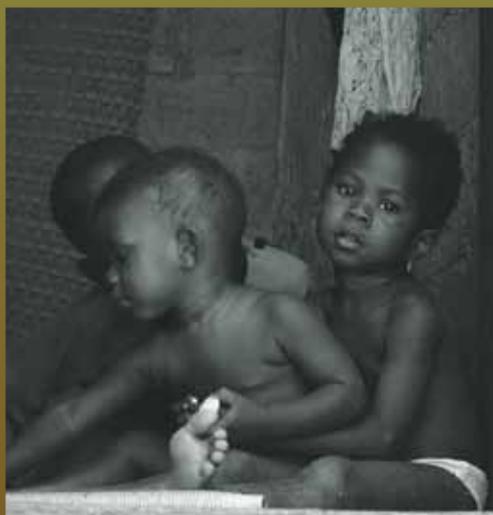
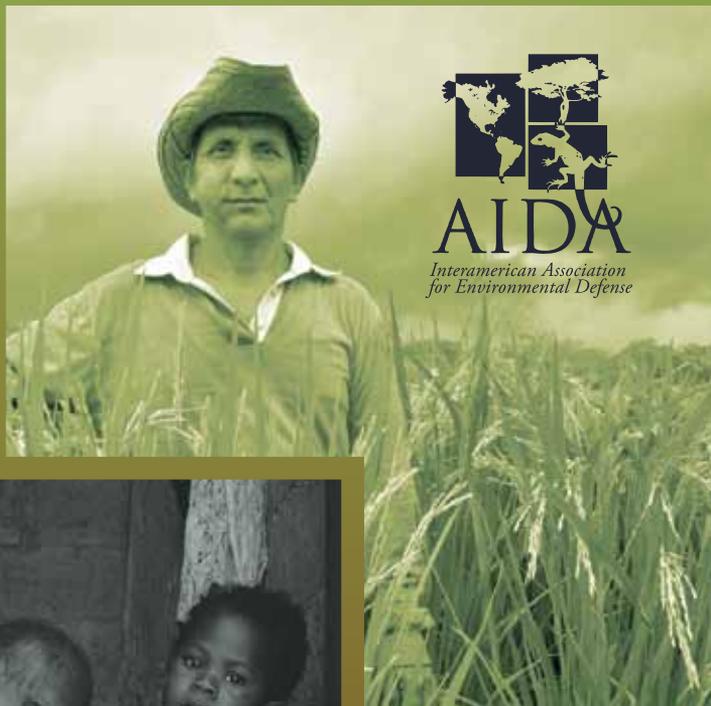




# A HUMAN CRISIS: CLIMATE CHANGE AND HUMAN RIGHTS



## in Latin America



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A Report by the Interamerican Association  
for Environmental Defense

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Asociación Interamericana para la Defensa del Ambiente

A HUMAN CRISIS: CLIMATE CHANGE AND HUMAN RIGHTS IN LATIN AMERICA  
2011

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Klimabündis Österreich.

## Preface

It is a great honor and joy for each of us at the Interamerican Association for Environmental Defense (AIDA) to present our latest report summarizing the principal impacts that climate change is already having on human rights in the Americas. In preparing this report, we drew on the latest scientific information that shows the negative effects that communities and individuals all over the Americas are suffering because of climate change. We hope this report will contribute to the understanding of this great problem, as well as to finding immediate and effective solutions. The information contained within will help communities, organizations, policy makers, and governments, at both the national and international level, understand the importance of addressing climate change from a human perspective, and of incorporating such a perspective into climate change policies.

We wish to give enormous thanks to each member of our team who worked hard in preparing the report. Special thanks go to authors Lara Cushing and Jacob Kopas for believing in the seemingly crazy idea of preparing this report and for making it a reality. We would also like to thank Martin Wagner, Director of the International Program at Earthjustice and a member of our Board of Directors, for his important comments and help polishing our research; Jessica Lawrence of Earthjustice for her invaluable technical review and input; Andres Pirazzoli, Celeste Kauffman, Jason Insdorf, and Michelle Bowen for their great research assistance; Eliana Villar and Marian Bocanegra for their excellent work translating the report into Spanish and Ashley Werner for editing the translation; and Judith Melendrez who designed and improved the report's final layout. Finally, we would like to thank the members of our Board for their continued support and strategic direction and to the CS Fund and the Mott Foundation for generously supporting this work.

We dedicate this report to all the people and communities of the coastal regions, the Andes, the forests, cities and towns of the Americas, who are already suffering the impacts of climate change described here. We hope that this document is a positive step in the direction toward improving their situation and guaranteeing their rights.

Anna Cederstav and Astrid Puentes Riaño  
CO-EXECUTIVE DIRECTORS OF AIDA

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# I. Executive Summary

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Global climate change is a reality and will cause serious impacts for human populations throughout the Americas and across the globe. Prompted by international concerns regarding climate change, the General Assembly of the Organization of American States (OAS) in 2008 requested that the Inter-American Commission on Human Rights (IACHR) investigate the link between climate change and human rights. This report seeks to inform that effort by describing climate change impacts in Latin America—both observed and predicted—and the ways in which these affect human rights. Our principal conclusion is that the IACHR should recognize the negative implications of climate change for human rights and make recommendations to OAS Member States on how to fulfill their international obligations to protect and guarantee human rights in the face of climate change.

This report shows that global climate change is already negatively affecting the enjoyment of human rights in the Americas and that present impacts will likely intensify in the future. The purpose of this report is not to provide an exhaustive list of all possible climate change consequences. Rather, we provide a summary of those impacts that are best supported by current evidence, most directly attributable to global climate change, and have the greatest potential to affect the human rights of people and vulnerable communities in Latin America.

One of the most troubling impacts that this report identifies is the dramatic reduction in freshwater availability for millions of people as glaciers melt, water-capturing ecosystems such as high-mountain *páramos* degrade, and weather patterns become more erratic. Climactic eccentricities are also increasing storm severity and flooding, thereby causing the destruction of thousands of homes, the loss of crops, and damage to infrastructure. The report further highlights the threat global climate change poses to the oceans, especially from sea-level rise and the decimation of fish populations that feed thousands of communities in the Americas. Further inland, climate change will increase droughts and wildfires, which will bring disastrous consequences for access to food and housing. Finally, this report describes how the above impacts can also lead to increases in heat and vector borne illnesses.

These climate change impacts all have severe consequences for the enjoyment of human



rights in the hemisphere. Principal among these will be the right to a healthy environment, as erratic weather deteriorates ecosystems on which human communities throughout the Americas depend. Because this right is closely connected to many other fundamental human rights, climate change effects will also severely hinder rights to a dignified life, health, food, water, and adequate housing, for millions of people in the Americas.

Under international law and the American Convention on Human Rights, States have a positive obligation to protect and guarantee the human rights of persons under their jurisdiction. Additionally, States are legally required to use all means at their disposal to avoid harmful activities, such as pollution, from causing significant damage to the environment in other nations. With respect to climate change, these obligations are particularly relevant for developed nations that are responsible for a disproportionately greater amount of historical and current contributions to human-generated climate change. For example, the United States of America has contributed 28.75% of historical, cumulative greenhouse gas (GHG) emissions, while all Central and South American nations have only contributed a total of 1.38% and 2.30% respectively. As a result, countries such as the United States and Canada have a greater obligation to prevent, mitigate, and facilitate adaptation to climate change in the hemisphere.

This report also demonstrates that human rights impacts stemming from climate change will be most strongly felt in socially marginalized and traditional communities, which are also the least responsible for the human contribution to climate change. Communities in situations of vulnerability, including the poor, women, children, disadvantaged ethnic groups and the elderly, are often disproportionately affected in natural and climate-induced disasters. Traditional and indigenous peoples and peasant farmers are especially vulnerable because they rely more heavily on the natural systems disrupted by climate change for their subsistence and livelihoods. Moreover, the ability of these communities to enjoy their culture will be negatively affected by climate change impacts on lands and ecosystems of historical, cultural, and spiritual significance.

Finally, it is important that the IACHR note how some examples of climate change mitigation and adaptation strategies can themselves threaten the enjoyment of human rights. Market-

based mechanisms for greenhouse gas mitigation present a host of equity concerns. For example, carbon trading programs can lead to the concentration of polluting industries near poor or disadvantaged communities. Companies planting biofuel crops can compete for limited farmland with farmers growing food crops, thereby causing food prices to rise. These price increases can interfere with the rights to food and a dignified life. Also, adaptation programs, which may involve the massive relocation of coastal communities, could result in forced displacements if not conducted properly. When planning and implementing measures to limit harms from climate change, it is crucial that States respect the rights of all peoples to information and public participation to help avoid the above complications.

Below we briefly summarize key facts regarding the impact of climate change on the enjoyment of human rights in Latin America. We then conclude by presenting recommendations that States and other key actors in the hemisphere should consider in developing solutions to human-caused climate change.

## **A. PRINCIPAL HUMAN RIGHTS IMPACTS OF CLIMATE CHANGE IN LATIN AMERICA:**

### **Loss of freshwater resources and droughts:**

- ▶ Tropical Andean glaciers have shrunk dramatically since the 1970s in a trend that is directly related to rising temperatures. Climate scientists predict that by 2050 up to 50 million people in the Tropical Andean region will be affected by the loss of dry-season water for drinking, irrigation, sanitation, and hydropower.
- ▶ Most of the region has experienced a substantial increase in drought severity since the 1970s, except for the Southern Cone region, which has gotten substantially wetter. Scientists estimate that by 2025, as many as 77 million additional people in Latin America will experience water stress because of climate change.
- ▶ About 90% of agriculture in Latin America is not irrigated and is thus very vulnerable to changes in precipitation or increased soil erosion

### **Extreme storms and flooding:**

- ▶ Heavy rains have become more frequent even in places where annual precipitation has decreased, and Latin America has recently experienced unusually extreme flooding. For example, in 2008 over 300,000 people were left homeless when two widespread floods hit Brazil in a single, six-month period. In 2010 Colombia suffered its most devastating floods in forty years, adversely affecting over 2.2 million people and costing the country more than USD \$300 million in emergency aid.
- ▶ The strongest hurricanes in the North Atlantic region have gained intensity since the 1970s in a pattern associated with warmer sea surface temperatures. Millions of people live in the path of increasingly fierce hurricanes in Central America, Mexico, and the Ca-

ibbean, where, since 1970, an average of 1,300 people have been killed and 70,000 left homeless every year by storms, mudslides, or floods.

### **Rising sea-levels and marine ecosystem destruction:**

- ▶ Since the 1960s, climate change has caused sea levels to rise at an ever-increasing pace, consistently exceeding scientific projections (current estimates range from 0.6 to 1.9 meters by 2100). The impacts are already being felt by coastal communities such as the indigenous Kuna of Panama's San Blas Islands. A 1.5 m sea level rise—within scientific projections in the absence of serious near-term mitigation efforts—could displace millions of people in the region, including 90% of the population of Guyana.
- ▶ Warming ocean temperatures are the likely cause of a precipitous decline in the marine algae that form the foundation of ocean ecosystems. Factors associated with climate change, including increases in storm surges, warming water temperatures, and ocean acidification, have likely contributed to the destruction of over 80% of Caribbean coral reefs that provide important breeding grounds for fish. Wild fish make up 84% of the fisheries of Latin America, and significant loss of fish populations would affect food security, nutrition, and livelihoods.

### **Increased wildfires:**

- ▶ Droughts associated with climate change have led to more frequent, intense, and deadly wildfires since the 1980s. During the 1990s, fires raged in forests that had never been subject to widespread burning before, including the Brazilian rainforests and Mexican cloud forests. Intergovernmental Panel on Climate Change (IPCC) scientists fear climate change will lead to a catastrophic die-back of the Amazon forests that would fundamentally alter local precipitation patterns and biodiversity, and negatively affect traditional livelihoods and cultures

### **Heat and vector-borne illness:**

- ▶ Climate change causes human health impacts through multiple pathways. Increased flooding and warmer temperatures help spread diarrhea and vector-borne illnesses. One study estimates that by 2030, Latin America may experience up to a 28% growth in risk of malaria due to climate change.
- ▶ Hot days, hot nights, and heat waves are on the rise and cause heat-related deaths, while warmer air temperatures also exacerbate ground-level ozone and smog pollution, contributing to respiratory illnesses. This can be especially worrisome in many large cities, such as Mexico City, that are also located in air basins subject to thermal inversions that trap toxic air pollutant.

## **B. SUMMARY RECOMMENDATIONS FOR PROTECTING HUMAN RIGHTS IN THE FACE OF CLIMATE CHANGE:**

### **For all actors:**

- ▶ Recognize in official communications and policies the link between climate change and human rights;

### **For States:**

- ▶ Cooperate to create binding, effective, and equitable international commitments to prevent further contributions to global climate change;
- ▶ Work to the greatest extent possible to reduce the human-caused contributions to global climate change;
- ▶ Review current energy policies to include more sources of renewable energy;
- ▶ States that have historically contributed and/or are presently contributing most to global climate change should contribute more to finding lasting solutions;
- ▶ Conduct full risk analyses of possible climate change impacts to human rights and incorporate a human rights perspective in mitigation and adaptation plans;
- ▶ Ensure the active participation of stakeholders and access to information when undertake adaptation or mitigation measures;

- ▶ Prioritize adaptation and *mitigation measures* that protect critical ecosystems such as mangrove forests, glaciers, and *páramos* that help reduce climate change impacts;
- ▶ Take measures to improve access to information regarding adverse climate change impacts and their potential human rights implications, especially for vulnerable communities;
- ▶ Require that all large development projects include climate change assessments as part of a full, prior, and independent impact evaluation;

#### **For intergovernmental institutions:**

- ▶ The IACHR should recognize the connection between human rights and climate change in its report to the OAS and should hold special thematic hearings with civil society organizations, affected peoples, and governments;
- ▶ Intergovernmental bodies such as the OAS should create spaces for Member States to negotiate binding obligations to mitigate climate change;

#### **For international financial institutions, national development banks, and sovereign wealth funds:**

- ▶ Incorporate climate change mitigating goals in their financing policies to avoid funding projects that contribute to climate change;
- ▶ Adopt a human rights perspective in climate change and energy policies for investments.

## II. Introduction

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The Intergovernmental Panel on Climate Change's (IPCC) 2007 Fourth Assessment Report (4AR) unequivocally shows that human induced climate change is a reality. In recent, independent reviews, the U.S. National Review Council and the Netherlands Environmental Assessment Agency have both overwhelmingly confirmed the key conclusions of the IPCC's 4AR.<sup>1</sup> Global average temperature has increased by 0.74°C over the past century, with most of that increase taking place since the 1970s.<sup>2</sup> Most of the warming over the last several decades can be attributed to human activities that release climate change pollutants such as carbon dioxide, methane, and black carbon.<sup>3</sup> Primary among these activities is the burning of fossil fuels,<sup>4</sup> although deforestation, large tropical dams,<sup>5</sup> and land-use changes are also major contributors.

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<sup>1</sup> Netherlands Environmental Assessment Agency, *Assessing an IPCC assessment: An analysis of statements on projected regional impacts in the 2007 report*, (2010) available at <http://www.pbl.nl/en/sites/default/files/cms/publicaties/500216002.pdf>; National Research Council, *Advancing the Science of Climate Change* (National Academy Press) (2010) available at [http://www.nap.edu/catalog.php?record\\_id=12782](http://www.nap.edu/catalog.php?record_id=12782); see also, Open Letter from U.S. Scientists on the IPCC, signed by over 300 scientists available at <http://www.openletterfromscientists.com/>.

<sup>2</sup> INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (IPCC), CLIMATE CHANGE 2007: SYNTHESIS REPORT, Section and Figure 1.1 (Core Writing Team, RK Pachauri and A Reisinger eds., 2007) (hereinafter IPCC AR4 SYNTHESIS REPORT). The IPCC is tasked by the World Meteorological Organization (WMO) and by the United Nations Environment Programme (UNEP) to assess on a comprehensive, objective, and transparent basis the latest scientific, technical, and socio-economic literature on human-induced climate change. The IPCC is comprised of over 2000 of the world's preeminent climate scientists. It has produced four assessment reports, the latest from 2007.

<sup>3</sup> Black carbon (or soot) is created by the incomplete burning of biomass, fossil fuels, and biofuels, and is estimated to be the second largest contributor to global warming after carbon dioxide. V. Ramanathan & G. Carmichael, *Global and regional climate changes due to black carbon*, 1 NATURE GEOSCIENCE 221, 221-27 (2008). For more information on the climate change effects of black carbon, see AIDA, EL CARBONO NEGRO: CONCEPTO, EFECTOS CLIMÁTICOS Y OPORTUNIDADES EN SU CONTROL (2010) available at [http://www.aida-americas.org/sites/default/files/AIDA\\_Carbono%20Negro%20FINAL.pdf](http://www.aida-americas.org/sites/default/files/AIDA_Carbono%20Negro%20FINAL.pdf).

<sup>4</sup> IPCC, SUMMARY FOR POLICYMAKERS. IN: CLIMATE CHANGE 2007: THE PHYSICAL SCIENCE BASIS. CONTRIBUTION OF WORKING GROUP I TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE (Solomon, S., D. Qin, M. Manning, et al eds. Cambridge University Press) (2007) (hereinafter IPCC SUMMARY FOR POLICYMAKERS) available at [http://www.ipcc.ch/publications\\_and\\_data/ar4/wg1/en/tssts-4-2.html](http://www.ipcc.ch/publications_and_data/ar4/wg1/en/tssts-4-2.html); see also National Research Council, *Advancing the Science of Climate Change*, 2(National Academy Press) (2010) available at [http://www.nap.edu/catalog.php?record\\_id=12782](http://www.nap.edu/catalog.php?record_id=12782).

<sup>5</sup> See, JACOB KOPAS & ASTRID PUENTES, GRANDES REPRESAS EN AMÉRICA: ¿PEOR EL REMEDIO QUE LA ENFERMEDAD?, 8-9 (AIDA, 2010) available at <http://www.aida-americas.org/es/project/grandesrepresas>.



In its landmark 2009 report on human rights and climate change, the Office of the United Nations High Commissioner for Human Rights (OHCHR) concluded that climate change threatens the enjoyment of a wide range of human rights. The OHCHR described current human rights obligations as providing “important protection to the individuals whose rights are affected by climate change”<sup>6</sup> and emphasized in particular State obligations to protect those beyond their own borders and cooperate internationally in regards to climate change.<sup>7</sup> Moreover, in drafting the Cancun Agreements that came out of the 16th Conference of the Parties (COP16) to the United Nations Framework Convention on Climate Change (UNFCCC), the Parties took note of how climate change will have a range of direct and indirect implications for the effective enjoyment of human rights. The Parties emphasized in the Agreement that Parties should, in all climate change-related actions, fully respect human rights.<sup>8</sup> With the Organization of American States’ (OAS) instructions to study the “possible link” between human rights and climate change,<sup>9</sup> the Inter-American Commission on Human Rights (IACHR) now has an important opportunity to highlight the link between climate change and human rights and to clarify the international obligation of States to protect human rights in the face of climate change impacts.

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<sup>6</sup> Office of the United Nations High Commissioner for Human Rights (OHCHR), *Report of the Office of the United Nations High Commissioner for Human Rights on the Relationship Between Climate Change and Human Rights*, ¶ 71, U.N. Doc. A/HRC/ (2009) (hereinafter OHCHR Report).

<sup>7</sup> *Id.*, ¶ 84-9.

