

## **SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF CLIMATE CHANGE: OVERRIDING PRIORITY OF THE SOUTH**

### **SYNOPSIS**

This Analytical Note stresses that both sustainable development and climate change are interlinked. Climate change will have impacts on the pace and progress of developing countries' efforts to achieve sustainable development objectives, while achieving such objectives form the fundamental premise upon which developing countries are undertaking their actions to address climate change. Sustainable development is a legitimate aspiration of developing countries whose populations are affected by a wide range of poverty- and climate change-related impacts. It is the condition sine qua non for developing countries to be able to contribute substantially and effectively on global efforts to address climate change. The challenge for the global community in addressing both sustainable development and climate change issues is on ensuring that developing countries are supported in shifting to a low-carbon sustainable development path as their best contribution to global efforts to address climate change. This will mean that at the national and international levels, much more integrated and coherent approaches with respect to both development and climate change need to be created and implemented.

September 2008  
Geneva, Switzerland

---

This South Centre Analytical Note is produced by the South Centre's Global Governance Programme for Development (GGDP) to contribute to the better participation of developing countries in international negotiations. Readers are encouraged to quote or reproduce the contents of this South Centre Analytical Note for their own use, but are requested to grant due acknowledgement to the South Centre and to send a copy of the publication in which such quote or reproduction appears to the South Centre.

The South Centre is an intergovernmental organization of developing countries. It prepares, publishes and distributes information, strategic analyses and recommendations on international economic, social and political matters of concern to the South. The South Centre's output does not necessarily reflect the official positions or views of its Member States or other developing countries.

Electronic copies of this and other South Centre publications may be downloaded without charge from  
<http://www.southcentre.org>

**SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF CLIMATE CHANGE:  
 OVERRIDING PRIORITY OF THE SOUTH**

**TABLE OF CONTENTS**

EXECUTIVE SUMMARY .....	iii
I. INTRODUCTION.....	7
II. CLIMATE CHANGE AND DEVELOPMENT IMPACTS .....	3
A. The South and Achieving Sustainable Development.....	3
B. Projected Effects of Climate Change on Developing Countries.....	5
B.1 Food Security .....	6
B.2. Water Availability.....	8
B.3. Health .....	9
B.4. Environmental Risks.....	10
B.5. Social Stability.....	11
III. SUSTAINABLE DEVELOPMENT AS ADAPTATION IN A CLIMATE CONSTRAINED WORLD .....	12
A. Sustainable Development as the Basis for Shaping Adaptive Capacity in Developing Countries.....	14
B. Economic Capacity.....	15
C. Technological Level, Innovation and Availability .....	16
D. Adequate Information and Human Capital .....	18
E. Sustainable Development and Poverty Eradication: Overriding Priorities of Developing Countries.....	19
F. Integrating Development and Climate Change Policies.....	23
IV. CONCLUSION .....	25

## EXECUTIVE SUMMARY

1. Climate change is now universally accepted as a global threat of the first magnitude. The consequences of anthropogenic climate change will be felt everywhere on the planet. However, the global warming resulting in anthropogenic climate change is due largely to the development process of developed countries (the “North”) but will have greater adverse impacts on the poor populations in developing countries, especially those living in least developing countries and small island states (the “South”).
2. The United Nations Convention on Climate Change (UNFCCC) and its Kyoto Protocol is currently the sole multilaterally agreed normative global response to global warming. The UNFCCC in its Art. 4.7 recognizes that “economic and social development and poverty reduction are the first and overriding priorities of the developing country Parties” and that such priorities are to be taken into account in the context of both developed and developing countries’ implementation of their respective commitments under the Convention. In short, the UNFCCC views climate change fundamentally as a socio-economic developmental issue.
3. Sustainable economic development – that is, a development pathway that provides adequate economic opportunities and a decent quality of life in a manner that is equitable and environmentally sustainable – is needed. The poor of the South simply cannot afford to see development in their countries be constrained by climate change. Development is also urgently needed in order to minimize and mitigate climate change risks by improving developing countries’ adaptive capacity. Furthermore, developing countries would be in a better position to participate in global efforts to address climate change if the basic economic needs of their populations are already met. Sustainable development as the overriding priority of developing countries must be placed at the heart of the global climate change discourse.
4. Global temperature increases as a result of anthropogenic climate change will have a broad range of impacts on the development prospects in all parts of the world, climate change creates significantly higher levels of risk and challenges to development prospects for the South, in particular least developing countries (LDCs) and small islands which are the most vulnerable to climate change effects. The higher vulnerability of developing countries is the consequence of a combination of geographical and socio-economic factors.
5. Practically any amount of increase in global mean temperatures would produce net economic losses in many developing countries. Economic growth and development in countries of the South may be slowed or retarded by climate change effects on their factors of production. Other climate change impacts that have adverse development effects on developing countries relate to impacts on the agriculture sector and food security, access to water resources, health, environmental risk, and social stability. Thus, climate change is expected to have profound socio-economic effects, including a further increase in economic inequities between developed and developing countries.
6. It is clear that addressing development needs in a climate constrained context poses an enormous challenge to developing countries and to their partners in developed countries, global economic and development institutions, NGOs, and civil society. But still, the fact remains that effective global responses to climate change cannot be divorced from effective global responses to the South’s continuing development challenge.

