibilities and stresses, as they “generally assume the responsibility for child and domestic care, such as getting food, fuel and water, which can become more onerous in resettlements situations.”⁸⁴ Additionally, women also “encounter a

⁷⁶ Ibid. ¶ 65.

⁷⁷ Ibid. ¶ 16.

⁷⁸ Ibid.

⁷⁹ Ibid. ¶¶ 18, 67.

⁸⁰ Ibid. ¶¶ 20, 67.

⁸¹ Ibid. ¶ 15.

⁸² Ibid. ¶ 14.

⁸³ Ibid. ¶ 15.

⁸⁴ Ibid. ¶ 59.

number of problems related to lack of tenure and property rights and they are frequently ignored in the process of reconstruction and rebuilding of livelihoods.”⁸⁵

44. Rolnik also noted that children are one of the groups most vulnerable to climate change, particularly as it impacts poor urban populations. She explained that “[c]hildren may be removed from school in order to work and help to increase the income of their families and the supply of food and water” and that schools are often used as an emergency lodging after natural disasters, as she observed in Senegal.⁸⁶ She highlighted that climate change related effects could also exacerbate the exposure of children to undernutrition and increase their vulnerability to a number of diseases and illnesses, such as malaria. She further indicated that the effects and pressures of climate change-induced disasters may increase gender inequalities and intensify the common constraints many children already suffer due to poverty.

45. Rolnik cautioned that climate change induced drought will decrease water supply in urban systems.⁸⁷ Additionally, she stated that disturbances in marine ecosystems and fisheries, as well as the deterioration of farmlands due to salt water flooding, will jeopardize the access to safe drinking water and food.⁸⁸ She also warned that glacier melt will affect water storage, resulting in scarcity of water supply.⁸⁹

46. Moreover, she noted that climate change induced flooding and landslides, caused by increases in rainfall intensity, sea-level rise and storm surges in coastal areas, can “overwhelm urban drainage systems and result in floods” and “overburden sanitation systems and cause contamination of drinking water.”⁹⁰ Moreover, she noted that “when shelters are built in areas susceptible to hazards, such as in floodplains on the banks of rivers or on slopes that pose the risk of erosion and mudslides during heavy rains, the consequences can be devastating.”⁹¹

47. Rolnik also related climate change impacts to an increase in migration and substantial human mobility.⁹² She explained that as a consequence of environmental degradation due to climate change, depletion of natural resources and natural disasters, many people around the world find their lives and health threatened, their houses and land destroyed and their sources of livelihood taken away.⁹³ She stated: “Affected populations are then forced to migrate to other regions within their countries or to other countries. Migrants may leave voluntarily in search of better lives or may be forcibly evacuated during disasters.”⁹⁴ The Special Rapporteur pointed out that substantial migration connected to climate change can cause economic strain in

⁸⁵ Ibid.

⁸⁶ Ibid. ¶ 21.

⁸⁷ Ibid. ¶ 15.

⁸⁸ Ibid. ¶ 27.

⁸⁹ Ibid. ¶¶ 9, 15, 25.

⁹⁰ Ibid. ¶ 14.

⁹¹ Ibid.

⁹² Ibid. ¶ 22.

⁹³ Report on the Special Rapporteur on adequate housing as a component of the right to an adequate standard of living, 9 August 2010, U.N. Doc. A/65/261, ¶ 7.

⁹⁴ Ibid.; see also Report of the Special Rapporteur on adequate housing, 6 August 2009, U.N. Doc. A/64/25, ¶¶ 23-28.

receiving countries.⁹⁵ Migration will affect urban development by increasing pressure on infrastructure and services.⁹⁶ Rapid and unplanned urbanization by migrants has serious consequences for urban welfare and service provision.⁹⁷

48. In addition, she stated that the right to food is greatly affected by the impacts of climate change-induced disasters. For example, she noted that the inhabitants of Tlaxcala, an area dependent on rain-fed agriculture, complained of shifting rainfall periods, which generated uncertainty and a decline in crop yields and incomes.⁹⁸ She also warned that rising sea levels will affect the ability of many small islands to grow vegetables and plants.⁹⁹ Additionally, she cautioned that disturbances in marine ecosystems and fisheries as well as the deterioration of farmlands due to salt water flooding will jeopardize the access of population to food.¹⁰⁰