<sup>8</sup> Conference of the Parties to the UNFCCC, Cancun, Mex., Dec. 11, 2010, The Cancun Agreements: Outcome of the work of the Ad Hoc Working Group on Long-term Cooperative Action under the Convention, Decision 1/CP.16, UN Doc. FCCC/CP/2010/7/Add.1 (March 15, 2011) [hereinafter The Cancun Agreements], available at <http://unfccc.int/resource/docs/2010/cop16/eng/07a01.pdf#page=2>

<sup>9</sup> Organization of American States (OAS), *Human Rights and Climate Change in the Americas*, AG/Res 2429 (XXXVIII-O/08), June 3, 2008.

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This document seeks to inform that effort by describing the principal impacts of climate change—both observed and predicted—on human communities in the Americas. This discussion will also highlight some of the disparate impacts that are already, or will be felt by vulnerable communities, and the need to consider human rights in mitigation and adaptation measures. The report then concludes by outlining the implications of this situation for the enjoyment of human rights and States’ international obligations in the face of climate change.

This report does not seek to provide an exhaustive list of the potential effects of climate change. Rather, it focuses on those impacts that are the best understood, are most directly attributable to global climate change, and have the greatest potential to affect the human rights of people and vulnerable communities in Latin America. Therefore, we do not include climate change consequences such as biodiversity loss and physical land changes due to the melt of permafrost, despite abundant evidence supporting these predictions.<sup>10</sup> This is not because these impacts are insignificant, but rather because they tend to produce localized harms that are difficult to extrapolate into regional patterns. Similarly, this report places emphasis on only the most direct impacts for human rights in the region, and does not cover likely secondary consequences, such as the potential for violent conflict over diminishing resources.

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<sup>10</sup> See, e.g. T.L. Root et al., *Fingerprints of Global Warming on Wild Animals and Plants*, 421 NATURE, 57-60 (2003). The authors review 143 studies and conclude that “the balance of evidence from these studies strongly suggests that a significant impact of global warming is already discernible in animal and plant populations” in the form of a “consistent temperature-related shift, or ‘fingerprint’, in species ranging from mollusks to mammals and from grasses to trees.”

The overwhelming consensus amongst climate scientists is that the Earth is already experiencing multiple, dramatic changes caused by the burning of fossil fuels and other climate changing activities. Although the scientific method can never attribute a single storm or drought to global warming, evidence and models agree that the number and intensity of weather anomalies has increased significantly due to climate change.<sup>11</sup> Even in instances where there is less certainty regarding the extent of climate change impacts in an individual weather pattern—for example, on the El Niño Southern Oscillation (ENSO)—the magnitude, distribution, and irreversibility of the risks to human wellbeing are too great to excuse inaction. Instead, the precautionary principle, considerations of intergenerational equity, and human rights obligations all require action in the face of even those climate change impacts that are less understood.

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<sup>11</sup> IPCC SUMMARY FOR POLICYMAKERS, *supra* note 4 at Table SPM.2

# III. Principal Human Rights Impacts of Climate Change in Latin America

## A. LOSS OF FRESHWATER RESOURCES AND DROUGHTS

Today, over 71 million people in Latin America—nearly 14% of the population—have no access to a safe water supply<sup>12</sup> and over 22 million live in “water-stressed” watersheds.<sup>13</sup> However, an even direr situation awaits, as shrinking glaciers and increasing droughts continue to exacerbate water scarcity.<sup>14</sup> The IPCC estimates that by 2025, up to 77 million more people will experience water stress due to climate change in the region, and that number could nearly double by 2055.<sup>15</sup> The IPCC also predicts that by 2020, an additional five million people region-wide will be at risk of hunger due to climate change, with water scarcity as one of the main causes.<sup>16</sup> All of these impacts will result in serious consequences not only for human rights such as access to water, but also for rights to food, health and life, which governments must keep in mind when planning for the future.

<sup>12</sup> IPCC, *CLIMATE CHANGE 2007: IMPACTS, ADAPTATION AND VULNERABILITY. CONTRIBUTION OF WORKING GROUP II TO THE FOURTH ASSESSMENT REPORT OF THE INTERGOVERNMENTAL PANEL ON CLIMATE CHANGE*, Section 13.4.3 (M.L. Parry, O.F. Canziani, et al eds.) (2007), (hereinafter IPCC AR4, WORKING GROUP II).

<sup>13</sup> N.W. Arnell, *Climate Change and Global Water Resources: SRES scenarios and socio-economic scenarios*, 14 *GLOBAL ENVIRONMENTAL CHANGE*, 31-52 (2004).

<sup>14</sup> See, e.g., IPCC, *Climate Change and Water, Technical Paper VI* 97 (B. Bates, Z.W Kundzewicz, et al. eds.) (2008) (hereinafter IPCC Technical Paper VI).

<sup>15</sup> IPCC AR4, WORKING GROUP II, *supra* note 12 at Chapter 13, Executive Summary and Table 13.6. Note that the table is incorrectly labeled: columns 2, 3 and 5 are absolute numbers while columns 4 and 6 are increases attributable to climate change. This correction was noted by the Netherlands Environmental Assessment Agency (see note 1 at 74) and by the IPCC in an errata: IPCC, *Climate Change 2007: Working Group II: Impacts, Adaption and Vulnerability*, Errata (Feb. 24, 2011) available at [http://www.ipcc.ch/publications\\_and\\_data/ar4/wg2/en/errataserrata-errata.html](http://www.ipcc.ch/publications_and_data/ar4/wg2/en/errataserrata-errata.html). These increases are significant as they far surpass the predictions for increase in population which are predicted to grow approximately 13.7% by 2025 and 23.9% by 2050. Number calculated based on data from: POPULATION DIVISION OF THE DEPARTMENT OF ECONOMIC AND SOCIAL AFFAIRS OF THE UNITED NATIONS SECRETARIAT, *WORLD POPULATION PROSPECTS: THE 2008 REVISION* (2008) available at <http://esa.un.org/unpp>.

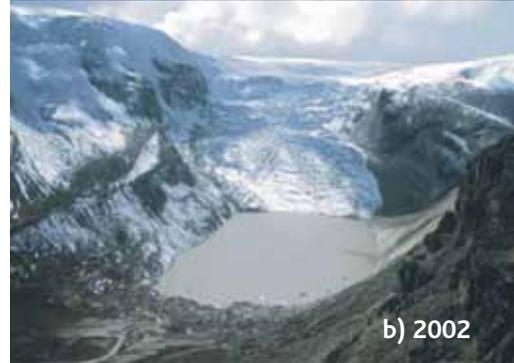
<sup>16</sup> IPCC AR4 WORKING GROUP II, *supra* note 12, at Chapter 13, Executive Summary.



The widely-documented, dramatic retreat of Andean glaciers, which provide the drinking, sanitation, irrigation, and hydroelectric power needs of an estimated 50 million people, has mirrored the observed increase in temperature since 1975 and is considered one of the clearest indicators of global climate change.<sup>17</sup> Across the region, glaciers have lost nearly a quarter of their surface area over the last 30 years.<sup>18</sup> A recent study found that from 1963-2006, 21 glaciers in the Bolivian Andes lost 43% of their volume and from 1975–2006 lost 48% of their surface area.<sup>19</sup> The IPCC predicts with high confidence that tropical Andean glaciers will disappear in a few decades, if not sooner,<sup>20</sup> and recent studies indicate that most of the South American glaciers from Colombia to Chile and Argentina are losing their volume at an accelerated rate.<sup>21</sup> The snow that feeds many rivers is also rapidly disappearing: 82% of Colombian snow cover, for example, has been lost since 1850.<sup>22</sup>



a) 1978



b) 2002

The retreat of the Qori Kalis glacier in Peru between 1978 (top) and 2002 (bottom). Red line was added to show the approximate area lost. Photos by L. Thompson, from Barnett et al. *Potential Impacts of Warming Climate on Water Dominated Region*, 438 NATURE 303-309 (2005).

<sup>17</sup> IPCC SUMMARY FOR POLICY MAKERS, *supra* note 4, at Section 4.5.3); See also B Franco, et al., *Glaciers of the Tropical Andes, Indicators of the Global Climate Variability*, in: GLOBAL CHANGE AND MOUNTAIN REGIONS: A STATE OF KNOWLEDGE OVERVIEW (U. Huber, K.M. Harald & M.A. Reasoner eds.) (2005).

<sup>18</sup> N.H. STERN, THE ECONOMICS OF CLIMATE CHANGE: THE STERN REVIEW, Part II, 63 (2007), (hereinafter THE STERN REVIEW).

<sup>19</sup> A. Soruco et al., *Glacier decline between 1963 and 2006 in the Cordillera Real*, Bolivia, Geophysical Research Letters, 36 (2009).

<sup>20</sup> IPCC AR4, WORKING GROUP II, *supra* note 12, at Chapter 13, Latin America, Executive Summary.

<sup>21</sup> *Id.*, at Chapter 13.

<sup>22</sup> W. Buytaert, R. Céleri, et al., *Human Impact on the Hydrology of the Andean Páramos* 79 EARTH-SCIENCE REVIEWS 53, 53–72 (2006).



Water security throughout the Northern Andes is threatened by the degradation of the region's páramos. Photo credit: Natalia Jiménez

18 Scientists have also begun to document the decline of *páramos*, important high-altitude wetlands endemic to certain parts of the tropical Andes<sup>23</sup> that provide environmental services for over 100 million people.<sup>24</sup> These systems store vast amounts of carbon as well as water and are vulnerable to the observed increase in temperature, decrease in precipitation and snow and glacial melt, all of which could exacerbate and rapidly increase their degradation.<sup>25</sup>

While melting glaciers increase water supply in the short term, their disappearance, together with the loss of other water regulating ecosystems, will yield catastrophic consequences soon thereafter. Andean glaciers and *páramos* serve two important hydrological functions: they store water and release it slowly when it is most needed during the dry seasons. By 2050, up to 50 million people in Bolivia, Colombia, Ecuador, and Peru will be affected by the loss of dry-season water for drinking, sanitation, and irrigation.<sup>26</sup> Bolivia and Peru are particularly vulnerable: home to<sup>27</sup> About two million people in the metropolitan area of La Paz and El Alto, Bolivia rely principally on glacial melt for water;<sup>28</sup> while communities on the arid Pacific coast of Peru derive 80% of their water from glacial and snow melt.<sup>29</sup> The over seven million residents of Bogotá, Colombia, meanwhile, rely almost ex-

<sup>23</sup> D. Ruiz, H. Alonso Moreno, et al., *Changing Climate and Endangered High Mountain Ecosystems in Colombia* 398:1-3 SCIENCE OF THE TOTAL ENVIRONMENT 122-32 (2008).

<sup>24</sup> Buytaert et al., *supra* note 22, at 60.

<sup>25</sup> *Id.* at 66.

<sup>26</sup> THE STERN REPORT, *supra* note 18, at 64.

<sup>27</sup> U.N. Development Programme [UNDP], Human Development Report Office Occasional Paper 2007/55, *Deglaciation in the Andean Region, 1* (prepared by J. Painter) available at: [http://origin-hdr.undp.org/es/informes/mundial/idh2007-2008/trabajos/Painter\\_James.pdf](http://origin-hdr.undp.org/es/informes/mundial/idh2007-2008/trabajos/Painter_James.pdf).

<sup>28</sup> Instituto Nacional de Estadística, Bolivia, *Proyecciones de población, 2000-2010*, available at: <http://www.ine.gov.bo/indice/visualizador.aspx?ah=PC20402.HTM>.

<sup>29</sup> Anne Coudrain, Bernard Francou & Zbigniew Kundzewicz, *Glacier Shrinking in the Andes and Consequences for Water Resources*, 50 HYDROLOGICAL SCIENCES JOURNAL 925-932 (2005).



Loss of traditional water sources can have grave impacts on the cultural and agricultural practices of indigenous groups. Photo credit: Johannes Roith.

clusively on *páramos* for their domestic water use. *Páramos* also provide 85% of household water for Quito, Ecuador.<sup>30</sup> The food security and rural livelihoods of poor and subsistence farmers, many of them indigenous, are particularly at risk. Agriculture in semiarid mountainous regions is especially vulnerable to disruptions in access to water; 85% of water consumption in Peru, for example, is put to agricultural use.<sup>31</sup>

Communities around Latin America are already feeling the human rights impacts from diminished access to water. Following the complete disappearance of the Cotacachi glacier in Ecuador, 25,000 inhabitants, including 18 indigenous communities, have experienced the total loss of significant rivers and traditional sources of drinking water.<sup>32</sup> As a result, these communities have struggled to adapt their agricultural practices and have experienced a rise in conflicts over water. The Cotacachi glacier was over 20,000 years old and central in the cosmology of indigenous Cotacacheños. Its rapid disappearance not only affects the rights to food and water of these communities, but also seriously disrupts their culture.

The loss of glaciers will also heavily impact electricity supply in the region. Hydropower provides the majority of electricity generated in Peru (80%), Colombia (82%), Ecuador (50%)<sup>33</sup> and Chile (37.2%).<sup>34</sup> An analysis of one power plant in Peru suggests that the disappearance of glaciers would

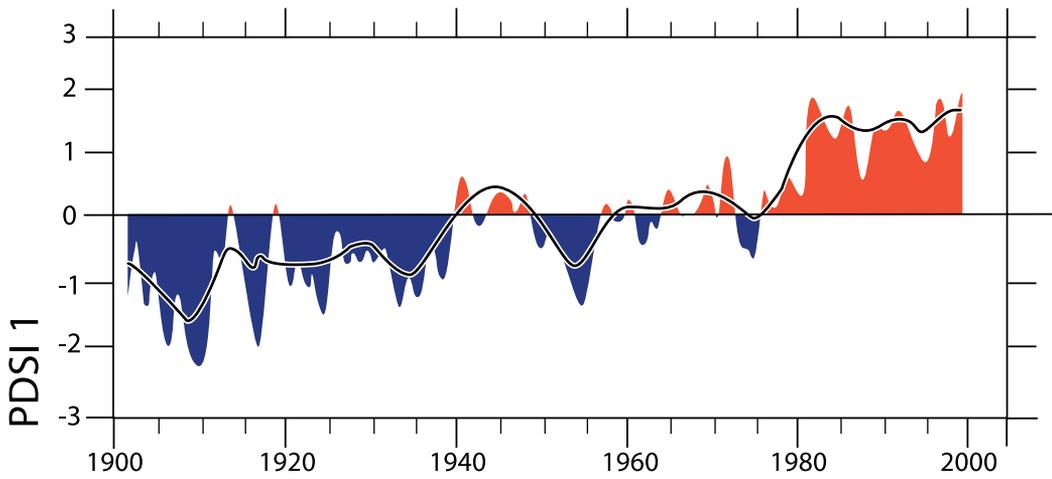
<sup>30</sup> Buytaert et al., *supra* note 22, at 61.

<sup>31</sup> World Bank, Sustainable Development Department, *Working Paper 32 Assessing the Potential Consequences of Climate Destabilization in Latin America*, 66 (W. Vergara ed.) (2009) [herein after *WB Working Paper 32*].

<sup>32</sup> R. Rhoades, *Disappearance of the Glacier on Mama Cotacachi: Ethnoecological Research and Climate Change in the Ecuadorian Andes*, 163 *PIRINEOS* 37-50 (2007).

<sup>33</sup> *WB Working Paper 32*, *supra* note 31, at 62.

<sup>34</sup> Chilean National Energy Commission, *Política Energética, Nuevos Lineamientos*, 43 available at [http://www.cne.cl/archivos\\_bajar/Politica\\_Energetica.pdf](http://www.cne.cl/archivos_bajar/Politica_Energetica.pdf).



**FIGURE 1**

Shows the trend of drought severity over a 100-year period since 1900 as measured by the Palmer Drought Severity Index (PDSI). The graph depicts a sharp increase in drought severity with red representing dryer years and blue representing wetter years. Reproduced from IPCC AR4 WORKING GROUP I, *supra* note 2, at FAQ 3.2..

lead to a nearly 40% loss in output, and cost the energy sector USD \$1.835 billion.<sup>35</sup> As they melt, glaciers can also cause sudden flash floods and avalanches, as occurred in Cuzco, Peru in 1998.<sup>36</sup> More than 1,000 lakes have been formed by recent glacial retreat in the Cordillera Blanca, Peru; as more glaciers melt there will be a serious threat of catastrophic flood as these lakes and others overflow their capacity.<sup>37</sup>

Scientists have also observed more intense and longer droughts over wider areas since the 1970s, particularly in the tropics and subtropics.<sup>38</sup> Drought severity has increased substantially across the region, except in the eastern Southern Cone, which has gotten wetter (see Figure 1). During 2004-2006 alone, unusually severe droughts afflicted Bolivia, Paraguay, the Argentinean Chaco, and the Brazilian Amazon and Rio Grande do Sul regions.<sup>39</sup> If greenhouse gas emissions continue at their current rate, models predict annual precipitation will decrease in most of Central America, particularly during the already dry spring season,<sup>40</sup> and that extremely dry seasons will be over six times as frequent by the end of the century.<sup>41</sup>

Precipitation loss can also be exacerbated by an increase in the frequency, intensity and duration of warm cycle El Niño events, which are the primary drivers of climate variability in Latin

<sup>35</sup> *WB Working Paper 32, supra* note 31, at 66.

<sup>36</sup> PAN-AMERICAN ADVANCED STUDIES INSTITUTE, *CLIMATE CHANGE IN THE AMERICAS: SYNTHESIS, INTEGRATION AND ASSESSMENT* (2007).

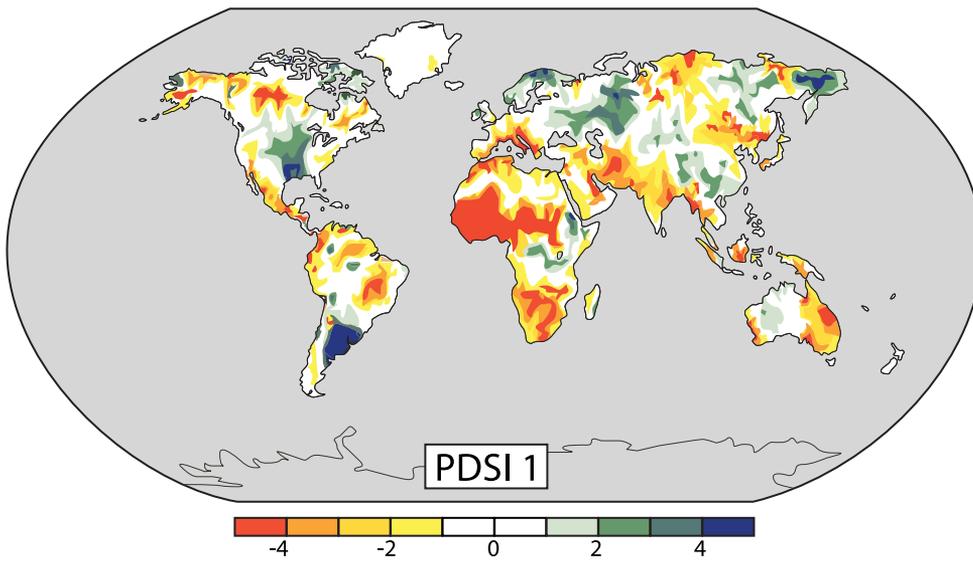
<sup>37</sup> Coudrain, Francou & Kundzewicz, *supra* note 29, at 931.

<sup>38</sup> IPCC AR4 SYNTHESIS REPORT, *supra* note 2, at Section TS 3.1.3.

<sup>39</sup> IPCC AR4, WORKING GROUP II, *supra* note 12, at Table 13.1.

<sup>40</sup> *Id.*, at Section 11.6.

<sup>41</sup> *Id.*, at Table 11.1. Section 11.1.2 explains the interpretation of this table. In Central North America (CNA), 33% of years between 2080-2099 are projected to be extremely dry, corresponding to a factor of more than six-fold increase over the rate of 5% for the years 1980-1999.