7. Sustainable economic development is not only the most effective tool to pursue poverty alleviation; for developing countries, it also plays a key role in the two major responses to climate change: mitigation and adaptation. The ability to adapt to climate change is “highly dependent on the level of economic development”. By this standard, developed countries tend to be better able adapt to climate change because their higher levels of development produce resources that lead to greater adaptive capacity. It should be noted though that developed countries, by and large, were able to acquire and maintain such resources as a consequence of a carbon-intensive development process that: (i) was maintained through economic and political arrangements that exploited and marginalized developing countries and their populations; (ii) significantly consumed and diminished the resources of developing countries; and (iii) led to steep increases in anthropogenic GHG emissions.
8. The ability of countries to adapt effectively to climate change can also depend on the availability of and access to appropriate technologies. Developed countries tend to be better equipped in terms of technology than developing countries because they have more resources to invest in knowledge creation, dissemination and utilization. Although some developing countries have traditional knowledge useful for adaptation purposes, adaptation-relevant technologies available and used in developed countries may not always be accessible to developing countries. In fact, the key issue with respect to technology transfer in the context of the UNFCCC is the issue of defining and having a common agreement on what would be effective technology transfer, assessing whether such transfer is taking place or not, and, if not, determining why such transfer is not taking place, and then agreeing on a multilaterally agreed approach to solving the problem. This would mean, among other things, also looking at other related issues such as:
  - financing of climate-friendly technology transfers under the UNFCCC
  - defining actual modalities of climate technology transfer under the UNFCCC (both public sector and market-based)
  - the link between intellectual property rights (IPRs) and technology transfer (include shared ownership, compulsory licensing, innovation and development)
  - technology transfer and trade (including trade restrictions on developing country tech, export restrictions of developed country tech, NTBs, standards, performance requirements)
  - climate technology needs requirements of developing countries for adaptation and development
  - policy regimes for promoting received technology innovation and development in developing countries.
9. Under the UNFCCC (Art. 4.5), technology transfer is a treaty obligation that developed country Parties must comply with. This means, for developing countries, that developed country Parties should put in place public policy measures that would ensure that such technology transfer does take place - whether through direct public sector-to-public sector transfers or encouraging and promoting their private sector to effect such transfers to either the public or private sectors of developing countries. Technology transfers to the public sector could be in the form of, for example, transfers of tech to developing country government agencies tasked with undertaking specific climate adaptation or mitigation actions or to government R&D agencies/materials production facilities for purposes of licensed reproduction of the technology. It also implies that measures for technology transfer under the UNFCCC must necessarily be easy to use and actually facilitates such

transfer - i.e. no policy conditionalities, no middleman modalities (e.g. no going through the World Bank or other institutions), etc. But to a large extent, North-South technology transfer for both mitigation and adaptation is not happening.

10. Improvements with respect to information and human capital are also required for effective adaptation to climate change in developing countries. In general developed countries have higher levels of skilled personnel than developing countries and therefore have greater adaptive capacity. By contrast, developing countries often lack economic resources to invest on research and formal instruction. The consequence of this is low levels of educational attainment and limited human capital to stimulate creation and development of appropriate technologies. In this regard, support should be provided to developing countries for education, training and public awareness consistent with the provisions of Art. 6 of the UNFCCC
11. Art. 3.4 of the UNFCCC states that “Parties have a right to, and should, promote sustainable development. Policies and measures to protect the climate system against human-induced change should be appropriate for the specific conditions of each Party and should be integrated with national development programmes, taking into account that economic development is essential for adopting measures to address climate change.” If developing countries are to achieve their sustainable development goals, some increase in their GHG emissions due to increased energy use should be expected. Economic and population growth are both drivers with strong influence on GHG emissions entailing an increasing demand for energy, goods and services. Hence, emissions in developing countries are expected to grow as a result of their high population growth rates and their need to grow in economic terms to address poverty and development concerns. It is important to emphasize that, emissions in most developing countries, in particular LDCs and small states, are minuscule and do not add important pressure to the climate system. Most developing countries combined contribute only 10 percent of annual global GHG emissions. Thus, although global GHG emissions need to be reduced in order to avoid surpassing “safe levels” of GHG concentration in the atmosphere, the reduction has to come in large part from developed countries and these reductions should be large enough to offset the needed emissions increase in developing countries, in particular those of LDCs and small islands.
12. Developed countries are historically and primarily responsible for climate change mitigation as a result of their historical responsibility in creating the problem. In order to re-orient their development path towards a sustainable one, developed countries should implement effective GHG mitigation policies that would drastically reduce their GHG emissions through major shifts in their patterns of production and consumption leading to the modification of longer-term trends of anthropogenic GHG emissions. Developing countries for their part should focus on the development and implementation of adaptation strategies in order to mainstream climate change responses and put their economies onto a low-carbon development path.
13. To support a shift to low-carbon sustainable development pathways in developing countries, an integrated approach to development and climate change policy needs to be undertaken both at the national and international levels. Traditionally, development and climate change concerns have been addressed by policy-makers in different forums and in an uncoordinated manner. Yet the causal relationship between unsustainable development of developed countries and climate change is undeniable. It is also evident that climate change has important implications for development prospects. Furthermore, sustainable

development is essential to address climate change, both in terms of adaptation and mitigation, and poverty-related manifestations, including the attainment of the MDGs.

14. Sustainable development is a legitimate aspiration of developing countries whose populations are affected by a wide range of poverty- and climate change-related impacts. It is the condition sine qua non for developing countries to be able to contribute substantially and effectively on global efforts to address climate change. It is also the greatest contribution that developing countries can make to achieve the objective of the UNFCCC. The departing point of the international response to climate change must be the recognition that the participation of developing countries in international efforts to address global warming is premised on the achievement of their sustainable development goals. This recognition should be the foundation for the establishment of “global partnership” to promote an integrated strategy and to improved collaboration between development and climate change communities.
  
15. The UN, in particular the UNFCCC, must continue to be the main multilateral framework for global approaches to climate change. In this context, the principle of common but differentiated responsibilities should be faithfully applied and reflected in any future normative commitments relating to climate change. Given their historic responsibility, developed countries should adopt more ambitious and effective reduction of GHG emissions to prevent global warming beyond 2°C by 2015. In addition, developed countries should provide adaptation compensatory financing as well as technology to developing countries to enable the latter to effectively undertake actions under the UNFCCC.

## SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF CLIMATE CHANGE: OVERRIDING PRIORITY OF THE SOUTH\*

### I. INTRODUCTION

1. Climate change is now universally accepted as a global threat of the first magnitude. The Intergovernmental Panel on Climate Change (IPCC), a body of scientists assessing climate change, has concluded that it is 90 to 99 per cent likely that the increase in the atmospheric temperature since the mid-20<sup>th</sup> century is the result of human emissions of greenhouse gases (GHG)<sup>1</sup>. The consequences of anthropogenic climate change will be felt everywhere on the planet. However, the global warming resulting in anthropogenic climate change is due largely to the development process of developed countries (the “North”)<sup>2</sup> but will have greater adverse impacts on the poor populations in developing countries, especially those living in least developing countries and small island states (the “South”)<sup>3</sup>. Geographical conditions that give rise to extreme weather events coupled with limited resources to invest in adaptation measures are among the reasons that explain why the South is more vulnerable to climate change than the North<sup>4</sup>.