49. Rolnik further stressed that small island communities and low-lying coastal areas are particularly vulnerable to climate change and related problems, such as rising sea levels and other natural disasters associated with changes in temperature and rainfall patterns.¹⁰¹ For example, in her mission to the Maldives, she cautioned that climate change will significantly impact the enjoyment of many human rights related to protecting the right to adequate housing for Maldivians, including by: the loss of or contamination of freshwater sources; the total or partial destruction of houses and properties because of a rise in the sea level and natural disasters such as floods and cyclones; and the loss of livelihoods. Since many economic activities depend on the coastal ecosystem, climate change will affect communities' livelihoods, including through loss of land, and environmental changes affecting fisheries and agriculture and other livelihood activities.¹⁰²

F. Right to Self-Determination

50. The right to self-determination is recognized in article 1 of the ICCPR and in article 1 of the ICESCR. Both state that "all peoples have the right of self-determination", and that "by virtue of that right they freely determine their political status and freely pursue their economic, social and cultural development." Each Covenant provides that "in no case may a people be deprived of its own means of subsistence."

51. The 2009 OHCHR report, drawing on IPCC AR4, stated that "Sea level rise and extreme weather events related to climate change are threatening the habitability and, in the longer term,

⁹⁵ Ibid. ¶ 28.

⁹⁶ Ibid. ¶ 29.

⁹⁷ Ibid.

⁹⁸ Ibid. ¶ 26.

⁹⁹ Ibid. ¶ 33.

¹⁰⁰ Ibid. ¶ 27.

¹⁰¹ Addendum to the Report of the Special Rapporteur on adequate housing as a component of the right to an adequate standard of living, and on the right to non-discrimination in this context, Raquel Rolnik, Mission to Maldives, 11 January 2010, U.N. Doc. A/HRC/13/20/Add.3, ¶ 12; Report of the Special Rapporteur on adequate housing, 6 August 2009, U.N. Doc. A/64/25, ¶¶ 30-32.

¹⁰² Addendum to the Report of the Special Rapporteur on adequate housing as a component of the right to an adequate standard of living, and on the right to non-discrimination in this context, Raquel Rolnik, Mission to Maldives, 11 January 2010, U.N. Doc. A/HRC/13/20/Add.3, ¶ 14.

the territorial existence of a number of low-lying island States. Equally, changes in the climate threaten to deprive indigenous peoples of their traditional territories and sources of livelihood. Either of these impacts would have implications for the right to self-determination.”¹⁰³

52. This situation has only worsened since the 2009 report. The IPCC AR5 report states:

Current and future climate-related drivers of risk for small islands during the 21st century include sea level rise (SLR), tropical and extratropical cyclones, increasing air and sea surface temperatures, and changing rainfall patterns (*high confidence; robust evidence, high agreement*). Current impacts associated with these changes confirm findings reported on small islands from the Fourth Assessment Report (AR4) and previous IPCC assessments. The future risks associated with these drivers include loss of adaptive capacity and ecosystem services critical to lives and livelihoods in small islands.¹⁰⁴

52. Again, the greater the temperature rise, the more quickly and drastically the peoples living in small island states will be faced with challenges to their ability to continue to live on their traditional territory, and therefore faced with challenges to their ability to enjoy and exercise their right to self-determination.

G. Effects on Specific Groups

53. No State in the world has been spared the effects of some type of extreme weather occurrences or patterns. With alarming frequency, global temperature changes contribute to disasters that result in the loss of human lives and threaten to erase decades of development progress. States cannot move forward in isolation and meaningful international cooperation as well as solidarity then becomes more crucial to combating this challenge.