**FIGURE 2**  
Map of the world showing changes in drought severity as measured by the Palmer Drought Severity Index (PDSI) since 1900. Blue and green areas are wetter than average, red and yellow areas are drier. The Eastern Southern Cone has gotten wetter, while the majority of the rest of the region has gotten drier. Reproduced from IPCC AR4 WORKING GROUP I, *supra* note 2, at FAQ 3.2.

America, strongly influencing rainfall patterns.<sup>42</sup> While the existence of this pattern is uncontested, climate change’s role in these changes is still a matter of debate. The increase in El Niño events is consistent with rising tropical sea surface temperatures driven by climate change, and some scientists associate the unusually severe El Niño events of 1982 and 1997 with climate change.<sup>43</sup> Yet, because of the complexity of the El Niño Southern Oscillation (ENSO) and the existence of strong inter-decadal variability, there is no consensus amongst scientists as to the effects that climate change will have on ENSO in the future.<sup>44</sup> Nevertheless, droughts related to El Niño and La Niña events could create severe restrictions on water supply in parts of Argentina, Chile, and the Colombian Cauca and Magdalena river basins.<sup>45</sup>

Reduced precipitation will further exacerbate problems with access to freshwater resources, and could dry out underground aquifers that require rainwater to recharge. In Eastern Brazil, for example, the recharge of aquifers is expected to decrease 70% by 2050.<sup>46</sup>

Changes in precipitation will also negatively affect agriculture in the hemisphere. On average, communities use over 70% of their freshwater for growing food,<sup>47</sup> and rain-fed agriculture—

<sup>42</sup> See J.L. Gergis & A.M. Fowler, *A History of ENSO Events since A.D. 1525: implications for future climate change* 92:3-4 CLIMATIC CHANGE (2009) available at: doi:10.1007/s10584-008-9476-z; K.E. Trenberth & T.J. Hoar, *The 1990–1995 El Niño Southern Oscillation Event: Longest on Record*, 23 GEOPHYSICAL RESEARCH LETTERS 57-60; Qiong Zhang, Yue Guan & Haijun Yang, *ENSO amplitude change in observation and coupled models*, 25 ADVANCES IN ATMOSPHERIC SCIENCES 361-366 (2008).

<sup>43</sup> A.V. Fedorov, *Is El Niño Changing?*, 288 SCIENCE 1997-2002 (2000).

<sup>44</sup> See, e.g. G.A. Meehl, H. Teng & G. Branstator, *Future Changes of El Niño in Two Global Coupled Climate Models*, 26 CLIMATIC DYNAMICS 549-66 (2006). As the authors note, some climate models predict greater amplitude in ENSO events, others smaller, and some little difference.

<sup>45</sup> IPCC AR4, WORKING GROUP II, *supra* note 12, at Section 13.2.2.

<sup>46</sup> See IPCC Technical Paper VI, *supra* note 14, at 47 & Figure 3.4.

<sup>47</sup> UNDP, HUMAN DEVELOPMENT REPORT 2006, BEYOND SCARCITY: POWER, POVERTY AND THE GLOBAL WATER CRISIS, 173 (2006).



A drought induced fishkill in Brazil, 2005. Climate change impacts can disrupt entire ecosystems and local economies. Photo credit: Klimabündis Österreich

which makes up 90% of agriculture in Latin America<sup>48</sup>—is very vulnerable to changes in precipitation during the growing season. The IPCC predicts significant losses in rice yield in Guyana, Costa Rica, Guatemala, and Bolivia, and a regional 10% reduction of smallholder corn harvests by 2055, with countries such as Honduras facing severe losses of 21% by 2070.<sup>49</sup> These numbers are sobering given that undernourishment is already at 8% in the region, with rates of over 20% in countries such as Nicaragua, Bolivia, and the Dominican Republic, and a staggering 58% in Haiti.<sup>50</sup> In Mexico, over a fifth of the land currently available for growing corn may become unsuitable for that use as a result of reduced precipitation and rising temperatures.<sup>51</sup> In 2010, several Bolivian dams lost up to 70% of their water, leading the government to declare a state of emergency because of the widespread loss of crops and death of livestock which depended on the dams for irrigation.<sup>52</sup>

At least one humanitarian crisis has already occurred due to reduced rainfall in the Brazilian Amazon. During the dry season of 2005, warming of the North Atlantic caused the most severe drought in southwest Amazonia ever recorded, stranding hundreds of riverside settlements and caus-

<sup>48</sup> S.P. Wani et al., *Rainfed Agriculture - Past Trends and Future Prospects* 1-35, in: RAINFED AGRICULTURE: UNLOCKING THE POTENTIAL (CAB International) (2009) available at [http://www.iwmi.cgiar.org/Publications/CABI\\_Publications/CA\\_CABI\\_Series/Rainfed\\_Agriculture/Protected/Rainfed\\_Agriculture\\_Unlocking\\_the\\_Potential.pdf](http://www.iwmi.cgiar.org/Publications/CABI_Publications/CA_CABI_Series/Rainfed_Agriculture/Protected/Rainfed_Agriculture_Unlocking_the_Potential.pdf).

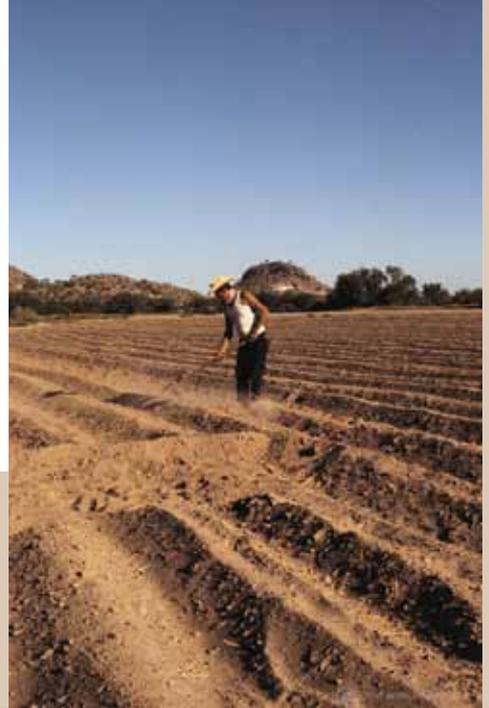
<sup>49</sup> IPCC AR4, WORKING GROUP II, *supra* note 12, at Figure 13.5.

<sup>50</sup> FOOD AND AGRICULTURE ORGANIZATION (FAO), *FOOD SECURITY STATISTICS* (2009) available at: <http://www.fao.org/economic/ess/food-security-statistics/en/>.

<sup>51</sup> C. Conde, D. Liverman, et al., *Vulnerability of Rainfed Maize Crops in Mexico to Climate Change*, 9 CLIMATE RESEARCH 7, at 20 (1997) available at: <http://www.int-res.com/articles/cr/9/c009p017.pdf>.

<sup>52</sup> *Represas del valle y del Chaco pierden del 20 al 70% de su agua*, LA PRENSA (BOLIVIA), July 6, 2010, available at: [http://www.laprensa.com.bo/noticias/6-7-2010/noticias/06-07-2010\\_388.php](http://www.laprensa.com.bo/noticias/6-7-2010/noticias/06-07-2010_388.php).

Rain-fed agriculture makes up 90% of all agriculture in Latin America and is very vulnerable to changes in precipitation. Photo credit: World Bank Photo Collection



ing a massive die-back of fish and crops.<sup>53</sup> A sanitation crisis ensued as the river no longer carried away sewage. The drought also led to tree death and increased forest fires.<sup>54</sup>

Finally, the loss of agricultural livelihoods is also a strong “push factor” for migration.<sup>55</sup> One recent study estimates that by 2080, climate change induced crop losses (due to droughts, floods and loss of cultivatable land) will lead an additional 1.4 to 6.8 million Mexicans to attempt migration to the United States.<sup>56</sup> Internally displaced people and emigrants are particularly vulnerable to exploitation, discrimination and hardship.

## B. EXTREME STORMS AND FLOODING

The IPCC notes that Latin America has suffered “highly unusual extreme weather events” over recent years,<sup>57</sup> and that in a warmer world, heavy rains are “very likely to continue to become more frequent.”<sup>58</sup> There has been a rise in heavy rains in north-eastern Brazil, Colombia and central

<sup>53</sup> Larry Rohter, *Record Drought Cripples Life Along the Amazon*, THE NEW YORK TIMES, Dec. 11, 2005, section International/Americas, available at: <http://www.nytimes.com/2005/12/11/international/americas/11amazon.html>.

<sup>54</sup> O.L. Phillips, et al., *Drought Sensitivity of the Amazon Rainforest*, 323 SCIENCE, 1344-47 (2009); LEOC Aragão, et al., *Spatial Patterns and Fire Response of Recent Amazonian Droughts*, 34 GEOPHYSICAL RESEARCH LETTERS, 5 (2007).

<sup>55</sup> The UNHCHR Report lists four types of climate-related drivers of displacement in paragraph 56: weather-related disasters; slow-onset disasters such as desertification, sinking of coastal zones and submersion of low-lying island states; increased disaster risks resulting in relocation from high risk zones; and social upheaval and violence attributable to climate change-related factors.

<sup>56</sup> S. Feng, A.B. Krueger & M. Oppenheimer, *Linkages among Climate Change, Crop Yields and Mexico-U.S. Cross-border Migration*, Proceedings of the National Academy of Science early edition (2010).

<sup>57</sup> IPCC AR4, WORKING GROUP II, *supra* note 12, at Ch. 11, Exec. Summary.

<sup>58</sup> IPCC SUMMARY FOR POLICY MAKERS, *supra* note 4, at 15.



In 2010, tropical storm Agatha devastated communities in Guatemala. Climate change increases the frequency and severity of such storms, which have devastating consequences for poor and marginalized communities.  
Photo Credit: Guatemala Government

24 Mexico,<sup>59</sup> which, combined with more frequent El Niño events since the 1980s,<sup>60</sup> are contributing to natural disasters including floods and landslides—all of which imply significant human rights consequences for rights such as the right to life, health, and adequate housing

The strongest hurricanes in the North Atlantic region have also become markedly more intense since the 1970s in a pattern that scientists have linked to warming sea surface temperatures associated with climate change.<sup>61</sup> The 2005 Atlantic cyclone season set multiple records, with 28 named systems, 15 hurricanes and four Category 5 storms.<sup>62</sup> This was consistent with IPCC predictions that tropical cyclones in this region will likely become more intense in terms of both wind speeds and precipitation.<sup>63</sup> Climate change may put South America in risk of cyclones as well: in March 2004, the first hurricane ever observed over the South Atlantic, Hurricane Catarina, left over 2,000 people homeless<sup>64</sup> and disproportionately affected the poor.<sup>65</sup>

<sup>59</sup> IPCC AR4, WORKING GROUP II, *supra* note 12, at Ch. 13, 13.2.4.1.

<sup>60</sup> *Id.*, at Ch. 13, 13.2.2.

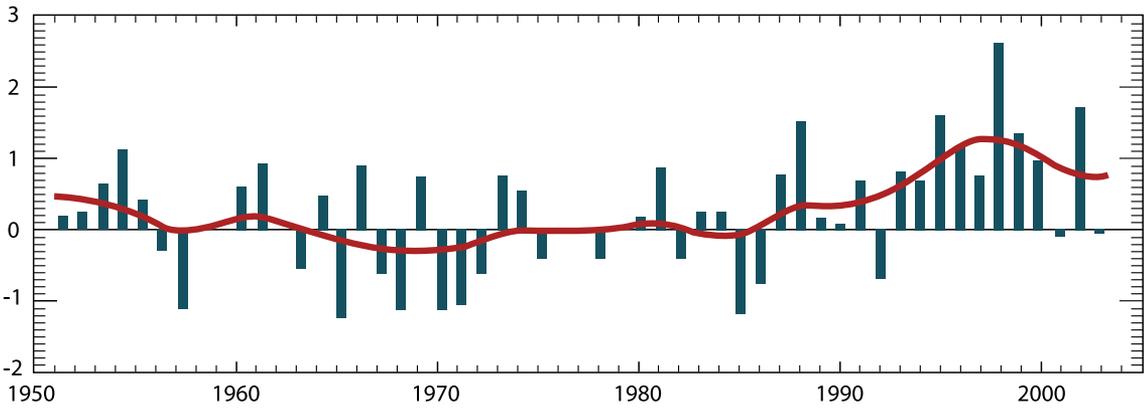
<sup>61</sup> C.D. Hoyos et al., *Deconvolution of the Factors Contributing to the Increase in Global Hurricane Intensity*, SCIENCE, 312 (2006); G.J. Holland & P.J. Webster, *Heightened Tropical Cyclone Activity in the North Atlantic: natural variability or climate trend?*, 365 PHILOSOPHICAL TRANSACTIONS OF THE ROYAL SOCIETY A: MATHEMATICAL, PHYSICAL AND ENGINEERING SCIENCES, 2695-716 (2007).

<sup>62</sup> NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION, THE 2005 NORTH ATLANTIC HURRICANE SEASON: A CLIMATE PERSPECTIVE available at: [http://www.cpc.noaa.gov/products/expert\\_assessment/hursummary\\_2005.pdf](http://www.cpc.noaa.gov/products/expert_assessment/hursummary_2005.pdf).

<sup>63</sup> IPCC SUMMARY FOR POLICY MAKERS, *supra* note 4, at 15.

<sup>64</sup> *First South Atlantic Hurricane Hits Brazil*, USA TODAY, Mar. 29, 2004.

<sup>65</sup> Emerson Vieira Marcelino, Isabela Pena Viana de Oliveira Marcelino & Frederico de Moraes Rudorff, Santa Caterina Federal University, *Cyclone Catarina: Damage and vulnerability assessment*, 14, available at: [http://www.dsr.inpe.br/geu/Rel\\_projetos/Relatorio\\_IAI\\_Emerson\\_Marcelino.pdf](http://www.dsr.inpe.br/geu/Rel_projetos/Relatorio_IAI_Emerson_Marcelino.pdf).



**FIGURE 3**

Extreme weather events are on the rise in recent years and unusually heavy rains occur with more frequency. The bars in the above graph show the rates of extremely wet days in a year. Higher bars correspond to years with more unusually heavy rains, as compared to an average measured from 1961-1990. IPCC AR4 WORKING GROUP I, *supra* note 2, at Figure TS 10

While it is impossible to attribute any one storm to the warming of the globe, scientists agree that climate change has been accompanied by a global increase in the strength and duration of hurricanes and heavy rains. Rising sea surface temperatures driven by greater atmospheric greenhouse gas concentrations generally increase evaporation rates, leading to more storms.<sup>66</sup> These heavier precipitation events are occurring even in places where the overall amount of annual precipitation has decreased—meaning the same area could be at risk of both heavy flooding as well as severe droughts.<sup>67</sup>

Latin America is very vulnerable to this increase in extreme storms. Instead of relieving problems with droughts and access to freshwater highlighted in the previous section, more severe storms will actually exacerbate problems by causing floods, mud- and land- slides and long-term impacts of crop loss, displacement, and disease epidemics. Approximately 8.4 million people live in the path of hurricanes in Central America,<sup>68</sup> where on average over 1,300 people are killed and 70,000 left homeless each year by storms, mudslides, or floods.<sup>69</sup> The contamination of water sources, disruption of sanitation and health services, and the crowding of refugees facilitate the

<sup>66</sup> See P.J. Webster, G.J. Holland, et al., *Changes in Tropical Cyclone Number, Duration, and Intensity in a Warming Environment*, 309/5742 SCIENCE 1844 (2005).

<sup>67</sup> IPCC SUMMARY FOR POLICY MAKERS, *supra* note 4, at FAQ 3.3.

<sup>68</sup> IPCC AR4, WORKING GROUP II, *supra* note 12, Section 13.2.2.

<sup>69</sup> This figure was calculated by averaging annual disaster statistics for Central America and the Caribbean between the years 1970-2009 for storms, floods, and 'wet' mass movements. Data are from the WHO Collaborating Centre for Research on the Epidemiology of Disasters (CRED), Emergency Events Database (EM-DAT) <http://www.emdat.be/>.



The frequency and intensity of extreme storms, such as those that in 2007 left nearly all of Tabasco, Mexico underwater are expected to increase due to climate change.  
Photo credit: Javier Garcia

spread of diarrheal and respiratory disease after floods. Malarial epidemics followed the unusually intense El Niño storms of 1982/83 in Peru, Ecuador, and Bolivia, and leptospirosis (Weil's disease) outbreaks have followed floods in many Latin American countries.<sup>70</sup> Storms also strain the economic resources of people and the State, which often require years to recover. Damage from storms, mudslides and floods in Latin America averaged over USD \$2.2 million per year from 1970-2009.<sup>71</sup> In 2010 alone, Colombia suffered USD \$218 million in flood and storm related damages.<sup>72</sup> Finally, storms can affect food security through the loss of agricultural harvests, fish, livestock and wildlife. The extreme El Niño event of 1997-1998, for example, caused significant damages to agricultural in the Andean region due to both storms and drought: approximately USD \$107 million in Colombia, USD \$121 million in Bolivia, USD \$630 million in Peru, and USD\$1.44 billion in Ecuador.<sup>73</sup>

<sup>70</sup> M. Ahern, *Global Health Impacts of Floods: Epidemiologic Evidence*, 27 *Epidemiologic Reviews*, 36-46 (2005).

<sup>71</sup> See CRED EM-DAT, *supra* note 69. This datum includes South America.

<sup>72</sup> *El costo del desastre natural en Colombia*, EL ESPECTADOR (BOGOTÁ), Apr. 11, 2011 available at <http://www.elspectador.com/impreso/negocios/articulo-262367-el-costo-del-desastre-natural-colombia>.

<sup>73</sup> J. Samaniego, Comisión Económica para América Latina y el Caribe (CEPAL) *Cambio climático y desarrollo en América Latina y el Caribe: una reseña*, 42 (2009).

STORM	AREA AFFECTED	IMPACTS
Mitch (1998)	Guatemala El Salvador Honduras Nicaragua	Over 9,000 killed 9,000 more missing
Jeanne (2004)	Haiti	3,000 killed 200,000 homeless
Stan (2005)	Costa Rica El Salvador Guatemala Honduras Mexico Nicaragua	Approx. 2,000 killed
Agatha (2010)	El Salvador Guatemala Honduras Honduras Mexico Nicaragua	184 killed \$1.1 billion in damages

**TABLE 1**  
Impact of worst storms in Latin America (<http://www.nhc.noaa.gov>)

Recent events in Latin America illustrate the human consequences of increasing severe storms due to climate change. Heavy rains in 2007 left nearly the entire state of Tabasco, Mexico underwater, affecting over one million people and displacing over 126,500.<sup>74</sup> Nearly all of the year’s corn, citrus, sugar cane, banana, and coffee harvest were lost, affecting over a third of Tabasco’s population, which depends on the agricultural sector. Deforestation and land subsidence associated with oil and gas development contributed to the severity of the flood, which President Felipe Calderon called “one of the worst natural disasters in the history of the country.”<sup>76</sup>

In northern Bolivia, just a year after some of the worst flooding ever experienced in the area, La Niña-induced heavy rains prompted the government to declare a state of emergency in January 2008.<sup>77</sup> Floodwaters, landslides, and mudslides claimed the lives of 75 people and affected over 94,000 families. These impacts were further exacerbated by the spread of water borne illnesses and extensive damage to housing and agriculture, which caused food prices to more than double.<sup>78</sup>

<sup>74</sup> P.W., Fagen, Humanitarian Policy Group, HPG Working Paper *Natural disasters in Latin America and the Caribbean: national, regional and international interactions* 19 (2008).

<sup>75</sup> Manuel de la Cruz, *Inundaciones arruinan la agricultura de fértil región mexicana*, Associated PRESS, Nov. 9, 2007, available at: <http://www.terra.com.pr/noticias/articulo/html/act1033111.htm>.