2. The United Nations Convention on Climate Change (UNFCCC) and its Kyoto Protocol is currently the sole multilaterally agreed normative global response to global warming<sup>5</sup>. The UNFCCC in its Art. 4.7 recognizes that “economic and social development and poverty reduction are the first and overriding priorities of the developing country Parties” and that such priorities are to be taken into account in the context of both developed and developing countries’ implementation of their respective commitments under the Convention. In short, the UNFCCC views climate change fundamentally as a socio-economic developmental issue.

---

\* The South Centre acknowledges the research contributions of Mr. Miguel Elizalde to this Analytical Note.

<sup>1</sup> IPCC, *Climate Change 2007: Impacts, Adaptation, and Vulnerability* (2007) [hereinafter IPCC 2007, *Adaptation and Vulnerability*]

<sup>2</sup> In this paper the terms “North” and “developed countries” are used interchangeably to refer to countries that are Member States of the Organization for Economic Cooperation and Development (OECD).

<sup>3</sup> The terms “South” and “developing countries” are used interchangeably to refer to countries that are Member States of the South Centre, the Group of 77, or the Non-Aligned Movement.

<sup>4</sup> IPCC, *Climate Change 2001: Impacts, Adaptation, and Vulnerability* 8 (2001) [hereinafter IPCC 2001, *Adaptation and Vulnerability*]

<sup>5</sup> United Nations Framework Convention on Climate Change 31 I.L.M. 849 (1992), [hereinafter UNFCCC]; Kyoto Protocol to the UNFCCC, 37 I.L.M. 22. (1998) [hereinafter Kyoto Protocol]

3. In developing countries, the major – and legitimate – source of concern associated with climate change are the anticipated negative effects on their economies and development prospects. The reason for their concern is easy to understand. There are 854 million people in poverty globally, of which about 820 million live in developing countries<sup>6</sup>. Sustainable economic development – that is, a development pathway that provides adequate economic opportunities and a decent quality of life in a manner that is equitable and environmentally sustainable – is needed. The poor of the South simply cannot afford to see development in their countries be constrained by climate change. Development is also urgently needed in order to minimize and mitigate climate change risks by improving developing countries' adaptive capacity. Furthermore, developing countries would be in a better position to participate in global efforts to address climate change if the basic economic needs of their populations are already met.

4. Increased and more effective action and collaboration among different sectors of the international community, including different international organizations and institutions, is urgently needed. The full, effective, sustained and strengthened implementation of the UNFCCC, including deeper emissions reductions commitments for developed countries under the second commitment period of the Kyoto Protocol, must be emphasized as the basis under which all countries contribute to climate change stabilization on the basis of equity and according to their common but differentiated responsibilities and respective capabilities.

5. But this is not enough. Even if the most ambitious reduction targets of greenhouse gas emissions were attained in full, the past emissions of developed countries due to their highly carbon-intensive development process have already “locked in” adverse climate change impacts on developing countries. Herein lie the historical responsibility of developed countries for both causing and addressing the impacts of climate change. This historical responsibility is science-based and is reflected in the UNFCCC.<sup>7</sup> Furthermore, such historical responsibility is taken into account in the balance of commitments that is contained in the UNFCCC in terms of the treaty obligations of developed countries to provide financing and technology to developing countries and to undertake deep emissions reductions that would show that they are taking the lead in modifying longer-term trends in GHG emissions. Unfortunately, such treaty obligations have by and large not been effectively and fully complied with by developed countries.

6. Hence, the adoption of climate adaptation measures cannot be considered optional in developing countries nor can the improvement of their climate change adaptation capacity be delayed. Sustainable development as the

---

<sup>6</sup> FAO, The State of Food Insecurity in the World 2006: Eradicating World Hunger – Taking Stock ten years after the World Food Summit 8 (2006) [hereinafter Food Insecurity in the World] Available online at: <ftp://ftp.fao.org/docrep/fao/009/a0750e/a0750e00.pdf>

<sup>7</sup> See e.g. the preamble to the UNFCCC.

overriding priority of developing countries must be placed at the heart of the global climate change discourse.

7. An example of the political rhetoric from the international community with respect to development is the Millennium Declaration in which UN Member States pledged themselves to meet the goal of poverty eradication by the year 2015<sup>8</sup>. As a consequence, the Millennium Development Goals (MDGs) have become major benchmarks for development that many in the international community are promoting. However, as a recently released Millennium Development Report concluded, climate change is a major obstacle to the attainment of the MDGs<sup>9</sup>. Promoting sustainable development of developing countries becomes a necessary condition to favor the attainment of the MDGs and to improve their ability to adapt to climate change.

8. This Analytical Note seeks to raise awareness among policy-makers, scholars, NGOs and civil society to the close interlinkages between development and climate change. It emphasizes that the achievement of sustainable and equitable economic and social development and poverty eradication are at the foundation of improving the South's ability to contribute effectively to global efforts to address climate change.

## II. CLIMATE CHANGE AND DEVELOPMENT IMPACTS

### A. The South and Achieving Sustainable Development

9. Achieving sustainable development in all of its economic, social and environmental aspects continues to be the main challenge facing the South.

10. Today, the world population is 6.55 billion people: 1 billion live in developed countries; approximately 0.4 billion live in countries with economies in transition (EITs); and approximately 5.1 billion people live in the South (in approximately 125 low and middle-income developing countries<sup>10</sup>) whose populations have lower standards of living than the population living in any of the approximately 57 developed countries<sup>11</sup>. Poverty is the most pervasive manifestation of underdevelopment and is generally reflected in hunger, insufficient health and educational services, insecurity, political instability, gender inequalities, etc.