54. In this context, human rights norms place special emphasis on non-discrimination and the protection of the most vulnerable. Prohibitions against discrimination run throughout human rights instruments. Article 2(2) of the ICESCR provides, for example, that “The States Parties to the present Covenant undertake to guarantee that the rights enunciated in the present Covenant will be exercised without discrimination of any kind as to race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status.” Similarly, article 2(1) of the ICCPR states that “Each State Party to the present Covenant undertakes to respect and to ensure to all individuals within its territory and subject to its jurisdiction the rights recognized in the present Covenant, without distinction of any kind, such as race, colour, sex, language, religion, political or other opinion, national or social origin, property, birth or other status.” Many treaties set out more specific protections with respect to those in a particular status, including women, children, racial minorities, persons with disabilities, and indigenous peoples.

55. The Human Rights Council has recognized that “environmental damage is felt most acutely by those segments of the population already in vulnerable situations.”¹⁰⁵ As the IPCC AR5 report states, “People who are socially, economically, culturally, politically, institutionally

¹⁰³ 2009 OHCHR Report, ¶ 40.

¹⁰⁴ AR5, WGII Report, p. 1616.

¹⁰⁵ U.N. Doc. A/HRC/RES/16/11.

or otherwise marginalized are especially vulnerable to climate change and also to some adaptation and mitigation responses (*medium evidence, high agreement*).¹⁰⁶ The AR5 report identifies potential for heightened impacts from climate change to various groups in vulnerable situations, including women, children, those living in poverty, and indigenous peoples.

1. Women

56. The 2009 OHCHR report stated that “Women are especially exposed to climate change-related risks due to existing gender discrimination, inequality and inhibiting gender roles.” The report also noted that “women, particularly elderly women and girls, are affected more severely and are more at risk during all phases of weather-related disasters: risk preparedness, warning communication and response, social and economic impacts, recovery and reconstruction.”¹⁰⁷ The IPCC AR5 report reiterates that “existing gender inequalities are increased or heightened by climate-related hazards. Gendered impacts result from customary and new roles in society, often entailing higher workloads, occupational hazards indoors and outdoors, psychological and emotional distress, and mortality in climate-related disasters.”¹⁰⁸

57. According to AR5, worldwide mortality due to natural disasters, including droughts, floods, and storms, is higher among women than men, although there are regional variations.¹⁰⁹ For example, while a study in China found an excess of flood-related deaths among males, usually because of rural farming, a study in Bangladesh found that females “are more affected than males by a range of climate hazards, due to differences in prevalence of poverty, undernutrition, and exposure to water-logged environments.”¹¹⁰ However, pregnancy is a period of increased vulnerability to a wide range of environmental hazards, including extreme heat and infectious diseases such as malaria, foodborne infections, and influenza.¹¹¹

2. Children

58. The Convention on the Rights of the Child, which enjoys near universal ratification, obliges States to take action to ensure the realization of all rights in the Convention, including rights to life and health, for all children within their jurisdiction. The 2009 OHCHR report stated:

Overall, the health burden of climate change will primarily be borne by children in the developing world. For example, extreme weather events and increased water stress already constitute leading causes of malnutrition and infant and child mortality and morbidity. Likewise, increased stress on livelihoods will make it more difficult for children to attend school. Girls will be particularly affected as traditional household chores, such as collecting

¹⁰⁶ AR5m WGII Synthesis Report, p. 54.

¹⁰⁷ 2009 OHCHR report, ¶ 45.

¹⁰⁸ AR5, WGII Report, p. 796.

¹⁰⁹ AR5, WGII Report, p. 718.

¹¹⁰ Ibid.