<sup>76</sup> *Mexico Battles Worst Flooding in 50 Years*, CBS NEWS, WORLD EDITION, Nov. 2, 2007, available at: <http://www.cbsnews.com/stories/2007/11/02/world/main3443635.shtml>.

<sup>77</sup> Republic of Bolivia, Permanent Mission Geneva, Submission to the Office of the High Commissioner on Human Rights: Cuestionario “Los derechos humanos y el cambio climatic” (2008).

<sup>78</sup> See U.N. Economic and Social Council [ECOSOC], Commission on Sustainable Development, Health and Sustainable Development: Report of the Secretary General, at 18, U.N. Doc. 32 E/CN.17/2001/PC/6 (2001) [hereinafter Secretary Gen. Report].



Increased instances of flooding due to climate change costs Colombia millions of dollars in relief efforts every year.  
Photo credit: World Bank Photo Collection

Brazil was also struck twice with widespread flooding in a single six-month period. In November 2008, torrential rains flooded 60 towns and landslides killed 135 people in the southern state of Santa Catarina.<sup>79</sup> Months of heavy rains in northeastern Brazil in early 2009 triggered landslides and flooding that ultimately left over 300,000 people homeless and killed at least 40.<sup>80</sup>

In late 2010, Colombia also suffered severe impacts when its most devastating floods in 40 years adversely affected over 2.2 million people and cost the country over US \$300 million in emergency relief.<sup>81</sup> With a global average temperature increase of 3°C, climate models predict with 93% probability that 20% of Colombia's population will be adversely affected by flooding this century.<sup>82</sup>

Governments must be prepared to respond to severe storms and the massive human rights impacts that can result, in particular for the rights to adequate housing, food, water health, integrity, and life. As this report explains further below, the communities that often suffer most from severe storms are historically discriminated populations and those without access to government services, such as the poor. Without adequate planning and the capacity to respond to severe storms, these human rights risks can easily become unavoidable tragedies.

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<sup>79</sup> A. Barrionuevo, *Little Relief Expected for Flood-Ravaged Brazil*, THE NEW YORK TIMES, May 18, 2009, available at: <http://www.nytimes.com/2009/05/18/world/americas/18brazil.html>.

<sup>80</sup> *Floods Ease in Brazil, but 300,000-plus Homeless*, THE GUARDIAN, (LONDON), World News (2008) available at: <http://www.guardian.co.uk/world/feedarticle/8499960>.

<sup>81</sup> T. Heyden, *Colombia Distributes \$309 Million for Flood Relief*, COLOMBIA REPORTS (2011) available at <http://colombiareports.com/colombia-news/news/13809-colombia-distributes-309-for-flood-relief.html>.

<sup>82</sup> See Samaniego, *supra* note 73.

## C. SEA LEVEL RISE AND OCEAN ECOSYSTEMS

As the oceans heat up, they expand. This, in combination with the melting of terrestrial ice sheets and glaciers, is causing sea levels to rise.<sup>83</sup> Since the 1960s, they have been rising at an increasingly rapid pace, now averaging over 3 mm per year globally.<sup>84</sup> Although it is difficult to find consensus on projections, most studies now predict that oceans could rise between 0.6 m to 1.9 m by the end of the 21st century.<sup>85</sup> These estimates far exceed the IPCC's latest figures from its 2007 report, which many scientists now criticize for not including effects such as the rapid disintegration of ice sheets.<sup>86</sup> Some studies also suggest that if governments do not take rapid action to curb global warming, we may soon reach a tipping point, after which the complete melting of the large Greenland ice sheet would be inevitable, which could raise world sea levels more than 7 m in the distant future.<sup>87</sup>

The impact in Latin America of a change of such magnitude is potentially huge: a one meter sea level rise would, for example, threaten 15,000 square kilometers of coastal Mexico, advancing as much as 40 km inland.<sup>88</sup> It would also put 1.4 million people and 29% of homes at risk in Colombia.<sup>89</sup> A 1.5 m sea level rise would displace 90% of the population of Guyana and affect most of the country's important economic activities.<sup>90</sup> Unless governments plan accordingly, the

<sup>83</sup> The three principal causes of sea-level rise are: *eustatic rise* (melting of glaciers and land ice), *isostatic rise* (rising of tectonic plates), and *thermal expansion* (expansion of seawater due to warming). See M. BOLLMANN, T. BOSCH, ET AL., *WORLD OCEAN REVIEW* 57 (MARIBUS, 2010).

<sup>84</sup> Coastal sea levels can vary significantly from the global average due to regional differences in water temperature, salinity, winds and ocean circulation patterns. IPCC AR4 SYNTHESIS REPORT, *supra* note 2, at Section 1.1.

<sup>85</sup> Estimating a 0.6-1.6m rise, Jeverjeva, et al., *How Will Sea Level Respond to Changes in Natural and Anthropogenic Forcings by 2100?* 37 *GEOPHYSICAL RESEARCH LETTERS* 3 (2010) available at: [http://kaares.ulapland.fi/home/hkunta/jmoore/pdfs/Jeverjeva\\_moore\\_grinsted\\_GSLforcing2010GL042947.pdf](http://kaares.ulapland.fi/home/hkunta/jmoore/pdfs/Jeverjeva_moore_grinsted_GSLforcing2010GL042947.pdf); Estimating a 0.75m to 1.9m sea-level rise, Martin Vermeer & Stefan Rahmstorf, *Global Sea Level Linked to Global Temperature*, 106 (51) *PROCEEDINGS OF THE NATIONAL ACADEMY OF SCIENCE* 21527-32 (2009) available at: <http://www.pnas.org/content/early/2009/12/04/0907765106.full.pdf>; indicating a general scientific consensus that sea levels will rise at least 1m by 2100, Orrin H. Pilkey, *Sea Level Rise and the World's Beaches*, ¶ 11 (2011) available at: <http://coastalcare.org/2011/01/sea-level-rise-and-the-worlds-baches/>; see also, T. RICHARDSON, D.M. KAMMEN, ET AL., *SYNTHESIS REPORT, GLOBAL RISKS, CHALLENGES & DECISIONS*, 10, (University of Copenhagen, 2009) available at: <http://www.pik-potsdam.de/news/press-releases/files/synthesis-report-web.pdf> (showing some new studies conclude a 1m or more rise by 2100); DELTACOMMISSIE, *WORKING TOGETHER WITH WATER: A LIVING LAND BUILDS FOR ITS FUTURE, FINDINGS OF THE DELTACOMMISSIE*, 10 (2008) available at [http://www.deltacommissie.com/doc/deltareport\\_full.pdf](http://www.deltacommissie.com/doc/deltareport_full.pdf) (0.6m to 1.3m rise in the Netherlands by 2100).

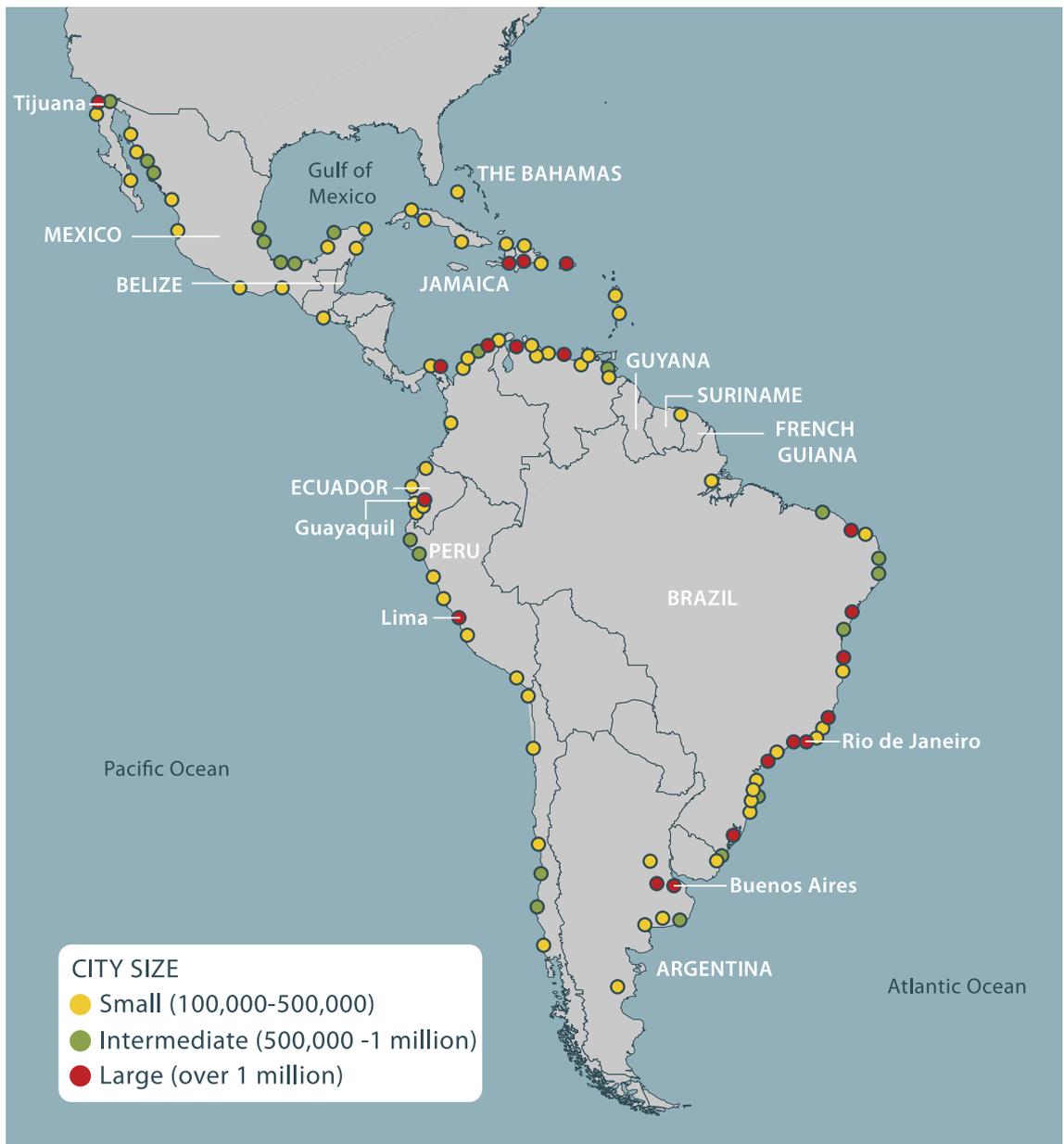
<sup>86</sup> See, e.g. Susmita Dasgupta & Craig Meisner, *Climate Change and Sea Level Rise: a review of the scientific evidence*, Environment Department Papers, Climate Change Series, 1 (World Bank, 2009) available at: <http://go.worldbank.org/XKAVWY0XCO> (and sources cited within); Jonathan T. Overpeck, et al., *Paleoclimatic Evidence for Future Ice-Sheet Instability and Rapid Sea-Level Rise*, 311 *SCIENCE* 1747-50, (2006) (suggesting that records of past ice-sheet melting indicate that future sea-level rise could be much faster than predicted). The IPCC estimates that sea levels could rise by 0.18m to 0.59m by the end of the century, and notes that understanding of rapid melting of the Greenland and Antarctic ice sheets "is too limited to assess their likelihood or to give a best estimate." IPCC SUMMARY FOR POLICY MAKERS, *supra* note 4, at Ch. 10.

<sup>87</sup> See Anil Ananthaswamy, *Last Chance to Hold Greenland Back from Tipping Point*, 2794 *THE NEW SCIENTIST* (2011); see also, Dasgupta & Meisner, *supra* note 86, at 7.

<sup>88</sup> Victor Magaña & Carlos Gay García, *Vulnerabilidad y Adaptación Regional ante el Cambio Climático y sus Impactos Ambiental, Social y Económicos*, 6 (Instituto Nacional de Ecología de México, 2002) available at: [www.inec.gob.mx/descargas/cclimatico/vulnerabilidad.pdf](http://www.inec.gob.mx/descargas/cclimatico/vulnerabilidad.pdf).

<sup>89</sup> IPCC AR4 WORKING GROUP II, *supra* note 12, at Figure 13.7.

<sup>90</sup> *Id.*, at Section 13.7.



**FIGURE 4**  
Latin American and Caribbean cities at risk of sea level rise. Reproduced from: UN Habitat Global Urban Observatory, 2008.

relocation of communities can easily cause forced displacement and violate multiple human rights, such as the right to adequate housing. It is important to note, however, that the number of people ultimately affected will depend on the speed at which sea levels rise and the adaptive capacity of each country. Low-lying islands, deltas and coastal plains are particularly vulnerable, as increasingly intense tropical storms can exacerbate sea level rise by increasing the risk of severe storm surges and flooding. In addition, as sea levels rise, salt water can also infiltrate underground sources of fresh water, threatening coastal water quality, agriculture, forestry, fisheries, aquaculture and biodiversity,<sup>91</sup> affecting rights to health, water, and food.

Climate change is also threatening ocean ecosystems, with dangerous implications for communities that rely on fisheries for their food and livelihoods.<sup>92</sup> Warming ocean temperatures are the likely cause of a 40% decline in marine phytoplankton (algae) since 1950.<sup>93</sup> These species form the basis for entire ocean food webs, and the pace of their decline is increasing rapidly. Sea level rise, surges and sedimentation associated with storms, ocean acidification<sup>94</sup> and warming have likely contributed to the destruction of over 80% of Caribbean coral reefs,<sup>95</sup> which are essential breeding grounds for fish. In Belize, high sea surface temperatures in 1998-1999 caused the first complete collapse of a coral population ever observed in the Caribbean.<sup>96</sup> Fish stocks near Peru and Chile, the coastal mangroves of Mexico, Central America and the continental Caribbean, and the Mesoamerican reefs are particularly threatened by climate change.<sup>97</sup> The impacts on the human rights to food and livelihood may be devastating: wild fish constitute 84% of the fisheries of Latin America.<sup>98</sup>

The situation of the Kuna indigenous peoples of Panama illustrates the multiple human impacts of climate change on coastal communities. Sea level rise is already apparent on the Atlantic San Blas islands of the autonomous *comarca* of Kuna Yala, where the indigenous government has begun planning the relocation of 32,000 residents of 47 communities.<sup>99</sup> Sea surges have destroyed homes and residents estimate that the sea has encroached 350 meters inland, causing a loss of agricultural land.<sup>100</sup> Subsistence agriculture and fishing play an important role in the Kuna way of life, and their worldview is intimately linked with the islands they have inhabited for over 500 years.<sup>101</sup> Relocation therefore involves not just economic and psychological hardship, but also a loss of sacred places, threatening their rights to cultural and spiritual integrity, in addition to the individual human rights impacts that this can imply.

<sup>92</sup> *Id.*, at Section 6.4.2, Table 6.4.

<sup>93</sup> Ove Hoegh-Guldberg & John F. Bruno, *The Impact of Climate Change on the World's Marine Ecosystems*, 328 *SCIENCE* 1523-28 (2010).

<sup>94</sup> D. Boyce, M. Lewis & B Worm, *Global Phytoplankton Decline over the Past Century*, 466 *NATURE* 591-96 (2010).

<sup>95</sup> BOLLMANN ET AL., *supra* note 83, at 36 ("There is a permanent exchange of gas between the air and the ocean. If the CO<sub>2</sub> levels in the atmosphere increase, then the concentrations in the near-surface layers of the ocean increase accordingly. The dissolved carbon dioxide reacts to some extent to form carbonic acid. This reaction releases protons, which leads to acidification of the seawater. The pH values drop.")

<sup>96</sup> Toby A. Gardner, et al., *Long-Term Region-Wide Declines in Caribbean Corals*, 301 *SCIENCE* 958-60 (2003).

<sup>97</sup> R.B. Aronson, et al., *Coral bleach-out in Belize*, 405 *NATURE* 36 (2000).

<sup>98</sup> PCC AR4 WORKING GROUP II, *supra* note 12, Section 13.2.2.

<sup>99</sup> *Id.*, at Section 5.3.2.3.

<sup>100</sup> H. Martín, *Islas kuna se hunden*, LA ESTRELLA (PANAMA) (2010) available at: <http://www.laestrella.com.pa/mensual/2010/04/20/contenido/226079.asp>.

<sup>101</sup> *Islas se hunden por cambio climático*, TVN NOTICIAS, Apr. 26, 2010, available at: [http://www.tvn-2.com/noticias/noticias\\_detalle.asp?id\\_news=31378](http://www.tvn-2.com/noticias/noticias_detalle.asp?id_news=31378).

<sup>102</sup> J. VENTOCILLA ET AL., *PLANTS AND ANIMALS IN THE LIFE OF THE KUNA*, (1995).



The Kuna indigenous peoples of Panama's San Blas islands must already face rising sea levels. Climate change threatens to destroy traditional ways of life for many indigenous groups and coastal communities.  
Photo credit: MacElwee

## D. INCREASED WILDFIRES

Since the 1980s, wildfires have become markedly more frequent and intense around the world, despite the growing implementation of management practices to reduce dry wood and undergrowth in forests. As discussed below, wildfires can have devastating impacts on communities, hindering the enjoyment of the rights to life, health, food and adequate housing, among others. During the unprecedented fire season associated with the ENSO droughts of 1997-98, 2.5 million, 3 million, and 5 million hectares burned, respectively, in Central America, Bolivia, and the single Brazilian state of Roraima, together equivalent to an area nearly as big as Uruguay.<sup>102</sup> The trend is not limited to forests alone: in 1993, four times the annual average of grass- and shrub-land burned in the Pampa region of central Argentina.<sup>103</sup> Ecosystems previously untouched by large scale fires, including the tropical rainforests of Brazil and cloud forests of Chiapas, Mexico, were also devastated by drought-driven fire during the 1990s.<sup>104</sup>

Climate change has been identified as a leading contributor to the recent increase in the number and severity of wildfires in North America.<sup>105</sup> Prolonged droughts are a primary contributor to wildfires in tropical forests,<sup>106</sup> while road-building, deforestation and forest fragmentation facili-

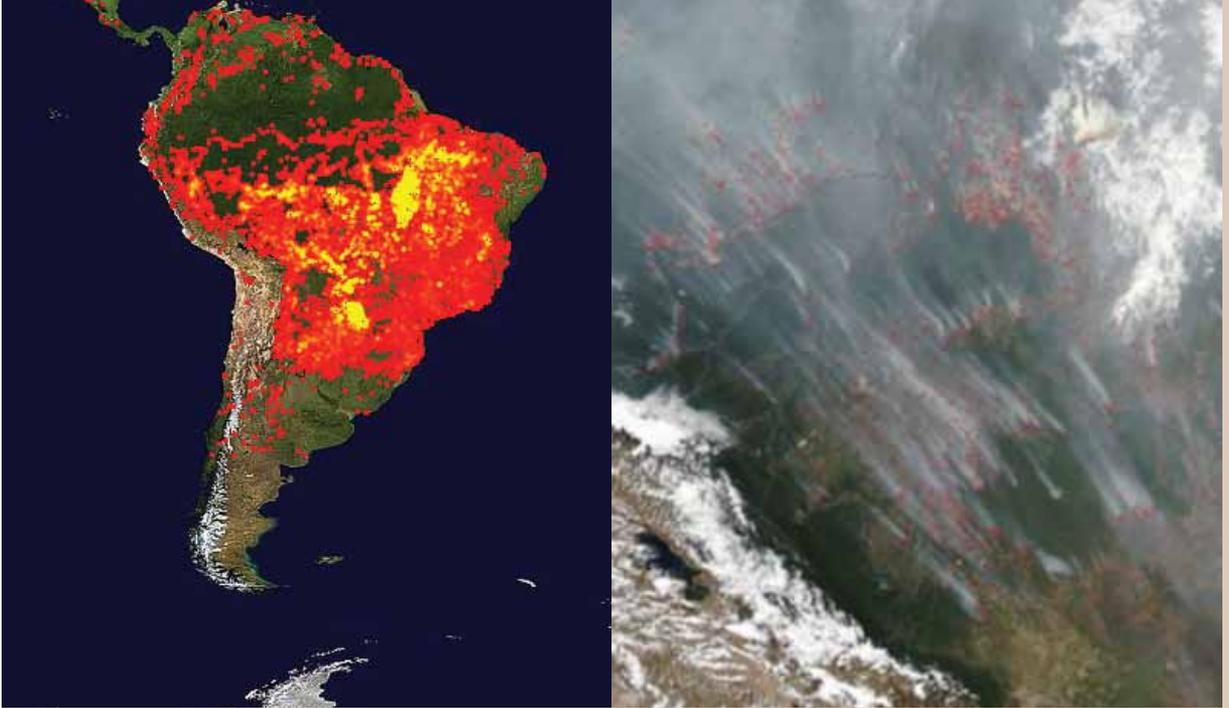
<sup>102</sup> M.A. Cochrane, *Fire Science for Rainforests*, 421 *NATURE* 913-19 (2003).