---

<sup>8</sup> United Nations Millennium Declaration, resolution adopted by the General Assembly, [*without reference to a Main Committee (A/55/L.2)*], 55/2, 8th plenary meeting, 8 September 2000, ¶ 19. Available online: <http://www.un.org/millennium/declaration/ares552e.htm>

<sup>9</sup> UN *et. al.*, The Millennium Development Goals Report 2007, 5 (2007); [hereinafter Millennium Report 2007] Available online: <http://www.un.org/millenniumgoals/pdf/mdg2007.pdf>

<sup>10</sup> See *supra* note 3

<sup>11</sup> Bread for the World Institute, Hunger Facts: International. Available online at: [www.bread.org](http://www.bread.org)

11. Environmental degradation affects overall human well-being.<sup>12</sup> Diseases due to inadequate water, sanitation and hygiene affect approximately half of the population in Africa, Asia, Latin America, and the Caribbean, causing about 1.7 millions of deaths each year. A cheap source of protein for developing countries is becoming scarce as a result of over exploitation fish stocks. Desertification is having a negative impact on millions of people's livelihood.

12. But what should not be forgotten is that all too often, the process of environmental degradation in developing countries has a historical context deeply rooted in the economic and political power structures that were created as a result of, or which reflected, colonial and post-colonial economic and political domination by developed over developing countries. For example, in much of South East Asia and Latin America, the logging and deforestation of tropical hardwood forests were primarily the result of commercial logging for the export of tropical hardwoods to Japan, Europe and the United States. Large-scale resource extraction activities (such as mineral and oil extraction for export to developed country markets) by primarily developed country companies operating in developing countries have also often caused large-scale social and environmental damage in many host developing countries. In short, it could often be said that the environmental degradation in many developing countries have been, and continues to be, the result of having their resources be extracted and used to fuel the development process and market demands of today's developed countries.

13. In its 2007 report on the achievement of the MDGs, the UN concluded that, although there has been some progress, if current trends persist, only one of the eight regions identified in the report would be able to achieve all the MDGs<sup>13</sup>. The peoples living in sub-Saharan Africa are less likely to improve their overall quality of life. Asian countries face significant environmental and health challenges. Furthermore, gender inequalities, lack employment opportunities, water scarcity, extended deforestation, unplanned urbanization, high incidence of HIV, insecurity and political insatiability, etc., remain important obstacles for development in the South. Some studies indicate that, even if the MDGs were met, 900 million people would still be affected by chronic poverty by 2015<sup>14</sup>. Thus, countries in the South can spare no effort in their pursuit of development because the well-being of its present and future generations is at stake. The Millennium Development Goals Report 2007 goes on to state that "climate

---

<sup>12</sup> UNEP, Global Environmental Outlook 2006: An Overview of our Changing Environment 5-6 (2006) [hereinafter GEO 2006]

<sup>13</sup> UN *et. al.*, Millennium Report 2007, *supra note* 8.

<sup>14</sup> Chronic Poverty Research Center, CHRONIC POVERTY REPORT 2004-05, 3 (2006). Available online at: [www.chronicpoverty.org](http://www.chronicpoverty.org). This study considers that people in chronic poverty are those who have benefited least from economic growth and development; i.e., people who remain poor for much or all of their lives, many of whom will pass on their poverty to their children, and all too often die easily preventable deaths.

change is projected to have serious economic and social impacts, which will impede progress towards the MDGs.”<sup>15</sup>

### B. Projected Effects of Climate Change on Developing Countries

14. The causal link between climate change and development has been described as follows: economic activities result in emissions of GHGs which leads to greater GHG concentration in the atmosphere, leading in turn to global warming which would have impacts on physical and ecological systems which, in turn, would impact on development (e.g., economic growth decrease, poverty exacerbation, food insecurity, etc.)<sup>16</sup>. In particular, while global temperature increases as a result of anthropogenic climate change will have a broad range of impacts on the development prospects in all parts of the world, climate change creates significantly higher levels of risk and challenges to development prospects for the South, in particular least developing countries (LDCs) and small islands which are the most vulnerable to climate change effects.

15. The higher vulnerability of developing countries is the consequence of a combination of geographical and socio-economic factors. Many developing countries are located in tropical or subtropical regions, with extreme weather propensity, e.g., the monsoon, high temperatures, el Niño cycles, rainfall patterns variations, etc. Climate change is likely to exacerbate extreme weather events in the South with commensurate developmental challenges.

16. In addition, a large number of developing countries are located in low latitudes, in coastal areas or are small islands that make them particularly vulnerable to sea level rise. Developing countries are also more vulnerable to climate change than developed countries due to some socio-economic factors represented by lack of wealth, limited technology, inadequate infrastructures, and unskilled human resources. Among developing countries, LDCs are disproportionately vulnerable to climate change given their acute economic limitations<sup>17</sup>.

17. Thus, climate change is expected to have profound socio-economic effects, including a further increase in economic inequities between developed and developing countries<sup>18</sup>. In the words of the IPCC “[t]he projected distribution of impacts is such that it would increase the disparity in well-being between

---

<sup>15</sup> UN *et. al.*, Millennium Report 2007, *supra note* 8, at 5.

<sup>16</sup> Franck Lecocq & Zmarak Shalizi, “How Might Climate Change Affect Economic Growth in Developing Countries?: A Review of the Growth Literature with Climate Lens”, *Policy Research Working Paper* 4315 (The World Bank Development Research Group Sustainable Rural and Urban Development Team), August 2007, at 4. [hereinafter *How Might Climate Change Affect Economic Growth*]

<sup>17</sup> IPCC 2001, *Adaptation and Vulnerability*, *supra note* 4, at 8.

<sup>18</sup> F. Sperlberg (ed.), *Poverty and Climate Change: Reducing the vulnerability of the poor through adaptation* 1 (World Bank, 2003) [hereinafter *Poverty and Climate Change*]

developed and developing countries, with disparity growing for higher projected temperature increases..."<sup>19</sup>.

18. Practically any amount of increase in global mean temperatures would produce net economic losses in many developing countries. Economic growth and development in countries of the South may be slowed or retarded by climate change effects on their factors of production<sup>20</sup>. For instance, more frequent and severe storms will affect factories, infrastructures, and services reducing production rates; climate alterations will reduce crop growing seasons; climate-related diseases will diminish human labor productivity, etc.<sup>21</sup> These losses are expected to be greater if the magnitude of the level of warming is higher<sup>22</sup>. According to some studies of the World Bank, if the global temperature increases by 2-3°C, declining agricultural production, heat-waves, droughts, flooding events, extreme precipitation, biodiversity loss, disease spread, and soil erosion produce by climate change would cost developing countries between 5-10 percent reduction of their GDP<sup>23</sup>. Other sources estimate that in South East Asia the cost of climate change could be 9-13% of GDP by 2100<sup>24</sup>. The loss of life is also expected to be more severe in the South than in developed countries<sup>25</sup>. By contrast, there is a high degree of agreement among experts that some developed countries would benefit economically with a low increase in the global mean temperatures<sup>26</sup>.