¹¹¹ Ibid. (internal citations omitted).

firewood and water, require more time and energy when supplies are scarce. Moreover, like women, children have a higher mortality rate as a result of weather-related disasters.¹¹²

59. The IPCC AR5 report confirms that children and young people, as well as the elderly, are at increased risk of climate related injury and illness.¹¹³ Generally, they are more susceptible to heat-related illness, disease, and food insecurity, all of which are potentially increased by climate change.¹¹⁴

3. Persons with disabilities

60. Persons with disabilities face a broad range of barriers in the way that disaster responses are currently designed and implemented. Emergency responses are neither accessible nor inclusive, and they do not take into account the specific needs of persons with disabilities. In a majority of cases, there is no practice in place to inform persons with disabilities of a potential emergency risk – for instance, notifications about an emerging disaster are not accessible to deaf people – nor have special evacuation measures been established for those who have impairments related to mobility or orientation, such as persons who are blind. Further, the measures undertaken in societies to adapt to constant changes brought by climate change do not take into account the needs of persons with disabilities in terms of accessing basic services or participating actively in societal life.

61. The Third World Conference on Disaster Risk Reduction, held in Sendai, Japan, in March 2015, recognized that persons with disabilities are at higher risk of suffering the consequences of natural disasters, and that they face specific challenges and needs in such situations, including the need for appropriate and inclusive responses that consider their specific requirements. The Sendai Framework on Disaster Risk Reduction 2015-30 constitutes a promising step in being guided by the principle that disaster risk reduction requires an all-of-society engagement and partnership, as well as empowerment and inclusive, accessible and non-discriminatory participation.

62. Article 11 of the Convention the Rights of Persons with Disabilities (CRPD), on situations of risk and humanitarian emergencies, creates an obligation on States parties to take all necessary measures to ensure the protection and safety of persons with disabilities in situations of risk, including in the occurrence of natural disasters. This provision is key to making sure that the process of developing programmes and policies related to climate change, and the entire cycle from prevention and planning to response, are inclusive and fully consider the rights of persons with disabilities. Article 11 of the CRPD is an entry point to humanitarian responses based on human rights norms and principles, and should be promoted as a benchmark against which to measure progress across disciplinary borders. Given the importance of this issue, the Special Rapporteur on the rights of persons with disabilities, Catalina Devandas-Aguilar, will

¹¹² 2009 OHCHR report, ¶ 48.

¹¹³ AR5, WGII Report, p. 717.

¹¹⁴ Ibid. pp. 717-8.

focus on the implementation of Article 11 of the CRPD among her priority work areas, as outlined in her first report to the Human Rights Council.¹¹⁵

4. Those living in extreme poverty

63. There has been widespread acknowledgment that climate change will have a particularly dramatic impact on the human rights of the poorest. No one will suffer more. IPCC AR5 sets out various impacts on poor people from climate change. According to the report, “climate-related hazards, including subtle shifts and trends to extreme events, affect poor people’s lives directly through impacts on livelihoods, such as losses in crop yields, destroyed homes, food insecurity, and loss of sense of place, and indirectly through increased food prices (robust evidence, high agreement).” For example, AR5 predicts with high confidence that with a 2°C rise by 2080-2100 there is a high risk to deteriorating livelihoods in drylands, due to high and persistent poverty and a high risk of reaching tipping points for crop and livestock production in small-scale farming and/or pastoralist livelihoods.¹¹⁶ It similarly found with high confidence that under a similar time frame and temperature rise there will be a high risk for “shifts from transient to chronic poverty due to persistent economic and political marginalization of poor people combined with deteriorating food security” with limited options for adaptation.¹¹⁷ Furthermore, as discussed above, AR5 estimates with high confidence that with a 2°C rise by 2080-2100 there will be a very high risk for reduced access to water for rural and urban poor people due to water scarcity and increased competition for water.¹¹⁸

64. AR5 concludes that “future impacts of climate change, extending from the near term to the long term, mostly expecting 2°C scenarios, will slow down economic growth and poverty reduction, further erode food security, and trigger new poverty traps, the latter particularly in urban areas and emerging hotspots of hunger.” The report warns that “climate change will create new poor between now and 2100, in developing and developed countries, and jeopardize sustainable development.”

65. According to a 2014 report by the IBA Presidential Task Force on Climate Change Justice and Human Rights, the rights to “life, health, food, shelter and water are all plainly affected by the ravages of climate change.” According to many authorities, including the Human Rights Council, the chairperson of the IPCC, and World Bank President Jim Yong Kim, the poorest will be hit hardest by climate change, especially those living in the developing world. It can therefore be said that the human rights of the extremely poor will be most affected by climate change.