<sup>103</sup> FAO, Forestry Paper 140, *Global Forest Resources Assessment 2000*, at Ch. 8 (2000) available at: <http://www.fao.org/docrep/004/y1997e/y1997e0d.htm#bm130>.

<sup>104</sup> M.A. Cochrane, *supra* note 102. Historical records and charcoal in soil profiles show that tropical forests used to burn at intervals of hundreds if not thousands of years.

<sup>105</sup> A.L. Westerling, H.G. Hidalgo & T.W. Swetnam, *Warming and Earlier Spring Increase Western U.S. Forest Wildfire Activity*, 313 *SCIENCE* 940-43 (2006).

<sup>106</sup> D. Nepstad, et al., *Amazon Drought and Its Implications for Forest Flammability and Tree Growth: A Basin-Wide Analysis*, 10 *GLOBAL CHANGE BIOLOGY* 704-17 (2004).



South American forest fires as seen from space during September 2007 (left) and 2005 (right). Red areas on the left image contained a fire during a one week period, while yellow areas contained multiple. Smoke from fires in Brazil and Bolivia are pictured on the right. Both images are from NASA satellites. <http://rapidfire.sci.gsfc.nasa.gov/>

tate the ignition and spread of wildfires and make it even harder for forests to survive dry spells.<sup>107</sup> The IPCC has noted that climate variability is often the dominant factor affecting large wildfires, given the presence of an ignition source<sup>108</sup> and that even a slight reduction in precipitation could cause a drastic degradation in up to 40% of Amazonian forests.<sup>109</sup> During the 2001 drought associated with ENSO, for example, about one third of the Amazon forests became susceptible to fire.<sup>110</sup> Troublingly, the process can be self-reinforcing because Amazonian forests produce 25-50% of the region's rainfall through evapo-transpiration.<sup>111</sup> Intense storms associated with climate change also contribute to fire hazards in the Caribbean and Mesoamerica by creating a build-up of fuel.<sup>112</sup>

<sup>107</sup> M. Cochrane & W.F. Laurance, *Synergisms among Fire, Land Use, and Climate Change in the Amazon*, 37 *AMBIO: A JOURNAL OF THE HUMAN ENVIRONMENT* 522-27 (2008).

<sup>108</sup> IPCC AR4, WORKING GROUP II, *supra* note 12, at Section 1.3.6.2.

<sup>109</sup> *Id.*, at Section 13.4.1. The IPCC notes that these forest are likely to degrade into another type of ecosystem, such as tropical savanna, which are more resistant to wildfires, droughts and other stress.

<sup>110</sup> *Id.*, at Section 13.2.2.

<sup>111</sup> M.A. Cochrane & C.P. Barber, *Climate Change, Human Land Use and Future Fires in the Amazon*, 15 *GLOBAL CHANGE BIOLOGY* 601-12 (2009).

<sup>112</sup> See FAO, *supra* note 103; FAO, *Fire Management Working Paper FM/12/E*, 6 (2006) available at <http://www.fire.uni-freiburg.de/programmes/un/fao/FAO-Final-12-Regional-Reports-FRA-2005/WP%20FM12E%20Caribbean&Mesoamerica.pdf>.

The impacts of wildfires on human communities are both immediate and long lasting. Wildfires regularly take lives and can cause lasting economic damage and health problems. The Brazilian Roraima fires of 1998 killed 700 people<sup>113</sup> and wiped out 80% of the state's staple crops,<sup>114</sup> while in the same year 72 people died in Mexico attempting to control fires that covered the largest area to ever burn in one season there.<sup>115</sup> The damage resulting from that season's forest fires in Latin America has been crudely estimated at USD \$10-15 billion.<sup>116</sup> Several villages and towns were burned to the ground during Bolivia's 1999 fire season, when 12 million hectares, or 120 times the annual average, were destroyed.<sup>117</sup> More importantly, these fires also affect the human rights of communities in their wakes, by hindering access to food and harming the rights to health, life, and adequate housing.

The smoke from wildfires—which has darkened skies above South American cities enough to disrupt air traffic—is toxic and has been linked directly to low birth weight in infants and even mortality.<sup>118</sup> Wildfire smoke also affects the enjoyment of the rights to health and life by increasing the risk of respiratory illness, reduced lung function, hospital visits and asthma attacks. It can also lead to chronic disease.<sup>119</sup>

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<sup>113</sup> María Isabel Manta Nolasco, Fire Management Working Papers FM/5/E, *Global Fire Resource Assessment 2005 – Report on Fires in the South American Region*, 5-7 (FAO, 2006).

<sup>114</sup> See, Cochrane & Barber, *supra* note 111.

<sup>115</sup> See, FAO, *supra* note 103.

<sup>116</sup> UNEP, GEO-3: GLOBAL ENVIRONMENTAL OUTLOOK, 107 (2002) available at: <http://www.unep.org/geo/geo3/english/198.html>.

<sup>117</sup> *Fire Situation in Bolivia*, 28 INTERNATIONAL FOREST FIRE NEWS 41-44 (2003) available at: [http://www.fire.uni-freiburg.de/iffn/iffn\\_28/Bolivia.pdf](http://www.fire.uni-freiburg.de/iffn/iffn_28/Bolivia.pdf).

<sup>118</sup> WHO, WORLD HEALTH GUIDELINES FOR VEGETATION FIRE EVENTS, 73-74 (D. Schwela, J.G. Goldammer, et al., eds.) available at [http://www.preventionweb.net/files/1903\\_VL206105.pdf](http://www.preventionweb.net/files/1903_VL206105.pdf).

<sup>119</sup> *Id.*, at 71, 76.

## E. HEAT AND VECTOR-BORNE ILLNESS

Climate change has been called the “greatest global health threat of the 21st century.”<sup>120</sup> Overall, the World Health Organization estimates that in the year 2000, climate change related events killed 154,000 people worldwide through diarrhea, flood-related injury, malaria and malnutrition,<sup>121</sup> and led to a loss of 92,000 disability-adjusted life years in Latin American and the Caribbean region.<sup>122</sup> These figures are an underestimate because they only include the most easily quantifiable of the multiple impacts climate change can have on human health and consequently the rights to life and physical integrity. Other impacts include food shortages, outbreaks of water-borne illnesses following flood events, and air pollution resulting from wild fires. Among all these climate change related impacts, heat stress and vector-borne illnesses, such as malaria and dengue fever, are of particular concern for human rights in Latin America.<sup>123</sup>

Hot days, hot nights and heat waves have all increased globally since 1950,<sup>124</sup> and all of Latin America except for the Southern Cone is expected to warm more quickly than the global average.<sup>125</sup> Heat waves cause a dramatic, short term increase in mortality,<sup>126</sup> with children and the elderly at higher risk of death.<sup>127</sup> Warmer air temperatures also exacerbate ground-level ozone and smog pollution, contributing to respiratory illnesses.<sup>128</sup> Both are particularly worrisome in urban areas where the “heat-island effect” can warm air temperatures within a city 5–11°C above surrounding rural areas.<sup>129</sup> The rapid urbanization that Latin America is currently experiencing, combined with the effects of climate change, will lead to even greater increases in the above illnesses. In mega-metropolises such as Mexico City and Santiago, Chile, which are located in air basins subject to thermal inversions that trap toxic air pollutants, the combined effects will be particularly harmful for the health of residents.<sup>130</sup>

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<sup>120</sup> Anthony Costello et al., *Managing the Health Effects of Climate Change: Lancet and University College London Institute for Global Health Commission*, 373 *Lancet* 1693-1733 (2009).

<sup>121</sup> WHO, *THE WORLD HEALTH REPORT 2002* at 72 (2002) available at: [http://www.who.int/whr/2002/en/whr02\\_ch4.pdf](http://www.who.int/whr/2002/en/whr02_ch4.pdf).

<sup>122</sup> See, WHO, *CLIMATE CHANGE AND HUMAN HEALTH: RISKS AND RESPONSES*, at ch 7 (2003) available at: <http://www.who.int/entity/globalchange/environment/en/chapter7.pdf> (The disability-adjusted life year (DALY) is a summary measure of both morbidity and mortality that combines years of life lost due to premature death and ill health).

<sup>123</sup> IPCC AR4, *WORKING GROUP II*, *supra* note 12, at Section 13.4.5

<sup>124</sup> IPCC AR4 *SYNTHESIS REPORT*, *supra* note 2, at Section 1.

<sup>125</sup> IPCC AR4 *WORKING GROUP II*, *supra* note 12, at Section 11.6.

<sup>126</sup> *Id.*, at Section 8.2.1.1.

<sup>127</sup> N. Gouveia, *Socioeconomic Differentials in the Temperature-mortality Relationship in Sao Paulo, Brazil*, 32 *INTERNATIONAL JOURNAL OF EPIDEMIOLOGY*, 390-97 (2003).

<sup>128</sup> See ENVIRONMENTAL PROTECTION AGENCY (EPA), *CLIMATE CHANGE – HEALTH AND ENVIRONMENTAL EFFECTS* (Apr. 14, 2011) available at: <http://epa.gov/climatechange/effects/health.html>; EPA, *ASSESSMENT OF THE IMPACTS OF GLOBAL CHANGE ON REGIONAL U.S. AIR QUALITY: A SYNTHESIS OF CLIMATE CHANGE IMPACTS ON GROUND-LEVEL OZONE (2009)* available at <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=203459#Download>; WORLD BANK, *POLLUTION PREVENTION AND ABATEMENT HANDBOOK: GROUND LEVEL OZONE (1998)* available at <http://cfpub.epa.gov/ncea/cfm/recordisplay.cfm?deid=203459#Download>.

<sup>129</sup> C. Aniello, K. Morgan, et al., *Mapping Micro-urban Heat Islands Using Landsat TM and a GIS*, 21 *†* 965-69 (1995).

<sup>130</sup> IPCC AR4 *WORKING GROUP II*, *supra* note 12, at Section 13.3.2.

The reproduction and survival of infectious microorganisms and the insects that host them are also strongly influenced by fluctuations in temperature.<sup>131</sup> Climate change has already caused observable changes in the abundance and distribution of allergens and disease-causing bacteria and viruses.<sup>132</sup> The increase in El Niño events has been a driver of malarial epidemics in Colombia, Guyana, Peru, and Venezuela,<sup>133</sup> and one study estimates that by 2030, Latin America may experience up to a 28% growth in risk of malaria due to climate change.<sup>134</sup> Climate is associated with outbreaks of other diseases as well: during the 1997-98 El Niño event temperatures in Lima rose more than 5°C above normal and hospital admissions for diarrhea were more than double the expected rate.<sup>135</sup> One study also estimates that worldwide, 1.5-2.5 million more people will be at risk of dengue fever as a result of climate change.<sup>136</sup> If such trends continue, governments must take appropriate measures to ensure that these risks do not result in violations of the rights to health and life, particularly for vulnerable groups such as children and the elderly.

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<sup>131</sup> Jonathan A. Patz et al., *Impact of Regional Climate Change on Human Health*, 438 NATURE 310-17 (2005).

<sup>132</sup> IPCC AR4 WORKING GROUP II, *supra* note 12, at Table 1.11, Section 8.2.

<sup>133</sup> Alexandre Gagnon, Karen Smoyer-Tomic & Andrew Bush, *The El Niño Southern Oscillation and Malaria Epidemics in South America*, 46 INTERNATIONAL JOURNAL OF BIOMETEOROLOGY 81-89 (2002).

<sup>134</sup> WHO, CLIMATE CHANGE AND HUMAN HEALTH – RISKS AND RESPONSES, *supra* note 122, at Table 7.8.

<sup>135</sup> W. Checkley, et al., *Effect of El Niño and Ambient Temperature on Hospital Admissions for Diarrheal Diseases in Peruvian Children*, 355 LANCET 442-50 (2000).

<sup>136</sup> S. Hales, et al., *Potential Effect of Population and Climate Changes on Global Distribution of Dengue Fever: an empirical model*, 360 LANCET 830-34 (2002).

CAUSE	HEALTH EFFECT	LOCATION
El Niño	Epidemic malaria	Coastal Colombia and Venezuela
El Niño	Visceral leishmaniasis (Black fever)	Bahia State, Brazil
El Niño	Dermatological diseases (related to increased summer temperature)	Peru
La Niña	Cutaneous leishmaniasis	Venezuela
Drought	Epidemic malaria risk	Colombia and Guyana
Drought	Hantavirus pulmonary syndrome (probably due to increase food for rodents following intense rainfall)	Argentina, Bolivia, Chile, Paraguay, Panama and Brazil
Drought	Visceral leishmaniasis (Black fever)	North-eastern Brazil, amongst rural-urban migrant farmers
Flooding	Epidemic malaria risk	Northern coastal region of Peru
Flooding	Leptospirosis (Weil's Disease)	Brazil
Temperature, humidity, solar radiation & rainfall	Dengue / dengue hemorrhagic fever	Honduras and Nicaragua
Increased temperature & precipitation	Dengue transmission	Coastal Gulf of Mexico
Heat waves	Hyperthermia	Peru
Sea surface temperature	Carrion's disease	Peru

**TABLE 2**

Observed health impacts associated with climate patterns in Latin America, adapted from IPCC AR4, WORKING GROUP II, *supra* note 12, at Section 13.2.3.

## IV. Communities in Situations of Vulnerability

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People in situations of vulnerability, including impoverished communities, ethnic minorities, indigenous and tribal peoples, women, the elderly, and children, are at a higher risk of adverse impacts from climate change. The Member Parties of the UNFCCC directly recognized the greater burden that these groups suffer due to climate change during the 16<sup>th</sup> session of the Conference of the Parties.<sup>137</sup> These communities have historically suffered from structural discrimination due to their vulnerable position in society, and tend to have less access to State resources and agencies, and therefore are often exposed to the worst dangers in climate disasters. At the same time, international human rights law requires States to take special measures to protect the rights of these groups, and to do so within the context of their particular culture or special needs. Therefore, States must take these special vulnerabilities into account when preparing plans to respond to climate change. In addition, the fact that these communities hold very little, if any, responsibility for historical climate warming pollution makes for great inequity in the distribution of climate risks and responsibilities..

The Inter-American Court of Human Rights has long held that international law offers special protection to vulnerable communities and that States must “take affirmative action to reverse or change discriminatory situations that exist in their societies to the detriment of a specific group of persons.”<sup>138</sup> In situations where the right to life of vulnerable persons is at risk, this special protection must become a “high priority,”<sup>139</sup> such as in the case of children,<sup>140</sup> the elderly<sup>141</sup> and in-

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<sup>137</sup> The Cancun Agreements, *supra* note 8, preamble (“...the effects of climate change will be felt most acutely by those segments of the population that are already vulnerable owing to geography, gender, age, indigenous or minority status, or disability.”).

<sup>138</sup> Inter-Am. Ct. H.R., *Juridical Condition and Rights of the Undocumented Migrants*, Advisory Opinion OC-18/03, ¶ 104 (Sept. 17, 2003); see also United Nations Committee on Economic, Social and Cultural Rights (UNCESCR), *General Comment No 2: International technical assistance measures (art 22 of the Covenant)*, E/1990/23 (1990); UNCESCR, *General Comment No 3: The nature of State Parties’ obligations* (art 2, para. 1 of the Covenant), E/1991/23 (1990).

<sup>139</sup> *Yakye Axa Indigenous Community v. Paraguay*, 2005 Inter-Am. Ct. H.R. (Ser. C) No. 125, ¶ 162 (June 17, 2005).

<sup>140</sup> Advisory Opinion OC-17/02, *Juridical Condition and Human Rights of the Child*, 2002 Inter-Am. Ct. H.R. (Ser. A) No. 17 (Aug. 28, 2002); *Case of the Xákmok Kásek Indigenous Community v. Paraguay*, 2010 Inter-Am. Ct. H.R. (Ser. C) No 214, ¶¶ 257-258 (Aug. 24, 2010); “*Street Children*” (*Villagrán-Morales et al.*) *v. Guatemala*, 1999 Inter-Am. Ct. H.R. (Ser. C) No. 63, ¶¶ 190-96 (Nov. 19, 1999); “*Las Dos Erres*” *Massacre v. Guatemala*, 2009 Inter-Am. Ct. H.R. (Ser. C) No. 211, ¶ 184 (Nov. 24, 2009); *Chitay Nech et al. v. Guatemala*, 2010 Inter-Am. Ct. H.R. (Ser. C) No. 212, ¶ 164 (May 25, 2010).

<sup>141</sup> *Yakye Axa v. Paraguay*, *supra* note 139, ¶ 175.



indigenous communities.<sup>142</sup> In regard to women, the UN Office of the High Commissioner for Human Rights (OHCHR) has stated that international human rights standards and principles “underline the need to adequately assess and address the gender-differentiated impacts of climate change.”<sup>143</sup> In regard to children, the Convention on the Rights of the Child obliges States to “take action to safeguard children’s right to life, survival and development through, inter alia, addressing problems of environmental pollution and degradation.”<sup>144</sup> Also, the American Declaration and Convention for Human Rights both include provisions establishing special protections for children.<sup>145</sup>

Indigenous, tribal, and other traditional communities including peasant farmers have a special connection and dependency to their territories and natural resources, and therefore are especially vulnerable to environmental harms. Such communities often rely on traditional practices of farming, hunting, and fishing for subsistence, all of which are threatened by changes in precipitation, loss of ecosystems, or loss of fish populations. These traditional practices, and the close connection to the environment they represent, are often central for the culture of traditional communities. Therefore, the loss of such practices will not only interfere with communities’ rights to food, health and life, but will also affect their cultural and spiritual integrity. As the Inter-American Court has noted, such cultures have “developed on the basis of their close relationship with their traditional territories and the resources therein, not only because they are their main means of subsistence, but also because they are part of their worldview, their religiosity, and therefore, of their cultural identity.”<sup>146</sup> The examples

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<sup>142</sup> The Court has on repeated occasions declared that “it is crucial that the States grant effective protection providing for the particular conditions of the indigenous peoples, their economic and social situation, as well as their special vulnerability, customary law, values, and customs.” *Xakmok Kasek v. Paraguay*, *supra* note 140, ¶ 270; See also, *Yakye Axa v. Paraguay*, *supra* note 139, ¶ 63; *Saramaka People v. Suriname*, 2007 Inter-Am. Ct. H.R. (Ser. C) No. 172, ¶ 178 (Nov. 28, 2007); *Case of Tiu Tojin v. Guatemala*, 2008 Inter-Am. Ct. H.R. (Ser. C) No. 190, ¶ 96 (Nov. 26, 2008).