19. As mentioned above, current scientific knowledge does not allow a precise prediction of the extent and distribution of climate change effects at any given level. But projections of impacts of climate change in key sectors for development can be described. The extent of harm will depend on how much temperatures increase<sup>27</sup>.

### B.1 Food Security

20. The effects of climate change on the agriculture sector, the most vulnerable socioeconomic sector to extreme weather events, would be felt by large parts of the world's population. Approximately 1.3 billion people, i.e., one-fourth of the world's population and nearly half of the global labor force – and

---

<sup>19</sup> IPCC 2001, *Adaptation and Vulnerability*, *supra note 4*, at 8.

<sup>20</sup> Franck Lecocq & Zmarak Shalizi, *How Might Climate Change Affect Economic Growth*, *supra note 4*, at 6.

<sup>21</sup> *Id.*

<sup>22</sup> IPCC 2001, *Adaptation and Vulnerability*, *supra note 4*, at 8.

<sup>23</sup> World Bank, *Clean Energy and Development: Towards an Investment Framework* 144 (2006) [hereinafter *Clean Energy and Development*]

<sup>24</sup> N. Stern, *The Stern Review: The Economics of Climate Change* 62 (Cambridge University Press, 2007) [hereinafter *The Economics of Climate Change*] 92

<sup>25</sup> IPCC 2001, *Adaptation and Vulnerability*, *supra note 4*, at 8.

<sup>26</sup> World Bank, *Clean Energy and Development*, *supra note 24*, at 144.

<sup>27</sup> World Bank, *World Development Report 2007: Development and the Next Generation* 141-142, 149 (2007) [hereinafter *World Development Report 2007*] Available online at: [www.worldbank.org](http://www.worldbank.org)

most of whom live in developing countries -- work in agriculture-related activities. Almost 2.6 billion people, i.e., about half of the world's population, live in agricultural-based families<sup>28</sup> -- again most of them in developing countries. Likewise, most of the poor people of the world live in rural areas where hunger and malnutrition is concentrated<sup>29</sup>. For instance, two-thirds of the poorest people in the world, those that survive with less than \$1 a day, live in rural areas<sup>30</sup> - virtually all of them in developing countries. About 24% of the GDP of low-income developing countries was produced in the agriculture sector, including forestry and fishing<sup>31</sup>.

21. The economies of many developing countries are highly depended on climate-sensitive activities (for example, about 50% of the total population of all developing countries derive their livelihood from agriculture). By contrast, most developed countries have been increasingly moving from climate-sensitive activities (such as agriculture) to climate-intensive manufacturing and services activities. For instance, in the beginning of the nineteenth century 72% of the U.S. workers were employed in farms, whereas today they represent no more than the 1.2 %.<sup>32</sup>

22. The FAO estimates that food production would need to double to meet world food demand by the year 2030<sup>33</sup>. Climate change is expected to lead to an increase in agricultural productivity in some regions of the world and to a decrease in others. It is projected that some high latitude regions in northern Europe, Canada and the northern part of the U.S. would benefit from climate change if the global temperature increases below 3°C, making them more suitable for agricultural practices than they were before<sup>34</sup>. In contrast, in tropic and sub-tropic regions, where most developing countries are located and where food insecurity (such as in sub-Saharan Africa) is present, agriculture productivity is likely to decrease with global warming of 1-2°C<sup>35</sup> as most of the crops grown in these regions are not far from exceeding their temperature tolerance limits, and a large part of the land is dry and seasonal rainfall-dependent<sup>36</sup>. Variations in the rainfall pattern could reduce the length of the growing season and plant water availability<sup>37</sup>. Incremental increases in droughts and floods, both in terms of

<sup>28</sup> Millennium Ecosystem Assessment, *Ecosystems and Human Well-being: Synthesis*, Island Press, Washington D.C., 2005, at 49

<sup>29</sup> FAO, *Food Insecurity in the World*, *supra note 6*, at 5-6

<sup>30</sup> World Bank, *Global Economic Prospects 2006: Economic Implications of Remittances and Migration 10 (2006)* [hereinafter *Global Economic Prospects 2006*]

<sup>31</sup> Millennium Ecosystem Assessment, *Ecosystems and Human Well-being: Synthesis*, Island Press, Washington D.C., 2005, at 46

<sup>32</sup> Franck Lecocq & Zmarak Shalizi, *How Might Climate Change Affect Economic Growth*, *supra note 41*, at 6.

<sup>33</sup> FAO, *Food Insecurity in the World*, *supra note 6*, at 5-6

<sup>34</sup> IPCC 2001, *Adaptation and Vulnerability*, *supra note 4*, at 15.

<sup>35</sup> IPCC 2007, *Adaptation and Vulnerability*, *supra note 1*, at 6.

<sup>36</sup> IPCC 2001, *Adaptation and Vulnerability*, *supra note 4*, at 10.

<sup>37</sup> IPCC 2001, *Scientific Basis*, *supra note 9*, at 194.

severity and frequency, will further aggravate the situation of countries of the South, already more prone to this kind of extreme weather events.

23. According to some estimates of the UNDP, Africa could lose up to 33% of its maize productivity and more than 20% in sorghum and 18% for millet. About 75-125 more million people could be exposed to food shortages and hunger as a result of productivity losses.<sup>38</sup> Furthermore, with the increase of just a few degrees Celsius in the world's mean temperature, food prices may go up even further as a result of the lower productivity and relative growth in global food demand. This will exacerbate food insecurity in the South with higher undernourishment rates<sup>39</sup>. In addition, the decline of livelihood opportunities of people in rural areas may accelerate migration to cities<sup>40</sup>.

24. Water shortages will further impact on agriculture productivity. Due to warming, water evaporation will create more dry soils<sup>41</sup>.