66. The World Bank has published three so-called ‘Turn Down the Heat’ reports, prepared for the Bank by the Potsdam Institute for Climate Impact Research and Climate Analytics. In the second report, published in July 2013, the impacts of both 2°C warming and 4°C warming are described and the differences are striking. For example, under the 2°C scenario, the area of hyper-arid and arid regions grows by 3 percent, while under the 4°C scenario, the area of hyper-

¹¹⁵ Report of the Special Rapporteur on the rights of persons with disabilities, Catalina Devandas-Aguilar, 2 February 2015, U.N. Doc A/HRC/28/58.

¹¹⁶ AR5, WGII Report, p. 811, Table 13-2.

¹¹⁷ Ibid.

¹¹⁸ Ibid.

arid and arid regions grows by 10 percent. The more temperatures will rise, the more extreme the impact on the environment, and therefore the more likely that human rights, especially of the poorest, are affected.

67. It is clear that development efforts to alleviate poverty are threatened by climate change. As the World Bank Group's chief economist for climate change has said: "Climate change represents a direct and immediate threat to poverty alleviation." The World Bank, for example, refers to a 25-year survey in India that found that of the 12 percent of households in the state of Andhra Pradesh that became impoverished, 44 percent cited weather events as a cause. It is clear that climate change, extreme poverty and human rights are interrelated. The more ambitious the temperature target, the more likely it is that adverse impacts on human rights and extreme poverty eradication can be averted.

5. Indigenous Peoples

68. The 2009 OHCHR report stated:

Climate change, together with pollution and environmental degradation, poses a serious threat to indigenous peoples, who often live in marginal lands and fragile ecosystems which are particularly sensitive to alterations in the physical environment. Climate change-related impacts have already led to the relocation of Inuit communities in polar regions and affected their traditional livelihoods. Indigenous peoples inhabiting low-lying island States face similar pressures, threatening their cultural identity which is closely linked to their traditional lands and livelihoods.¹¹⁹

69. The IPCC AR5 report notes that "Climate change poses challenges for many indigenous peoples, including challenges to post-colonial power relations, cultural practices, their knowledge systems, and adaptive strategies."¹²⁰ For example, studies have found that the livelihoods of indigenous people in the Arctic will be "among the most severely affected by climate change, including food security aspects, traditional travel and hunting, and cultural values and references."¹²¹

70. James Anaya, while he was Special Rapporteur on the rights of indigenous peoples, stated in his *Report on the Situation of the Sami People in the Sápmi Region of Norway, Sweden and Finland* (2011) that climate change "has particular adverse effects on people such as the Sami who depend upon the arctic climate for their livelihoods." Professor Anaya explained that: "As winter temperatures rise due to global warming, snow thaws and melts into the lichen that reindeer eat, and when temperatures then drop below freezing, the lichen is encased in ice making it very difficult for the reindeer to eat and digest. Also, summer pastures may change from open to shrub vegetation land and herders are finding it necessary to move their herds to drier ground."

¹¹⁹ 2009 OHCHR Report, ¶ 51.

¹²⁰ AR5, WGII Report, p. 765.

¹²¹ Ibid. p. 1003.

6. Displaced Persons

71. The IPCC AR5 report defines displacement as “situations where choices are limited and movement is more or less compelled by land loss due to sea level rise or extreme drought, for example.”¹²² According to AR5, it is widely established that extreme weather events displace populations in the short term because of their loss of place of residence or economic disruption” and that “only a proportion of displacement leads to more permanent migration.”¹²³ Much of the scientific literature concludes that the increasing incidence and intensity of extreme weather events from climate change will lead directly to the risk of increased displacement.¹²⁴ Indeed, AR5 concludes with high confidence that “climate change will bear significant consequences for migration flows at particular times and places, creating risks as well as benefits for migrants and for sending and receiving regions and states.”¹²⁵