<sup>143</sup> OHCHR Report, *supra* note 6, ¶ 47.

<sup>144</sup> *Id.*, at ¶ 50.

<sup>145</sup> American Declaration on the Rights and Duties of Man, art. VII, May 2, 1948, O.A.S. Official Rec., OEA/Ser. L./V./II.23, doc. 21 rev. 6.; American Convention on Human Rights [ACHR], art. 19, Nov. 22, 1969, O.A.S. T.S. No. 36.

<sup>146</sup> *Yakye Axa v. Paraguay*, *supra* note 139, ¶ 135.



Poor and vulnerable communities that have contributed the least to climate change will bear the heaviest burden of its impacts. States have a special duty to protect such communities.  
Photo credit: Michelle Brea

presented earlier regarding Ecuadorean indigenous communities' dependence on the Cotacachi glacier for water and the Kuna peoples of Panama, highlight how loss of water resources and rising sea levels can both severely affect the cultural integrity of traditional peoples.

Poor communities in developing countries are also particularly vulnerable. Worldwide, approximately 95% of deaths resulting from natural disasters occur in developing countries, reflecting the lack of capacity to mitigate and prepare for extreme weather events.<sup>147</sup> Within those countries, the poorest communities are often located in informal urban slums built on floodplains or landslide-prone hillsides, and are thus at higher risk of disasters caused by increased storms and flooding. They also frequently lack access to State resources or programs to anticipate, cope with, resist, recover from, or adapt to climate change-related disasters.<sup>148</sup>

Climate change is likely to have a disproportionate impact on women, the elderly, children, and infants. The World Bank has noted that in the developing world, children will bear the primary burden of climate change,<sup>149</sup> raising the important concern of intergenerational injustice.<sup>150</sup> Meanwhile, women are subject to higher premature death rates associated with natural disasters or their aftermath than men.<sup>151</sup> Women are also vulnerable to increased sexual violence and made to shoulder a disproportionate amount of reconstruction work during recovery, as was evident in Nicaragua and Honduras following Hurricane Mitch.<sup>152</sup>

<sup>147</sup> Secretary Gen. Report, *supra* note 78, at 32.

<sup>148</sup> An overview of the interaction between poverty and natural disasters is given in D. GUHA-SAPIR, D. HARGITT & P. HOYOIS, THIRTY YEARS OF NATURAL DISASTERS 1974-2003: THE NUMBERS, 34-38 (2004).

<sup>149</sup> WORLD BANK, GLOBAL MONITORING REPORT 2008, MDGS AND THE ENVIRONMENT: AGENDA FOR INCLUSIVE AND SUSTAINABLE DEVELOPMENT, 211 (2008).

<sup>150</sup> The ICJ has recognized the principle of intergenerational justice as a concept imbedded in international law. See *Gabčíkovo-Nagymaros Project (Hung. v. Slov.)*, 1997 I.C.J. 7, at 150 (Sept. 25, 1997).

<sup>151</sup> Eric Neumayer & Thomas Plümper, *The Gendered Nature of Natural Disasters: The Impact of Catastrophic Events on the Gender Gap in Life Expectancy, 1981-2002*, 97 ANNALS OF THE ASSOCIATION OF AMERICAN GEOGRAPHERS, 551 (2007).

<sup>152</sup> P. DELANEY, GENDER AND POST-DISASTER RECONSTRUCTION: THE CASE OF HURRICANE MITCH IN HONDURAS AND NICARAGUA (World Bank, 2000) available at <http://www.sheltercentre.org/library/gender+post+disaster+reconstruction+case+hurricane+mitch+honduras+nicaragua>.

Vulnerable populations are also at greater risk for health problems in disaster situations. For example, these groups tend to have limited ability to travel and less access to health care or air conditioning, factors which can lead to a greater risk of death from heat-related illness. Additionally, children and pregnant women are particularly susceptible to vector-borne diseases such as malaria and dengue fever, as well as water-borne diseases like cholera and dysentery. For example, anemia resulting from malaria is currently responsible for one quarter of maternal mortality.<sup>153</sup> Finally, pregnant women, children, the elderly and those with existing respiratory problems are disproportionately at risk for the health effects of smoke due to large wildfires.<sup>154</sup>

When States consider measures to mitigate and adapt to climate change, they should place special emphasis on the vulnerability of the above groups and the unequal risks and burdens these groups face due to climate change. By doing so, States can strive to protect the human rights of disadvantaged groups in society and also fulfill their obligation to eliminate structural discrimination.

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<sup>153</sup> NFCCC, CLIMATE CHANGE: IMPACTS, ADAPTATION AND VULNERABILITIES IN DEVELOPING COUNTRIES (2009) available at: <http://unfccc.int/resource/docs/publications/impacts.pdf>.

<sup>154</sup> For example, wildfires led to an increase in deaths from respiratory and lung disease amongst the elderly in the state of Rondônia, Brazil, while biomass burning caused an outbreak of respiratory disease that sent many children to the emergency rooms of Rio Branco in 2005. See Hermano Albuquerque de Castro, Karen dos Santos Gonçalves & Sandra de Souza Hacon, *Trend of mortality from respiratory disease in elderly and the forest fires in the state of Rondônia/ Brazil - period between 1998 and 2005*, 14 CIÊNCIA & SAÚDE COLETIVA, 2083-90 (2009); Márcio Dênis Medeiros Mascarenhas et al., *Anthropogenic Air Pollution and Respiratory Disease-related Emergency Room VISITS IN RIO BRANCO, BRAZIL--SEPTEMBER, 2005*, 34 JORNAL BRASILEIRO DE PNEUMOLOGIA 42-46 (2008).

## V. Principal Human Rights Concerns of Mitigation and Adaptation Measures

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State responses for mitigating or adapting to climate change also may present important human rights implications, some of which are already occurring. Although a thorough analysis of these concerns is beyond the scope of this report, this section reviews some of the likely impacts these measures may have, in order to highlight the importance of including a human rights perspective when selecting, designing, and implementing climate change programs. *Mitigation measures* are attempts to reduce sources of GHG and climate change pollution or actions to capture GHG already in the atmosphere.<sup>155</sup> Such measures include improving energy efficiency, switching to solar or wind energy, and reforestation projects. On the other hand, *adaptation measures* respond to the predicted consequences of climate change, such as reacting to rising sea-levels or changing precipitation patterns.<sup>156</sup> While necessary, many adaptation and mitigation measures, if not properly implemented, may have unintentional consequences for human rights. These consequences may be particularly harmful if processes to develop measures do not include adequate procedures for access to information and public participation of interested parties (*see infra*, sec. VI.b). This section summarizes critiques of several mitigation and adaptation measures based on their tendency to cause unintended interference with the enjoyment of human rights.

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<sup>155</sup> IPCC AR4 WORKING GROUP II, *supra* note 12, at 3.1.2 & Glossary of terms.

<sup>156</sup> *Id.*, at 17.1 & Glossary of terms.



## A. MITIGATION MEASURES

Some of the principal strategies States are employing to reduce climate change pollution, including carbon trading schemes and biofuel production, are creating unintended human rights consequences. First, market-based mechanisms, including emissions-trading and tradable carbon “offsets,” have been a primary strategy for many States seeking to meet the Kyoto Protocol’s emissions targets.<sup>157</sup> Market mechanisms allow the creation of atmospheric rights in the form of pollution permits that can be traded. However, the allocation of property rights to a previously common resource holds many equity implications. For example, because carbon dioxide is typically emitted with co-pollutants that are toxic to human health, the trading of greenhouse gas permits may lead to the export of hazardous pollution or its concentration in “hot spots,” which are typically near vulnerable or disadvantaged communities.<sup>158</sup> Also, governments should ensure that by placing a price on carbon or promoting energy alternatives, they do not inadvertently impact poor communities by increasing the prices of many consumer goods, such as fuels and bread, as this could affect people’s economic rights.<sup>159</sup>

<sup>157</sup> Offsets are activities that avoid or reduce greenhouse gas emissions and must be “real and additional” in order to be effective. “Additional” projects are those that would not have occurred in the absence of additional financing provided through the carbon market, and additionality has proven notoriously difficult to verify because it must be measured against a counterfactual, and unknowable, future. For example, a wind power project would be “additional,” if it were not financially viable in the absence of carbon financing and a coal fired power plant would have been built in its place. Tradable offsets can be generated through the Clean Development Mechanism of the Kyoto Protocol and various voluntary markets.

<sup>158</sup> The California Environmental Justice Movement’s Declaration on Use of Carbon trading Schemes to Address Climate Change, Feb. 19, 2008 available at: <http://www.ejmmatters.org/declaration.html>.

<sup>159</sup> See Michael Vandenbergh & Brooke Akerly, *Climate Change: The Equity Problem*, 26 *Virg. Env. Law J.* (2007) available at: [http://papers.ssrn.com/sol3/papers.cfm?abstract\\_id=1024173](http://papers.ssrn.com/sol3/papers.cfm?abstract_id=1024173); INTERNATIONAL COUNCIL ON HUMAN RIGHTS POLICY, *CLIMATE CHANGE AND HUMAN RIGHTS: A ROUGH GUIDE*, 36-40 (2008) [hereinafter *ICHRP GUIDE*]. The “Greenhouse Development Rights” is one framework that attempts to reconcile tightening national emissions caps with the right to development by ensuring access to a baseline level of “subsistence emissions” for everyone. See P. BAER, ET AL., *THE RIGHT TO DEVELOPMENT IN A CLIMATE CONSTRAINED WORLD* (2008) available at: <http://www.ecoequity.org/docs/TheGDRsFramework.pdf>.



African palm plantations, such as these planted illegally on Afro-Colombian territory in Northwestern Colombia, can displace communities while purportedly advancing "green" energies like biofuels. Photo credit: AIDA

The production of biofuels from food crops such as corn, intended to mitigate greenhouse gas emissions from vehicles, has also contributed to rising food prices.<sup>160</sup> By causing competition for increasingly scarce arable land between food and fuel feedstock uses, even "second generation" biofuels, made from non-food crops, can displace agriculture in the global food market, driving up food prices and increasing deforestation.<sup>161</sup> The demand for biofuels may also encroach on traditional peoples' lands if projects are not properly implemented or the rights of communities are not respected. Unfortunately, cases of conflicts between biofuel projects and traditional communities have already been reported, as with the situation of several Afro-descendant communities in Colombia.<sup>162</sup>

44 An agreement on reducing emissions from deforestation and forest degradation (REDD) is the vehicle currently under development in the UNFCCC negotiations to finance the preservation of forests for their carbon sequestration capacities. The creation of new value in specific types of forest management could have human rights implication for the forest-dwelling communities of Latin America, especially those with only informal title to their traditional lands. In these cases, communities' "carbon rights" would be difficult to determine and distinguish from competing claims.<sup>163</sup> In particular, marginalized communities might not be able to access benefits, and instead,

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<sup>160</sup> Michael Kanellos, *The Biofuel Factor is Rising Food Prices*, CNET, (April 15, 2008) available at: [http://news.cnet.com/8301-11128\\_3-9918741-54.html](http://news.cnet.com/8301-11128_3-9918741-54.html).

<sup>161</sup> R. Trostle, *Global Agricultural Supply and Demand: factors contributing to the recent increase in food commodity prices*, 18 (United States Department of Agriculture, 2008) available at: <http://www.ers.usda.gov/Publications/WRS0801/WRS0801.pdf?fn=7411700381>.

<sup>162</sup> See e.g., the controversy over Palm Oil monocultures used to produce biofuels, FOOD FIRST, INSTITUTE FOR FOOD & DEVELOPMENT POLICY, COLOMBIA PALM OIL BIODIESEL PLANTATIONS: A "LOSE-LOSE" DEVELOPMENT STRATEGY? (2008) available at: <http://www.foodfirst.org/fr/node/1808>.

<sup>163</sup> REDD NET, *Carbon Rights in REDD+ and their implications in East Africa*, at Box 1 (Dec., 2010) available at: [http://www.ugandacoalition.or.ug/uploads/REDD-net%20Bulletin%20finalx\(2\).pdf](http://www.ugandacoalition.or.ug/uploads/REDD-net%20Bulletin%20finalx(2).pdf).

could be exposed to new risks, even of losing their lands, as the value of standing forests increases and different actors attempt to claim rights to land and forests.<sup>164</sup> While not many of these programs have been fully implemented yet, one recent report criticized REDD projects in East Africa for lacking transparency, not guaranteeing meaningful participation or free, prior, and informed consent from local indigenous peoples, and for potentially preventing local communities from realizing traditional subsistence practices.<sup>165</sup>

States can take a number of actions to mitigate emissions that do not present an undue burden on disadvantaged communities. Many have co-benefits in terms of job creation and health. For example, the air pollution associated with household cooking using inefficient biomass stoves is estimated to kill 950,000 children each year.<sup>166</sup> Household cooking is also responsible for about half of global black carbon emissions, which in turn are estimated to be the second largest contributor to global warming after carbon dioxide.<sup>167</sup> With an atmospheric lifetime of just weeks, reducing black carbon emissions is also one of the fastest ways of slowing climate change, because the benefits of curbing black carbon emissions is realized in a matter of weeks.<sup>168</sup> This is not the case for GHG such as CO<sub>2</sub>, which can remain in the atmosphere for over a century. The dissemination of inexpensive, improved cook stoves to poor households thus has huge potential for improving the human right to health at the same time as it represents one of the least expensive means of mitigating climate change.<sup>169</sup>

<sup>164</sup> *Id.*

<sup>165</sup> EMMANUEL FREUDENTHAL, SAMUEL NNAH & JUSTIN KENRICK, REDD AND RIGHTS IN CAMEROON: A REVIEW OF THE TREATMENT OF INDIGENOUS PEOPLES AND LOCAL COMMUNITIES IN POLICIES AND PROJECTS, 3 (Forest Peoples Programme, 2011) available at: [http://www.forestpeoples.org/sites/fpp/files/publication/2011/02/reddandrightscamerooneffeb2011englowres\\_0.pdf](http://www.forestpeoples.org/sites/fpp/files/publication/2011/02/reddandrightscamerooneffeb2011englowres_0.pdf).

<sup>166</sup> See K. Smith, S. Mehta, et al., *Indoor Smoke from Household Solid Fuels*, in WHO, COMPARATIVE QUANTIFICATION OF HEALTH RISKS: GLOBAL AND REGIONAL BURDEN OF DISEASE DUE TO SELECTED MAJOR RISK FACTORS 1435-93 (2004); UNEP & WMO, INTEGRATED ASSESSMENT OF BLACK CARBON AND TROPOSPHERIC OZONE: SUMMARY FOR DECISIONMAKERS (2011).

<sup>167</sup> V. Ramanathan & G. Carmichael, *Global and Regional Climate Changes Due to Black Carbon*, 1 NATURE GEOSCIENCE 221 (2008).

<sup>168</sup> See Jessica Seddon Wallack & Veerabhadran Ramanathan, *The Other Climate Changers: Why Black Carbon and Ozone Also Matter*, 88 FOREIGN AFFAIRS (2009).

<sup>169</sup> K. Smith & K. Balakrishnan, *Mitigating Climate, Meeting MDGs, and Moderating Chronic Disease: the health co-benefits landscape*, Commonwealth Health Minister's Update, 59 & Figure 2 (2009) available at <http://ehs.sph.berkeley.edu/krsmith/publications/2009%20pubs/Commonwealth%20Ministers%20Co-Ben%2009.pdf>.

Faster mitigation measures such as reducing black carbon should also be accompanied by longer-term solutions like protecting key carbon storing ecosystems including native forests, mangroves, and páramos. The concentration of organic material in the soil of páramo ecosystems, for example, can store more carbon than a tropical jungle.<sup>170</sup> Tropical mangrove trees are also more efficient at storing carbon than most other forests, and can store up to two to four times more carbon than tropical rainforests. However, because of its greater carbon storage capacity, when a mangrove is destroyed it releases considerably more carbon, accounting for as much as 10% of all deforestation emissions worldwide although comprising only 0.7% of the world's tropical forest area.<sup>171</sup>

## B. ADAPTATION MEASURES

Countries throughout Latin America must implement adaptation measures to protect human rights from the effects of climate change.<sup>172</sup> Even if all States stopped emitting climate change pollutants today, historical greenhouse gas emissions have already committed the world to a certain degree of climate change, and therefore all nations would still need to pursue measures to protect human rights. As most countries have not yet begun adapting to climate change effects, there are relatively few examples to draw upon a thorough analysis of the human rights implications of such measures. However, there already are several examples of innovative, local adaptation strategies, and governments can easily begin to adopt a human rights approach to the planning and implementation of measures today.

First, low-tech measures that draw on local knowledge and innovation could be the best solution to develop initial measures. For example, farmers in the altiplano region of Peru and Bolivia are adapting to increasing severity of drought through an ancient system of canals and raised fields, known as Waru Waru.<sup>173</sup> Traditional, multi-crop farming techniques have been shown to be more re-

<sup>170</sup> LOS PÁRAMOS EN EL MUNDO; SU DIVERSIDAD Y SUS HABITANTES, 24 (Robert Hofstede, Patricio Mena & Pool Zegarra eds.) (2003) available at: [http://www.paramo.org/files/Introduccion\\_Paramos\\_mundo.pdf](http://www.paramo.org/files/Introduccion_Paramos_mundo.pdf).

<sup>171</sup> Daniel C. Donato, et al., *Mangroves among the Most Carbon-rich Forests in the Tropics*, 4 NATURE GEOSCIENCE 293, X (2011).

<sup>172</sup> The IPCC predicts that "even if the concentrations of all GHGs and aerosols had been kept constant at year 2000 levels, a further warming of about 0.1°C per decade would be expected." IPCC AR4, SYNTHESIS REPORT, *supra* note 2, at 3.2.

<sup>173</sup> FAO, Globally Important Agricultural Heritage Systems (GIAHS) available at <http://www.fao.org/n/giahs/faq/questions/faq-1/en/>.

silent to hurricanes and may also improve rural livelihoods.<sup>174</sup> Unfortunately, while these initiatives are encouraging, such measures alone will unlikely be sufficient to adapt to most of the climate change effects highlighted in this report. Governments will have to develop and implement plans on a wider scale, involving difficult decisions, such as coordinating the relocation of thousands of people, as is being considered in Bolivia, where melting glaciers may leave many thousands without adequate water.<sup>175</sup>

In developing and implementing these larger-scale adaptation plans, it is crucial that States adopt a human rights approach.<sup>176</sup> Such an approach would give a central role not only to economic considerations, but also to the impact that measures will have on the human rights of individuals and communities—either positive or negative. This approach has already been incorporated in the December 2010 Cancun Adaptation Framework which, among other things, “[a]ffirms that enhanced action on adaptation... should follow a country-driven, gender-sensitive, participatory and fully transparent approach, taking into consideration vulnerable groups, communities, and ecosystems.”<sup>177</sup> At a minimum, States taking this approach should always ensure fair, inclusive, and transparent public participation from the early stages of planning, making a special effort to include vulnerable populations and communities.<sup>178</sup>

While all plans and programs should be country-specific, governments should consider using established methodologies such as the National Adaptation Programs of Action (NAPAs). NAPAs were developed to assist Least Developed Countries in identifying priority activities for adapting to climate change, especially those for which further delay would increase vulnerability and/or costs at a later stage.<sup>179</sup> NAPAs should be designed to assure gender equality and broad participation in developing adaptation plans and programs,<sup>180</sup> and can be a first step to incorporating a human rights perspective into adaptation measures.

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<sup>174</sup> GLOBAL FACILITY FOR DISASTER REDUCTION AND RECOVERY, GFDRR PROGRAMS: DISASTER RISK REDUCTION BUILDING RESILIENCE IN CLIMATE CHANGE (2008) available at [http://www.gfdr.org/gfdr/sites/gfdr.org/files/publication/GFDRR\\_Building\\_Resilience.pdf](http://www.gfdr.org/gfdr/sites/gfdr.org/files/publication/GFDRR_Building_Resilience.pdf).