## B.2. Water Availability

25. Water is an essential condition for life, both in the biological and sociological sense. Clean water is not only needed to sustain human health and ecological systems, it is also a basic requirement for human development<sup>42</sup>. For this reason, the UN Secretary-General has said that: "[a]ccess to safe water is a fundamental human need and, therefore, a basic human right"<sup>43</sup>.

26. A global water crisis is threatening life and livelihoods on a devastating scale<sup>44</sup>. Approximately one-third of the world's population suffers from moderate to high water stress. About 1.1 billion people living in the South lack access to adequate water, and population growth threatens to add more people to this figure. The water crisis is above all a problem that affects the poorest among the poor. Nearly two-thirds of the people lacking access to safe water live with less than \$2 a day. If current trends persist, 234 million people in 55 countries are likely to lack access to water by 2015, and even if this MDG target were met, there will still be nearly 800 million people deprived of clean water<sup>45</sup>

---

<sup>38</sup> UNDP, Human Development Report 2006. Beyond scarcity: Power, poverty and the global water crisis 15 (Palgrave Macmillan, 2006) [hereinafter Human Development Report 2006]

<sup>39</sup> IPCC 2001, Adaptation and Vulnerability, *supra note* 4, at 12.

<sup>40</sup> FAO, Food Insecurity in the World, *supra note* 6, at 5-6

<sup>41</sup> UNEP, Global Environmental Outlook 2006: An Overview of our Changing Environment 60 (2006) [hereinafter GEO 2006].

<sup>42</sup> UNDP, Human Development Report 2006. Beyond scarcity: Power, poverty and the global water crisis 2 (Palgrave Macmillan, 2006) [hereinafter Human Development Report 2006]

<sup>43</sup> United Nations Press Release, "Access to Safe Water Fundamental Human Need, Basic Human Right, Says Secretary-General in Message on World Water Day". SG/SM/7738, OBV/200, 12 March 2001. Available online at: <http://www.un.org/News/Press/docs/2001/sgsm7738.doc.htm>

<sup>44</sup> UNDP, Human Development Report 2006, *supra note* 43, at 2.

<sup>45</sup> *Id.*, at 4-7.

27. Climate change is going to affect rainfall patterns and water availability, and it will alter frequency and severity of floods and droughts<sup>46</sup>. Some areas of the world already affected by water stress will receive less water, and water flows and extreme weather events will become less predictable. Sea level rise will cause saltwater intrusions into river delta system, reducing freshwater availability in countries such as Bangladesh, Egypt and Thailand.<sup>47</sup>

28. It is projected an increase in rainfall in high latitudes, such as north parts of the U.S. and Europe. By contrast, water availability is going to diminish in tropical and subtropical regions, some of which are already facing water shortages. Fresh water availability will vary from region to region, with important differences between them. If there is a 2°C increase in the temperatures, up to 30% decrease in water availability would affect dry regions of South America, Southern Africa, and the Mediterranean basin; and a 40% decrease if there is a 4°C raise in the temperatures. For their part, South Asia, Russia and countries located in high latitudes in Europe are projected to have 10-20% water availability increase for a raise of 2°C in the temperatures, and a little more for a 4°C raise. This means that 1-4 billion of people will suffer from water scarcity, in particular in Africa, the Middle East, Southern Europe, and South and Central America. In contrast, 1-5 billion people, principally in South and East Asia, are expected to receive more water; most of which will be in the wet season increasing flood risk<sup>48</sup>.

29. Any increase in global mean temperatures are likely to affect water availability. According to some estimates, if there is a warming of 1°C, water shortages would affect approximately 50 million people as a result of the complete melting of small glaciers in the Andes; if the increase is more than 2°C, water availability would decrease 20-30% in some regions, such as Southern Africa and Mediterranean; if the warming is of 3°C, water scarcity would affected about 1-4 billion additional people, and approximately 1-5 billion would face a greater flood risk; if there is a 4°C temperature increase, Southern Africa and Mediterranean will suffer a 30-50% decrease in water availability; and a 5°C warming could lead to the disappearance of large glaciers in Himalayas, creating water shortages for one-quarter of China's population and hundreds of millions in India<sup>49</sup>.

### B.3. Health

30. Climate change will have both positive and negative impacts on human health, but negative health impacts are expected to outweigh positive health

<sup>46</sup> UNESCO *et al.*, THE United Nations World Water Development Report 2, 24 (Berhahn Books, 2006)

<sup>47</sup> UNDP, Human Development Report 2006, *supra note 43*, at 15.

<sup>48</sup> N. Stern, The Economics of Climate Change, *supra note 25*, at 62.

<sup>49</sup> *Id.*

impacts<sup>50</sup>. Part of the health problems will result as a direct consequence of extreme weather events such as floods, droughts, intense heat and cold, etc. However, human health will also be affected by climate change in an indirect manner as a result of ecosystems and social alteration, food decreases, changes in infectious diseases occurrence, migrations and economic shortfalls, etc<sup>51</sup>.

31. Considering the fact that in a number of occasions health of developing countries' population has proven to be highly vulnerable to extreme weather events<sup>52</sup>, there is a very high confidence among experts that an increase in the frequency and severity of extreme weather events as a byproduct of climate change would cause physical damage, migrations, big losses of food production, reduction of clean water availability, and would make more likely the occurrence of infectious disease epidemics in developing countries<sup>53</sup>. Such health impacts arising from climate change – such as productivity losses arising from sick and the economic costs associated with increased healthcare requirements – are also likely to adversely impact on developing countries' ability to meet their development objectives.

#### B.4. Environmental Risks

32. Given the multiple exiting factors causing wildlife disruptions, *specific* projections on the effects of climate change on wild flora and fauna imply a certain margin of error. However, experts observe that *general* projections have a more reduced error margin. In this regard, it has been observed that many endangered species will be driven closer to extinction by a combination of factors, including climate change. Alternation of sizes, variations in number of specimens, changes in breeding seasons are some of the ways in which wildlife is responding to local climatic variations<sup>54</sup>.