72. Some evidence also links vulnerability or lack of access to resources to an inability to migrate. This result is that those who are most vulnerable to climate change have “the least capability to migrate” and consequently climate change risks for this population become more significant.¹²⁶ In some case, even if the most vulnerable households are able to migrate to deal with environmental events, “their migration is an emergency response that creates conditions of debt and increased vulnerability, rather than reducing them.”¹²⁷

73. Although human migration is a potential adaptive strategy to climate change,¹²⁸ evidence also suggests that migration does not necessarily lead to better human security as “migrant populations may be exposed to more hazardous climatic conditions in their new destinations.” For example, studies have found that low-income migrants, in addition to being socially excluded, “cluster in high-density areas that are often highly exposed to flooding and landslides, with these risks increasing with climate change.”¹²⁹

74. Long-term environmental change, sea level rise, coastal erosion, and loss of agricultural productivity due to climate change will have a significant impact on migration flows.¹³⁰ One study from Brazil has found that “that de-population occurs with relatively modest rates of warming. In their scenarios the biggest increase in migration comes from productive agricultural areas that support a large labor force.”¹³¹ Low-lying coastal areas, particularly small island States, are vulnerable to displacement from climate induced sea level rise in conjunction with storm surges and flooding.¹³²

¹²² Ibid. p. 1060.

¹²³ Ibid. p. 767

¹²⁴ Ibid.

¹²⁵ Ibid. p. 1060.

¹²⁶ Ibid. p. 767.

¹²⁷ Ibid pp. 767, 769, Table 12-3 (internal citations omitted).

¹²⁸ Ibid. p. 770.

¹²⁹ Ibid. p. 768.

¹³⁰ Ibid. pp. 768-9.

¹³¹ Ibid. p. 769.

¹³² Ibid. p. 1060.

75. According to the 2009 OHCHR climate change report, persons who are internally displaced are entitled to a full range of human rights guarantees by their respective State.¹³³ The 2009 report also notes that “persons moving voluntarily or forcibly across an international border due to environmental factors would be entitled to general human rights guarantees in a receiving State, but would often not have a right of entry to that State.”¹³⁴

76. The Special Rapporteur on the human rights of migrants, François Crépeau, has also identified various impacts from climate change on migrant workers. He stated “that the effects of climate change will likely play a significant and increasingly determinative role in international migration.”¹³⁵ In particular, he explained that climate change will result in an increased frequency and intensity of extreme weather events (e.g., tropical storms, floods, heat waves) and the gradual processes of environmental degradation (e.g., desertification and soil and coastal erosion) resulting from climate change.¹³⁶ Accordingly, “Those effects of climate change and their adverse consequences for livelihoods, public health, food security and water availability will have a major impact on human mobility, as one natural response will be to migrate.”¹³⁷ However, Crépeau cautioned that understanding the true impact of climate change on migration is complex and that “the question of identifying those who have migrated as a result of climate change might be a challenging, if not impossible, task: the impacts of climate change often contribute to a cluster of causes that lead to migration.”¹³⁸ Moreover, adding to this difficult task is the fact that climate change may induce a range of migration patterns causing future predictions on the impacts of climate change on migrations patterns to “remain problematic.”¹³⁹ As a result, Crépeau noted, “the success, or lack thereof, of future mitigation and adaptation strategies, including the development of new technologies which may or may not ameliorate the situation of those most affected by the effects of climate change, are impossible to know.”¹⁴⁰

¹³³ OHCHR Climate Change Report, ¶ 57, citing Guiding Principles on Internal Displacement (E/CN.4/1998/53/Add.2, annex), principles 1, ¶ 1, and 6, ¶ 1.

¹³⁴ Ibid. ¶ 58.

¹³⁵ *Report of the Special Rapporteur on the human rights of migrants to the General Assembly*, 13 August 2012, U.N. Doc. A/67/299, ¶ 17.

¹³⁶ Ibid. ¶ 20.

¹³⁷ Ibid.

¹³⁸ Ibid. ¶ 32.

¹³⁹ Ibid. ¶ 33.

¹⁴⁰ Ibid.