<sup>175</sup> David Shukman, *Glacier Threat to Bolivia Capitol*, BBC NEWS, Dec. 04, 2009 available at <http://news.bbc.co.uk/2/mobile/science/nature/8394324.stm>.

<sup>176</sup> For more on how to incorporate a human rights approach, see ICHRP GUIDE, *supra* note 159, at 17-27 (2008); see also Human Rights and Equal Opportunity Commission, Background Paper, *Human Rights and Climate Change* (2008) available at: [http://www.hreoc.gov.au/about/media/papers/hrandclimate\\_change.html#fnB74](http://www.hreoc.gov.au/about/media/papers/hrandclimate_change.html#fnB74).

<sup>177</sup> The Cancun Agreements, *supra* note 8, ¶ 12; see also, UNFCCC, Decision 28/CP.7, Guidelines for the Preparation of National Adaptation Programmes of Action (NAPAs) U.N. Doc. FCCC/CP/2001/13 Add 4 (Jan. 21, 2002) [hereinafter NAPA Guidelines] available at [http://unfccc.int/national\\_reports/napa/items/2719.php](http://unfccc.int/national_reports/napa/items/2719.php).

<sup>178</sup> See *infra* section VI.B.

<sup>179</sup> Napa Guidelines, *supra* note 177.

<sup>180</sup> *Id.*

# VI. The Human Rights Implications of Climate Change

**F**or millions of people throughout the hemisphere the above climate change impacts will negatively affect the enjoyment of basic human rights, including the rights to a healthy environment, dignified life, health, food, adequate housing, and water. In the following section we summarize some of the most important human rights under the Inter-American System that are affected by climate change. This section, however, is not meant to be an exhaustive list, and virtually all human rights may be affected in some way by climate change.

Under international law, States and their governments have an obligation to actively protect human rights and to take positive measures to guarantee human rights against foreseeable dangers – including those caused by climate change. However, it is important to note that not all States have contributed or are presently contributing equally to human-caused climate change. Therefore, certain States should have differentiated responsibilities to help other countries adapt to and mitigate climate change. It is also crucial that the Inter-American Commission highlight the inherent inequalities of a problem to which a small number of industrialized nations have contributed excessively, but from which many nations in the region will suffer disproportionate impacts. With this in mind, the Commission will be able to make recommendations to States "on the basis of equity and in accordance with their common but differentiated responsibilities and respective capabilities."<sup>181</sup>

## A. HUMAN RIGHTS IMPLICATED BY CLIMATE CHANGE IMPACTS

### 1. Human Right to a Healthy Environment

■ The dramatic impacts foreseen in global climate change predictions are all inherently linked to alterations in the environment, and therefore will have their strongest effect in the enjoyment of the right to a healthy environment. This fundamental right is consecrated in article 11 of the Proto-

<sup>181</sup> U.N. Framework Convention on Climate Change [UNFCCC], art. 3(1) March 21, 1994.



For millions of people throughout the hemisphere climate change will negatively affect the enjoyment of basic human rights. Photo Credit: John O'Keefe

col of San Salvador: "Everyone shall have the right to live in a healthy environment and to have access to basic public services."<sup>182</sup> In addition, the principle behind this right has existed in many different forms in international environmental law, such as the first principles of both the Stockholm and the Rio Declarations on the environment<sup>183</sup> and the draft principles on Human Rights and the Environment.<sup>184</sup>

Highly erratic climactic patterns and the resulting increases in flooding, fierce storms, water scarcity, droughts, wildfires, and rising sea levels, all predicted or demonstrated by scientific studies highlighted above, will have an adverse impact on the natural environment of all the States in the hemisphere. These negative impacts will inhibit the enjoyment of the right to a healthy environment by severely and irreversibly disrupting the natural ecosystems upon which all people depend. In many cases, such as with water scarcity, droughts, flooding of coastal areas, and wildfires, these impacts can permanently harm or even destroy natural ecosystems that provide food, water and livelihoods to millions of people.

<sup>182</sup> Additional Protocol to the American Convention on Human Rights in the Area of Economic, Social and Cultural Rights (Protocol of San Salvador) art. 11, Nov. 17, 1988, O.A.S.T.S. No. 69.

<sup>183</sup> Declaration of the U.N. Conference on the Human Environment (Stockholm Declaration), June 16, 1972 11 I.L.M., 1416 principle 1 [hereinafter, Stockholm Declaration], ("Man has the fundamental right to freedom, equality and adequate conditions of life, in an environment of a quality that permits a life of dignity and well-being, and he bears a solemn responsibility to protect and improve the environment for present and future generations."); Rio Declaration on the Environment and Development, Principle 1, U.N. Doc A/CONF.151/26 (Vol. I) (June 1992) [hereinafter Rio Declaration] ("Human beings are at the centre of concerns for sustainable development. They are entitled to a healthy and productive life in harmony with nature.").

<sup>184</sup> Draft Principles on Human Rights and the Environment, art. 2, U.N. Doc. E/CN.4/Sub.2/1994/9, Annex I (1994). ("All persons have the right to a secure, healthy and ecologically sound environment. This right and other human rights, including civil, cultural, economic, political and social rights, are universal, interdependent and indivisible.").

These impacts also highlight how the right to a healthy environment is intricately connected with other human rights, principally the right to life, and that the disruption in the enjoyment of the right to a healthy environment will inevitably interfere with many different rights. This interconnection has been recognized by a growing number of international judicial bodies, including the Inter-American Court of Human Rights<sup>185</sup> and the European Court of Human Rights,<sup>186</sup> and is now a universally recognized principle of international law. On this issue the Inter-American Commission has expressed:

Respect for the inherent dignity of the person is the principle which underlies the fundamental protections of the right to life and to preservation of physical well-being. Conditions of severe environmental pollution, which may cause serious physical illness, impairment and suffering on the part of the local populace, are inconsistent with the right to be respected as a human being.<sup>187</sup>

## 2. Right to a Dignified Life

■ After the right to a healthy environment, the human right that climate change will most severely affect will be the right to a dignified life, as communities lose access to the basic amenities necessary for supporting life, such as water and food. The Inter-American Court has recognized on several occasions that the right to life, consecrated in article 4 of the American Convention, also protects the right to a dignified life or a decent existence.<sup>188</sup> Concretely, the Court has noted that "this right includes not only the right of every human being not to be arbitrarily deprived of his life, but also the right that conditions that impede or obstruct access to a decent existence should not be generated."<sup>189</sup> In turn, this right to a dignified life is composed of various elements that touch on other human rights. The Court has identified in concrete cases that these elements include human health, access to food and water, and education, among others.<sup>190</sup> We will examine each of these elements below to better describe how climate change impacts detailed in this report affect the enjoyment of the right to a dignified life.

<sup>185</sup> *Kawas Fernández v. Honduras*, 2009 Inter-Am. Ct. H.R. (Ser. C) No. 196, ¶ 148 and sources cited within (April 3, 2009).

<sup>186</sup> ECHR, *Guerra and others v. Italy* [GC], no. 14967/89 (1998); ECHR, *Lopez Ostra v. Spain*, no. 16798/90 (1994); ECHR, *Fadeyeva v. Russia*, no. 55723/00 (2005).

<sup>187</sup> IACHR, REPORT ON THE SITUATION OF HUMAN RIGHTS IN ECUADOR, OEA/Ser.L/II.96 doc. 10, rev. 1 (Apr. 24, 1997) [hereinafter IACHR REPORT ON ECUADOR].

<sup>188</sup> See *Yakye Axa v. Paraguay*, *supra* note 139, ¶ 161; "*Street Children*" v. *Guatemala*, *supra* note 140, ¶ 144; "*Instituto de Reeducación del Menor*" v. *Paraguay*, 2004 Inter-Am. Ct. H.R. (Ser. C) No. 112, ¶ 156 (Sept. 2, 2004); *Indigenous Community Sawhoyamaya v. Paraguay*, 2006 Inter-Am. Ct. H.R. (Ser. C) No. 146, ¶ 153 (March 29, 2006); *Xakmok Kasek v. Paraguay*, *supra* note 140, ¶ 194; See also International Covenant on Economic Social and Cultural Rights [ICESCR], art. 11.1, Dec. 16, 1966, 993 U.N.T.S. 3.

<sup>189</sup> *Yakye Axa v. Paraguay*, *supra* note 139, ¶ 161.

<sup>190</sup> See, *Xakmok Kasek v. Paraguay*, *supra* note 140, ¶¶ 194-271; See also, *Yakye Axa v. Paraguay*, *supra* note 139, ¶¶ 168-76; *Sawhoyamaya v. Paraguay*, *supra* note 188, ¶¶ 156-80.

### 3. Access to Water

■ Among the most important elements for the enjoyment of the right to a dignified life is access to water.<sup>191</sup> As explained above, climate change clearly exacerbates the current failures to prioritize the access to water for basic human needs in certain regions. Decreasing water availability from glacial, snowmelt, rainwater, and groundwater supplies will effectively cut off thousands of communities from traditional sources of water used for drinking, bathing, farming, and other necessities. Climate change impacts will also reduce water quality in some cases. Floods, for example, disrupt sanitation systems and spread disease, while rising sea water and storm surges can lead to the salinization of coastal freshwater aquifers.<sup>192</sup>

### 4. Access to Food

■ Many climate change impacts will also undermine the access to food, essential for the right to a dignified life and a human right in its own,<sup>193</sup> especially for low-income communities who depend on subsistence farming, fishing, or hunting. First, the loss of glaciers and groundwater, and the increasing unpredictability of rainfall will harm agricultural production. As noted above, 90% of agriculture in Latin America is rain-fed, and thus very vulnerable to changes in precipitation during the growing season. Rising sea levels can also destroy crops by increasing salinity in coastal areas. Heavy flooding and storms as well as unchecked wildfires can destroy subsistence crops and disrupt hunting. Finally, increasing seawater temperatures can destroy coral reefs and the fisheries that depend upon them, thereby eliminating access to wild fish, which makes up 84% of the fish caught in Latin America.

### 5. Human Health

■ Climate change will inevitably exacerbate health problems, thereby negatively affecting the enjoyment of the right to a dignified life and the right to health.<sup>194</sup> As detailed in previous sections, chronic flooding can overwhelm sanitation systems and cause outbreaks in water-borne illnesses. Increases in temperatures can spread the presence of vector borne diseases such as malaria, as well as exacerbate air pollution and produce mortality increasing heat waves. Wildfires can cause respiratory problems in large areas due to smoke inhalation, in addition to direct harms caused by

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<sup>191</sup> The right to safe and clean drinking water has recently been recognized as a human right by the General Assembly of the U.N.. G.A. Res. 64/292, U.N. Doc. A/RES/64/292, and includes the access to "sufficient, safe, acceptable, physically accessible and affordable water for personal and domestic uses." U.N. Committee on Economic, Social and Cultural Rights (CESCR), General Comment No. 15: The Right to Water, E/C.12/2002/11 (2003).

<sup>192</sup> IPCC *Technical Paper VI*, *supra* note 14, at 70, Table 4.1.

<sup>193</sup> Protocol of San Salvador, *supra* note 184, art. 12; ICESCR, *supra* note 188, art. 11.1; The right to adequate food is realized when "every man, woman and child, alone or in community with others, has the physical and economic access at all times to adequate food or means for its procurement." CESCR, General Comment No. 12: The Right to Adequate Food, U.N. Doc. E/C.12/1999/5 (1999).

<sup>194</sup> International Covenant on Civil and Political Rights [ICCPR], art. 6, Dec. 16, 1966, G.A. res. 2200A (XXI), U.N. Doc. A/6316; Protocol of San Salvador, *supra* note 184, art. 10.

the fires themselves. Finally, the destruction of subsistence crops and the lack of access to water can translate into right to health issues, particularly for communities in situations of vulnerability such as rural and indigenous communities. Access to clean water and sanitation can, for example, reduce the risk of child mortality by as much as 50%.<sup>195</sup>

## 6. Adequate Housing and Forced Displacement

■ Finally, the climate change impacts highlighted in this report can affect access to housing for millions of people and lead to mass forced displacement. Increases in intensity and frequency of large storms and hurricanes have already left hundreds of thousands of people homeless and without adequate housing in Latin America from resulting flooding and mudslides. Furthermore, rising sea levels could destroy homes and infrastructure forcing massive internal displacement of people. Finally, the loss of agricultural livelihoods is also a strong "push factor" for migration.<sup>196</sup> One recent study estimates that by 2080, crop losses due to climate change will lead an additional 1.4 to 6.8 million Mexicans to attempt migration to the United States.<sup>197</sup> The destruction of infrastructure and the uprooting of communities will have permanent impacts on the culture of many peoples, by disrupting communal ties, limiting educational opportunities, and making displaced people vulnerable to exploitation, discrimination, and hardship.

### **B. IMPORTANCE OF ACCESS TO INFORMATION AND PUBLIC PARTICIPATION**

Although not always implicated in climate change impacts, the full enjoyment of the rights to access to information and to public participation are essential for protecting humans rights in response to climate change. Properly advising the public and providing open forums for public participation can guarantee that communities are aware of the risks of climate change emergen-

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<sup>195</sup> UNDP, HUMAN DEVELOPMENT REPORT 2006, 23-23 (2006).

<sup>196</sup> See Etienne Piguet, Antoine Pécord & Paul de Guchteneire, *Migration and Climate Change: an Overview*, Working Paper No. 79 (Univ. of Oxford, 2010).

<sup>197</sup> S. Feng, A.B. Krueger & M. Oppenheimer, *Linkages among Climate Change, Crop Yields and Mexico-U.S. Cross-border Migration*, Proceedings of the National Academy of Science early edition (July 26, 2010).

cies, thus increasing their chances to protect their rights. These measures can also ensure effective decision-making for adaptation and mitigation plans. Therefore, the Commission should issue recommendations to States and other actors for establishing adequate procedures that guarantee public participation and access to information

Both the rights to freely access information and to public participation are now widely recognized in different areas of international law. The Inter-American Court has held that the right for individuals to solicit public information and the positive obligation for States to provide this information is protected by article 13 of the American Convention.<sup>198</sup> Both the American Convention<sup>199</sup> and the International Covenant on Civil and Political Rights<sup>200</sup> consecrate the right to public participation in the conduct of public affairs, a right which the UN Human Rights Committee<sup>201</sup> and the UN Office of the High Commission on Human Rights<sup>202</sup> have also reaffirmed. The Inter-American Commission has also noted that:

Public participation in decision-making allows those whose interests are at stake to have a say in the processes which affect them. Public participation is linked to Article 23 of the American Convention, which provides that every citizen shall enjoy the right "to take part in the conduct of public affairs, directly or through freely chosen representatives," as well as to the right to receive and impart information. ... Affected individuals should be able to be informed about and have input into the decisions which affect them.<sup>203</sup>

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<sup>198</sup> *Claude Reyes et al. v. Chile*, 2006 Inter-Am. Ct. H.R. (Ser. C) No. 151, ¶ 77 (Sept. 19, 2006).

<sup>199</sup> ACHR, *supra* note 145, art. 23.1(a) ("Every citizen shall enjoy the following rights and opportunities: a. to take part in the conduct of public affairs, directly or through freely chosen representatives").

<sup>200</sup> ICCPR, *supra* note 194, art. 25 ("citizen shall have the right and the opportunity, without any of the distinctions mentioned in article 2 and without unreasonable restrictions: (a) To take part in the conduct of public affairs, directly or through freely chosen representatives").

<sup>201</sup> See CHR, General Comment No. 25: The right to participate in public affairs, voting rights and the right of equal access to public service (art. 25), ¶ 5, Dec. 7, 1996, U.N. Doc. CCPR/C/Rev.1/Add.7. ("The conduct of public affairs, referred to in paragraph (a), is a broad concept which relates to the exercise of political power, in particular the exercise of legislative, executive and administrative powers. It covers all aspects of public administration, and the formulation and implementation of policy at international, national, regional and local levels.")

<sup>202</sup> OHCHR Report, *supra* note 6, ¶ 79 ("The right to participation in decision-making is implied in article 25 of the International Covenant on Civil and Political Rights which guarantees the right to "take part in the conduct of public affairs.")

<sup>203</sup> IACHR REPORT ON ECUADOR, *supra* note 187.

The principles of access to information and public participation in environmental affairs have also long been cornerstones of international environmental law. Principle 10 of the Rio Declaration expresses the importance of these guarantees:

Environmental issues are best handled with participation of all concerned citizens, at the relevant level. At the national level, each individual shall have appropriate access to information concerning the environment that is held by public authorities, including information on hazardous materials and activities in their communities, and the opportunity to participate in decision-making processes. States shall facilitate and encourage public awareness and participation by making information widely available.<sup>204</sup>

Both of these rights will help facilitate effective and participatory measures for mitigation and adaptation by allowing the involvement and perspectives of various stakeholders in such plans.

## C. RESPONSIBILITY OF STATES FOR HUMAN RIGHTS IMPACTS

### 1. Responsibility to Protect and Guarantee Human Rights in a State's Jurisdiction

■ As noted previously, every State has a positive obligation to protect and guarantee human rights.<sup>205</sup> This responsibility is accentuated when a State is aware of a risk to the right to a dignified life of persons within its jurisdiction.<sup>206</sup> Under this precept of international law, States must not only ensure that government agents do not violate rights, but must also take reasonable measures to protect human rights endangered by actions from private actors, regardless of whether the State actually contributed to or caused that risk. This obligation extends to pollution caused by private actors. The Inter-American Commission has recognized that, in certain cases, States are obligated to prevent private actors from violating human rights through toxic pollution.<sup>207</sup> In addition, the European Court of Human Rights has found State responsibility for human rights violations stemming from polluting, privately owned industries.<sup>208</sup>

<sup>204</sup> Rio Declaration, *supra* note 183, at principle 10; See also UNFCCC, *supra* note 181, art. 6(a)(i)-(ii); UN World Charter for Nature, at art. 16, U.N. G.A. Res. 37/7, U.N. doc A/RES/37/7 (Oct. 28, 1982); OAS, Unit for Sustainable Development and the Environment, *Inter-American Strategy for the Promotion of Public Participation in Decision-making for Sustainable Development*, OEA/Ser.W7II.5 CID/ doc.25/00 (2000); Inter-American Democratic Charter art. 6, Sept. 11, 2001.

<sup>205</sup> *Velasquez Rodriguez v. Honduras*, 1988 Inter-Am. Ct. H.R. (Ser. C) No. 4, ¶¶ 72-74 (July 29, 1988).

<sup>206</sup> See, *Yakye Axa v. Paraguay*, *supra* note 139, ¶¶ 160-63; *Sawhoyamaya v. Paraguay*, *supra* note 188, ¶¶ 150-55; *Xamok Kasek v. Paraguay*, *supra* note 140, ¶¶ 186-88.

<sup>207</sup> See, IACHR, *Comunidad La Oroya vs. Peru, Admissibility*, No. 76/09, ¶ 74 (Aug. 5, 2009); see also, IACHR, *Comunidades del Pueblo Maya (Sipakepense y Mam) de los municipios de Sipacapa y San Miguel Ixtahuacán en el Departamento de San Marcos, Guatemala, Medidas Cautelares*, MC 260/07, Decision of May 20, 2010.

<sup>208</sup> See, ECHR, *Guerra; Oneryildiz v. Turkey* [GC], no. 48939/99 (2004), ¶¶ 71 & 90; ECHR, *Fadeyeva* at ¶ 89; ECHR, *Okyay and others v. Turkey*, no. 36220/97 (2005); ECHR, *Giacomelli v. Italy*, no. 59909/00, (2006); ECHR, *Tatar v. Romania*, no. 67021/01 (2009); ECHR, *Lemke v. Turkey*, no. 17381/02 (2007); ECHR, *Branudse v. Romania*, no. 6486/03 (2009).