33. If the Earth's mean temperature exceeds 1.5-2.5°C, about 20-30% of wild flora and fauna assessed so far by the IPCC are likely to be at increased risk of extinction<sup>55</sup>. Furthermore, any warming above this temperature would cause significant disruptions in ecosystems structures, interaction among different species, species' geographic ranges; resulting in broad negative consequences for biodiversity and ecosystems.<sup>56</sup>

34. Extinction of wildlife will have important repercussions both in other natural processes as a result of the numerous interconnections among

<sup>50</sup> IPCC 2001, Adaptation and Vulnerability, *supra note* 4, at 453.

<sup>51</sup> A. J. McMichael, *et al.* (eds.), Climate Change and Human Health: Risks and Responses 47 (WHO, 2003) [hereinafter Climate Change and Human Health]

<sup>52</sup> *Id.*, at 79-96.

<sup>53</sup> IPCC 2001, Adaptation and Vulnerability, *supra note* 4, at 453.

<sup>54</sup> *Id.*

<sup>55</sup> IPCC 2007, Adaptation and Vulnerability, *supra note* 1, at 6.

<sup>56</sup> *Id.*

ecosystems, and in human livelihood which will be deprived of important environmental goods and services.

### B.5. Social Stability

35. Climate change could have significant social destabilization effects. It is projected to be the cause of significant environment-related migration, and potentially of major social disruptions and conflicts. In words of the IPCC “[i]n some parts of the world, the impacts of climate change will affect the livelihoods of the population in such a way that social disruption, economic decline and major displacement of populations are projected to occur”<sup>57</sup>. The extent of the damage to social structures will be proportional to the social, political and economic situation of the country and its population.<sup>58</sup>

36. Generally, large scale population displacements, whether internal or cross-border, add pressure to local scarce natural resources, aggravate overpopulation, limit water availability, and favor the transmission of epidemic diseases causing instability within the country, in other countries, or within a region<sup>59</sup>. Every year 10 million people are forced to flee from their homeland due to different forms of environmental deterioration and natural disasters. Sub-Saharan Africa experiences the largest environment-related displacements of people, with India and other parts of Asia following behind, and Europe and U.S. facing increasing pressure from North African and Latin American migrations.<sup>60</sup>

37. It is believed that rising sea levels, desertification and water shortages displace up to 50 million people by the end of the decade. Some experts state that “there are well-founded fears that the number of people fleeing untenable environmental conditions may grow exponentially as the world experiences the effects of climate change”.<sup>61</sup> According to some estimates, by the year 2050 there could be as much as 150 million people displaced as a consequence of environment-related factors<sup>62</sup>.

---

<sup>57</sup> IPCC 2001, *Adaptation and Vulnerability*, *supra note 4*, at 454.

<sup>58</sup> *Id.*

<sup>59</sup> UNEP, *Sudan: Post-Conflict Environmental Assessment 9* (2007) [hereinafter *Post Conflict Environmental Assessment*]

<sup>60</sup> UN University, *Environmental Refugees: The Forgotten Migrants* (2007). Available online: <http://www.ony.unu.edu/16May2007.html> [hereinafter *Environmental Refugees*]

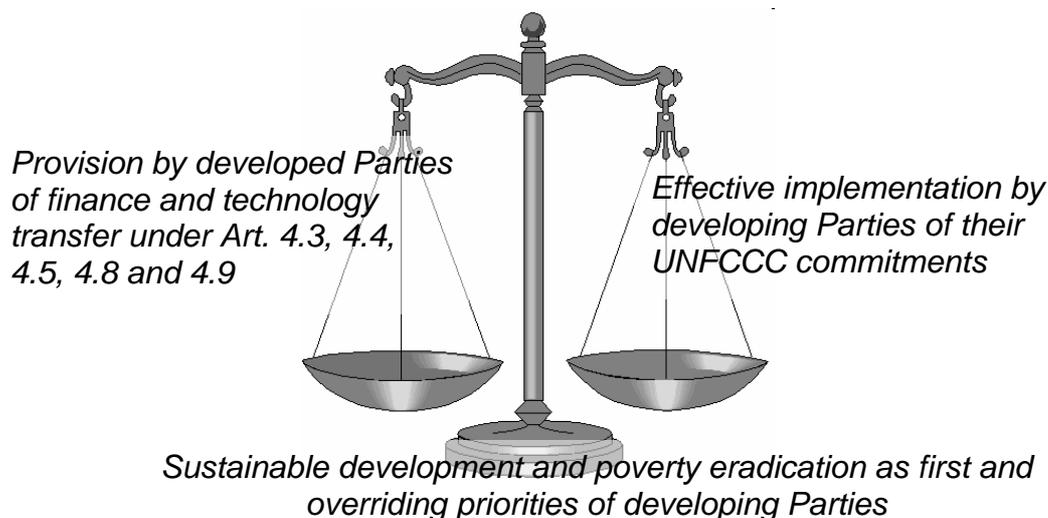
<sup>61</sup> D. Adam, “50m Environmental Refugees by End of Decade, UN Warns”, *The Guardian*, Wednesday October 12, 2005.

<sup>62</sup> UN University, *Environmental Refugees*, *supra note 95*.

### III. SUSTAINABLE DEVELOPMENT AS ADAPTATION IN A CLIMATE CONSTRAINED WORLD

38. It is clear that addressing development needs in a climate constrained context poses an enormous challenge to developing countries and to their partners in developed countries, global economic and development institutions, NGOs, and civil society. But still, the fact remains that effective global responses to climate change cannot be divorced from effective global responses to the South's continuing development challenge.

39. The role of sustainable development in the climate change and development context is increasingly acknowledged in different international fronts. In particular in the UNFCCC, Article 3.4 states that economic development is essential for adopting measures to address climate change, and acknowledges that the Parties have a right to, and should, promote sustainable development. Article 3.5 of the UNFCCC adds that all parties should cooperate to promote a supportive and open international economic system that would lead to sustainable economic growth and development in all Parties, particularly developing country Parties, thus enabling them better to address the problems of climate change.<sup>63</sup> Finally, Article 4.7 of the UNFCCC stresses that in terms of the implementation by the the UNFCCC Parties of their finely balanced commitments - e.g. that the developing Parties implementation of their UNFCCC commitments would depend on the extent of implementation of developed Parties' commitments to provide financing and technology - such implementation must take into account that "economic and social development and poverty eradication are the first and overriding priorities" of developing countries. This balance of UNFCCC commitments based on the sustainable development of developing countries can be visualized as follows:



<sup>63</sup> UNFCCC, *supra note 5*.