Therefore, all governments in the hemisphere must start taking measures to protect human rights against the potential impacts outlined in this report. As the majority of these impacts have been highly documented with credible evidence and even acknowledged in international agreements,<sup>209</sup> no government can plead ignorance of the potential consequences that these have for human rights. Although the precise extent of climate change is difficult to predict with absolute certainty, according to the Precautionary Principle of international environmental law, this uncertainty should not be used as an excuse to avoid implementing measures to prevent, mitigate, or adapt to climate change.<sup>210</sup> Finally, although the possible stakes are high, adaptation and mitigation measures are not out of the economic reach of the governments in the region. Many States can use reasonable measures at their disposal, some of which are mentioned above, to mobilize local knowledge and resources in preparing for climate change.

## 2. Differentiated Responsibility to Contribute to Effective Solutions to Climate Change

■ While nearly every State in the hemisphere will suffer the impacts of climate change, each nation has a differentiated level of responsibility in contributing to the climate change problem. States that have gone through a process of industrialization relatively early in their history (in the hemisphere, principally the United States and Canada) have historically contributed much more to GHG emissions and other anthropogenic causes of global climate change than less developed nations. As we discuss below, international law requires States to control pollution and other activities that have cross-boundary impacts, including climate change pollutants.<sup>211</sup> Therefore, because developed States have historically contributed more to climate change pollution, they share a proportionately larger obligation to seek effective solutions to climate change in accordance with the principle of “common but differentiated responsibilities and respective capabilities.”<sup>212</sup>

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<sup>209</sup> See The Cancun Agreements, *supra* note 8.

<sup>210</sup> See the application of the Precautionary Principle in the UNFCCC, *supra* note 181, art. 3(3).

<sup>211</sup> In individual cases of climate change harm, it may be difficult to demonstrate the causal nexus between one State’s climate change pollution and the damage felt in another. This legal question is beyond the scope of this report, and therefore the discussion on international responsibility for climate change impacts will be limited to general State responsibility to contribute to solutions, and not specific liability in individual cases.

<sup>212</sup> UNFCCC, *supra* note 181, art. 3(1).

	CUMULATIVE EMISSIONS 1850-2007 (MTCO <sub>2</sub> EQUIVALENT) <sup>213</sup>	CUMULATIVE EMISSIONS AS % OF WORLD TOTAL	YEARLY EMISSIONS (2005, MTCO <sub>2</sub> EQUIVALENT) <sup>214</sup>	PER CAPITA YEARLY EMISSIONS (2005, MTCO <sub>2</sub> EQUIVALENT)
United States	339,174.0	28.75%	6,931.0	23.5
Canada	25,716.0	2.18%	808.3	25
Mexico	12,242.8	1.04%	695.6	6.7
Guatemala	245.4	0.02%	90.0	7.1
Panama	173.5	0.01%	11.1	3.4
Colombia	2,213.2	0.19%	176.9	4.1
Bolivia	275.6	0.40%	200.8	21.9
Brazil	9,836.6	0.83%	2,855.9	15.3
Argentina	5,894.8	0.50%	363.9	9.4
Chile	1,831.9	0.16%	88.8	5.4
North America	364,890.0	30.93%	7,739.3	23.6
Central America & the Caribbean	16,274.1	1.38%	1,029.1	5.8
South America	27,131.3	2.30%	4,495.1	12.1

**TABLE 3**

Historical and Current Contributions to Climate Change (in CO<sub>2</sub> equivalents). Data from World Resources Institute, Climate Analysis Indicators Tool (CAIT) Version 8.0 <http://cait.wri.org>.

Table 3 above highlights the greater historical and current contribution to climate change of more-developed nations such as the United States (responsible for 28.75% of historical emissions), and to a lesser extent, Canada (2.18%). More notable is how little certain States have contributed, such as Guatemala (0.02%), Panama (0.01%) and Bolivia (0.4%), despite carrying a disproportional burden of the impacts highlighted in the report above. (For a complete table, see Annex).

<sup>213</sup> Based on historical CO<sub>2</sub> (carbon dioxide) emissions from energy use.

<sup>214</sup> Data is represented in CO<sub>2</sub> equivalents, but includes contributions from CO<sub>2</sub>, CH<sub>4</sub> (methane), N<sub>2</sub>O (nitrous oxide), PFCs (perfluorocarbons), HFCs (hydrofluorocarbons), and SF<sub>6</sub> (sulfur hexafluoride), as well as land use changes and international bunkers.

Although Bolivia has contributed only 0.4% of cumulative GHG emissions, it will bear a disproportionate burden of the impacts of climate change.  
Photo Credit: Neil Palmer, International Center for Tropical Agriculture (CIAT).



These differences in contributions are legally significant, as international law requires States to avoid extra-territorial pollution that could affect other countries. This principle is reflected in various international instruments such as the Stockholm<sup>215</sup> and Rio Declarations,<sup>216</sup> as well as the Convention on Biological Diversity.<sup>217</sup> The International Court of Justice has also recognized that as a principle of Customary International Law, a State is "obliged to use all the means at its disposal in order to avoid activities which take place in its territory, or in any area under its jurisdiction, causing significant damage to the environment of another State."<sup>218</sup> Therefore, States should refrain from producing excessive carbon, methane, and other climate change pollutants that will inevitably contribute to the human rights catastrophes outlined in this report.

There is also a broad obligation under international law for developed States to help less developed States ensure protection of economic, social, and cultural rights<sup>219</sup> and to support other nations in protecting their environment.<sup>220</sup> Since those States that have historically and are currently contributing excessively to GHG emissions are also more-developed nations, they therefore have a heightened responsibility to implement strong and effective measures including reducing their GHG emissions and aiding other States in mitigation and adaptation measures. However, it is important to note that this differentiated responsibility does not excuse States from taking reasonable measure to protect the human rights within their territories, nor does it free countries that *currently* (but have not historically) contribute excessively to climate change from their responsibility to mitigate their GHG emissions. Proper, long-term solutions to climate change will require the efforts of all countries to limit climate change pollutants, to seek cleaner sources of energy, and to protect the human rights of vulnerable populations.

<sup>215</sup> Stockholm Declaration, *supra* note 183, principle 21.

<sup>216</sup> Rio Declaration, *supra* note 183, at principle 2.

<sup>217</sup> Convention on Biological Diversity [CBD], art. 20, June 5, 1992, 31 I.L.M. 818.

<sup>218</sup> *Pulp Mills on the River Uruguay* (Arg. v. Uru.), 2010 I.C.J. No. 135, ¶ 101 (April 20, 2010); See also *Legality of the Threat or Use of Nuclear Weapons*, Advisory Opinion, 1996 I.C.J., 226, at 242 (Jul. 8, 1996); *The Gabčíkovo-Nagymaros Project* (Hung. v. Slov.), 1997 I.C.J. No. 92 (Sept. 25, 1997).

<sup>219</sup> UNCESCR General Comment No. 3, *supra* note 138, ¶ 14.

<sup>220</sup> UNFCCC, *supra* note 181, art. 4(3)-(10); The Cancun Agreements, *supra* note 8, ¶¶ 18 & 52; Rio Declaration, *supra* note 183, at principle 7; CBD, *supra* note 217, art. 3.

## VII. Conclusions and Recommendations

The information presented in this report demonstrates a clear link between current and predicted climate change impacts and the enjoyment of human rights of millions of people throughout the Americas. States and other key actors, such as intergovernmental organizations and international financial institutions, must take measures to prevent climate change impacts from violating human rights, including the rights to a healthy environment, a dignified life, health, food, water, adequate housing, and many others. When implementing these measures, decision-makers must provide for adequate procedures for public participation and access to information and must also bear in mind the special needs of vulnerable groups, including indigenous and traditional communities, women, children, the elderly, and the poor.

Human rights bodies like the Inter-American Commission of Human Rights have an important role to play in clarifying the international obligations of States to take measures for preventing, mitigating, and adapting to climate change. In these discussions, it is crucial to emphasize the heightened responsibility of certain States that have historically contributed, or are currently contributing, the most to human-caused climate change, and the differentiated responsibility for creating solutions to climate change that this implies. Although it is difficult to demonstrate a causal nexus between the greenhouse gas emissions of any one State and the human rights consequences in another, all States have an obligation to control their trans-border pollution that harms other nations under international law, including climate change pollutants. Therefore, it is important that the Inter-American Commission underscore this international responsibility and make recommendations urging States, in particular the United States and Canada, to take effective measures in reducing emissions of climate change pollutants and to aid other States in mitigating and adapting to climate change impacts.



Finally, it is important to remember that while climate change's consequences for human rights can be quite severe, there are many possible solutions for States to prepare themselves and adapt to future climate circumstances. While some of these solutions require international cooperation to reduce climate change pollutants or the transfer of new technologies, many solutions are easily within the reach and budgetary constraints of every government in the world. Less resource intensive solutions can include the protection of important ecosystems for adapting and mitigating to climate change and preparing human rights risk analyses with the active participation of all stakeholders. Crucial within the plans and discussions concerning the measures taken should be a human rights focus that places the possible human rights consequences of persons and communities in the forefront, with equal or greater consideration than for economic factors.

## **A. RECOMMENDATIONS FOR PROTECTING HUMAN RIGHTS IN THE FACE OF CLIMATE CHANGE**

### **Para todos los actores:**

- ▶ ***Recognize in official communications and policies the link between climate change and human rights:*** Before adequate protections for human rights in the face of climate change can be implemented, governments, international institutions, and civil society actors must first recognize that climate change is causing negative consequences for human rights and will continue to do so in the future, as outlined in this and other reports. Governments and domestic actors should first start promoting this link internally within their countries, but must also ensure that this connection is reflected in international agreements and documents coming from international climate change negotiations and other fora;

## For States:

- ▶ ***Cooperate to create binding, effective, and equitable international commitments for preventing further contributions to global climate change:*** Any plan to successfully protect human rights from climate change impacts must be accompanied by widespread international efforts to reduce and eliminate climate change pollutants, particularly from those countries that have historically contributed, or are currently contributing, excessively to human caused climate change. Presently, the only binding emission-reduction targets are contained in the Kyoto Protocol, set to expire in 2012. Therefore, it is urgent that all governments cooperate to create new binding commitments for mitigating climate change through the UN Framework Convention on Climate Change negotiations;
- ▶ ***Work to the greatest extent possible to reduce the human-caused contributions to global climate change:*** Governments, under the principle of “common but differentiated responsibilities and respective capabilities,” must all work to reduce their contributions to climate change pollutants including the emissions of greenhouse gases. Efforts should not only address vehicular and industrial sources, but also take a comprehensive view by addressing other causes such as large dams and deforestation, which can also have a large impact on climate change;
- ▶ ***Review current energy policies to include more sources of renewable energy:*** The reduction of climate change pollutants should start with a revision of the energy sector and existing energy policies with the goal of reducing dependency on energy that emits climate pollutants, in particular fossil fuels such as coal, gas, and oil, but also large hydro-power in tropical climates. These sources should be phased out in favor of renewable and local sources of energy including wind and solar;
- ▶ ***States that have historically contributed and/or are presently contributing most to global climate change should contribute more to finding lasting solutions:*** Governments, particularly the United States and Canada, should heed their international responsibility and work harder to reduce their contributions to climate change and to aid other States in adapting to and mitigating climate change impacts. This cooperation should also follow principles of equity and “common but differentiated responsibilities and respective capabilities;”

- Conduct full risk analyses of the possible climate change impacts to human rights and incorporate a human rights perspective in mitigation and adaptation plans:** As soon as possible, governments should conduct comprehensive risk analyses to identify the human rights impacts of climate change, particularly for vulnerable or historically disadvantaged communities that will be disproportionately harmed. Governments should also use a human rights perspective when planning adaptation and mitigation plans and place a priority on policies that can guarantee adequate human rights protections;
- Ensure the active participation of stakeholders and access to information when undertake adaptation or mitigation measures:** Access to public participation and information are both human rights and are necessary for developing effective mitigation plans that protect all members of society. Therefore, governments should ensure adequate procedures for public participation and access to information in all decision-making processes from the very earliest stages of planning, especially for historically discriminated communities such as indigenous and tribal peoples, peasant farmers, the poor, Afro-descendants, and women;
- Prioritize adaptation and mitigation measures that protect critical ecosystems that help reduce climate change impacts such as mangrove forests, glaciers, and páramos:** Critical ecosystems can help reduce the impact of climate change naturally and allow communities to adapt without resource or technology intensive solutions, and should therefore be given priority in adaptation and mitigation plans;
- Take measures to improve access to information regarding adverse climate change impacts and their potential human rights implications, especially for vulnerable communities:** By guaranteeing access to information on the future impacts of climate change, governments can directly involve affected communities in adaptation efforts.
- Require that all large development projects include climate change assessments as part of a full, prior, and independent impact evaluation:** In addition to other environmental and social impacts, emission of climate change pollutants should be an integral part of the impact assessment process for all large development projects in order to assess the potential for contributing to global climate change. Governments should also require the evaluation of climate change's potential impacts for a project's safety and viability, for example due to increased droughts or flooding;

## For intergovernmental institutions:

- ***The IACHR should recognize the connection between human rights and climate change in its report to the OAS and should hold special thematic hearings with civil society organizations, affected peoples and governments:*** The IACHR has a central role in promoting the recognition of the link between human rights and climate change and should therefore act as a facilitator between civil society and governments to clarify State obligations to protect human rights in the face of climate change impacts;
- ***Intergovernmental bodies such as the OAS should create spaces for Member States to negotiate binding obligations to mitigate climate change:*** Intergovernmental organizations can advance negotiations on climate change by facilitating dialogue between States with the participation of civil society. They should also encourage international cooperation between States so that developed nations can fulfill their obligations to help lesser developed countries adapt to climate change impacts that affect human rights;

**For financial institutions, including international financial institutions (IFIs), national development banks, and sovereign wealth funds:**

- ▶ ***Incorporate climate change mitigating goals in their financing policies to avoid funding projects that contribute to climate change:*** IFIs should refrain from funding projects that contribute to greenhouse gas emissions or otherwise exacerbate climate change impacts, including fossil fuels, projects that promote deforestation, and large hydropower in tropical areas. Banks should also adopt transparent emission reduction targets for their funding portfolios to help governments phase out operations that produce excessive climate change pollutants, and submit these to a public and independent monitoring process;
- ▶ ***Adopt a human rights perspective in climate change and energy policies:*** loBanks should establish priorities for funding projects that contribute positively to human rights protections in the face of climate change impacts. Banks should review every project proposal to eliminate unnecessary impacts that could exacerbate climate change affects to the detriment of human rights (e.g. by harming climate change mitigating ecosystems such as mangroves or *páramos*). Banks should also require all projects to assess possible climate change impacts for the project's safety or viability before approving funding.

## VIII. Abbreviations

<b>4AR</b>	The IPCC's 2007 Fourth Assessment Report
<b>COP</b>	Conference of Parties to the U.N. Framework Convention on Climate Change
<b>ENSO</b>	El Niño Southern Oscillation
<b>GHG</b>	Greenhouse gas
<b>IACHR</b>	Inter-American Commission on Human Rights
<b>IFI</b>	International Financial Institution
<b>IPCC</b>	Intergovernmental Panel on Climate Change
<b>NAPA</b>	National Adaptation Program of Action
<b>OAS</b>	Organization of American States
<b>OHCHR</b>	Office of the United Nations High Commissioner for Human Rights
<b>REDD</b>	Reducing emissions from deforestation and forest degradation
<b>UNFCCC</b>	United Nations Framework Convention on Climate Change
<b>USD</b>	United States dollars

## IX. Anexo

### HISTORICAL AND CURRENT CONTRIBUTIONS TO CLIMATE CHANGE (IN CO<sub>2</sub> EQUIVALENTS)<sup>i</sup>

	CUMULATIVE EMISSIONS CO <sub>2</sub> 1850-2007 <sup>ii</sup>			YEARLY EMISSIONS (2005, MTCO <sub>2</sub> EQUIVALENT) <sup>iii</sup>		
	TOTAL MTCO <sub>2</sub> EQUIVALENT	% OF WORLD TOTAL	PER CAPITA	TOTAL YEARLY EMISSIONS	% OF WORLD TOTAL	PER CAPITA
United States	339,174.0	28.75%	1125.7	6,931.0	15.71%	23.5
Canada	25,716.0	2.18%	779.8	808.3	1.83%	25
Mexico	12,242.8	1.04%	116.3	695.6	1.58%	6.7
Guatemala*	245.4	0.02%	18.4	90.0	0.20%	7.1
Belize*, **, ***	12.4	0.00%	39.9	0.7	0.00%	2.4
El Salvador*, **	149.3	0.01%	24.4	11.1	0.03%	1.8
Honduras**	137.9	0.01%	19.2	63.5	0.14%	9.2
Nicaragua*, **	111.8	0.01%	N/A	13.6	0.03%	2.5
Costa Rica*, **	146.3	0.01%	32.8	10.5	0.02%	2.4
Panama*, **	173.5	0.01%	51.9	11.1	0.03%	3.4
Colombia	2,213.2	0.19%	49.9	176.9	0.40%	4.1
Venezuela	4,751.6	0.40%	172.9	452.1	1.02%	17.0
Ecuador	652.0	0.06%	48.9	129.1	0.29%	9.9
Bolivia	275.6	0.40%	28.9	200.8	0.45%	21.9
Brazil	9,836.6	0.83%	51.7	2,855.9	6.47%	15.3
Argentina	5,894.8	0.50%	149.3	363.9	0.82%	9.4
Chile*	1,831.9	0.16%	110.1	88.8	0.20%	5.4
Uruguay*	283.9	0.02%	85.4	43.1	0.10%	13.0
Paraguay*, **	94.6	0.01%	15.4	28.3	0.06%	4.8
North America	364,890.0	30.93%	1091.6	7,739.3	17.54%	23.6
Central America & the Caribbean	16,274.1	1.38%	89.6	1,029.1	2.33%	5.8
South America	27,131.3	2.30%	71.4	4,495.1	10.19%	12.1

\* Data from Land Use Change & Forestry not available.

\*\* PFC, HFC & SF6 data not available.

\*\*\* Data from Int'l Bunkers not available.

<sup>i</sup> Data from World Resources Institute, Climate Analysis Indicators Tool (CAIT) Version 8.0 available at <http://cait.wri.org>.

<sup>ii</sup> Based on historical CO<sub>2</sub> (carbon dioxide) emissions from energy use.

<sup>iii</sup> Data is represented in CO<sub>2</sub> equivalents, but includes contributions from CO<sub>2</sub>, CH<sub>4</sub> (methane), N<sub>2</sub>O (nitrous oxide), PFCs (perfluorocarbons), HFCs (hydrofluorocarbons), and SF<sub>6</sub> (sulfur hexafluoride) emissions as well as land use changes and international bunkers.



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ASOCIACIÓN INTERAMERICANA PARA LA DEFENSA DEL AMBIENTE

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**G**lobal climate change is a reality and will cause serious impacts for human populations throughout the Americas and across the globe. Prompted by international concerns regarding climate change, the General Assembly of the Organization of American States (OAS) in 2008 requested that the Inter-American Commission on Human Rights (IACHR) investigate the link between climate change and human rights. This report seeks to inform that effort by describing climate change impacts in Latin America—both observed and predicted—and the ways in which these affect human rights. Our principal conclusion is that the IACHR should recognize the negative implications of climate change for human rights and make recommendations to OAS Member States on how to fulfill their international obligations to protect and guarantee human rights in the face of climate change.



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