40. In a similar manner, the IPCC has recognized that “[t]he primary factors underlying anthropogenic climate change are similar to those of most socio-economic issues –that is, economic growth, broad technological changes, life style patterns, demographic shifts . . . and governance structures”<sup>64</sup>, and that “[t]he capacity of countries to adapt and mitigate can be enhanced when climate policies are integrated with national development policies including economic, social, and other environmental dimensions”<sup>65</sup>. Having identified it as a cross-cutting theme, the IPCC integrated sustainable development it into his work with the explicit objective of leveraging sustainable development concepts towards climate change and vice versa<sup>66</sup>.

41. Sustainable economic development is not only the most effective tool to pursue poverty alleviation; for developing countries, it also plays a key role in the two major responses to climate change: mitigation and adaptation<sup>67</sup>. Mitigation is an anthropogenic intervention to reduce the sources or enhance the sinks of greenhouse gases<sup>68</sup>. Adaptation is defined as adjustments in human and natural systems, in response to actual or expected climate *stimuli* or their effects, that moderate harm or exploits beneficial opportunities<sup>69</sup>. The idea behind mitigation is to slow and ultimately stop anthropogenic climate change; whereas the idea behind adaptation is to reduce the negative impacts of the temperatures increase.

42. Developed countries are historically and primarily responsible for climate change mitigation as a result of their historical responsibility in creating the problem. In order to re-orient their development path towards a sustainable one, developed countries should implement effective GHG mitigation policies that would drastically reduce their GHG emissions through major shifts in their patterns of production and consumption leading to the modification of longer-term trends of anthropogenic GHG emissions. Developing countries for their part should focus on the development and implementation of adaptation strategies in order to mainstream climate change responses and put their economies onto a low-carbon development path.

43. Adaptation is a crucial response and the priority for developing countries. Even if international efforts could cut off the emission of GHG, they would not stabilize atmospheric concentrations of GHG emission and climate<sup>70</sup>. As the IPCC

<sup>64</sup> IPCC, Climate Change 2001: Synthesis Report 29 (2001). Available online at: <http://www.ipcc.ch/pub/un/syreng/spm.pdf> [hereinafter IPCC 2001, Synthesis Report]

<sup>65</sup> *Id.*, at 30.

<sup>66</sup> L. Srivastava & T. Heller, “Integrating Sustainable Development and Climate Change in AR4”, IPCC Technical Paper, 10 August 2003. Available at: [www.ipcc.ch](http://www.ipcc.ch)

<sup>67</sup> IPCC 2001, Adaptation and Vulnerability, *supra note 4*, at 89.

<sup>68</sup> *Id.*, at 990.

<sup>69</sup> *Id.*, at 982.

<sup>70</sup> IPCC 2001, Adaptation and Vulnerability, *supra note 4*, at 89.

observes: “[i]nsofar as no level of mitigation will completely prevent some climate change, some adaptation will be necessary”<sup>71</sup>.

#### A. Sustainable Development as the Basis for Shaping Adaptive Capacity in Developing Countries

44. Throughout human history, social systems have adjusted to natural climate variations and other environment perils. Temporary migration, diversification of production activities, storage of food are some of the measures adopted by some societies to deal with climate variability. Anthropogenic climate change, however, poses a particular challenge to the human ability to adapt, because knowledge of natural climate variability in which adaptive measures were based is now less reliable given that climate change is mainly human-induced and is no longer driven only by natural forces<sup>72</sup>. To a large extent, historic adaptation has been mainly *reactive*, that is, after initial impacts are manifest; for example, channeling reconstruction funds to disaster zones. Anthropogenic climate change poses the challenge to adopt anticipatory adaptive measures; i.e., before the occurrence of climate variations, and for which there is no direct previous experience.<sup>73</sup>

45. Some concrete examples of an *ex ante* adaptation measures adopted by some developed countries include requirements for engineering and construction plans to take sea-level rise into account, a prohibition to build in vulnerable coastal zones, changing planting dates and crops varieties in agriculture, development of guidance material for farmers to deal with current climate variability, etc.<sup>74</sup> These are measures which all too often developing countries find difficulty in adopting and implementing due to their financial and technological resource constraints.

46. Sustainable economic development is not only the optimal response to poverty-related challenges; it can also improve the so called *determinants of adaptive capacity*, such as economic capacity, technology options, adequate information and human capital. As Goklany observes, all these determinants of adaptive capacities are themselves indicators of the degree of development of a country<sup>75</sup>.

---

<sup>71</sup> *Id.*, at 94.

<sup>72</sup> I. Burton *et al.*, *Adaptation to Climate Change: International Policy Options 6* (Pew Center on Global Climate Change, 2006) [hereinafter *Adaptation to Climate Change*]

<sup>73</sup> *Id.*, at 10. Some planned adaptation measures, which are in strict sense anticipatory, can be labeled as reactive because they are to be applied in case of the occurrence of climate-related disaster. See IPCC 2001, *Adaptation and Vulnerability*, *supra note 4*, at 884.

<sup>74</sup> Frédéric Gagnon-Lebrun & Shardul Agrawala, *Progress on Adaptation to Climate Change in Developed Countries: An Analysis of Broad Trends 34* (OECD, 2006) [hereinafter *Adaptation in Developed Countries*]

<sup>75</sup> I. M. Goklany, “Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation and Sustainable Development”, *Mitigation and Adaptation Strategies for Global Change*, Vol. 12, No. 5, June 2007, pp 755-786 [hereinafter *Reduce Vulnerability and Advance Adaptation*]

## B. Economic Capacity

47. As countries develop economically, they improve their adaptive capacity and become less vulnerable to climate variability<sup>76</sup>. Developed countries continue to have considerably more technical and financial resources which enhance their capacity to adapt to climate change<sup>77</sup>. It should be noted though that developed countries, by and large, were able to acquire and maintain such resources as a consequence of a carbon-intensive development process that: (i) was maintained for a long time through economic and political arrangements that exploited and marginalized developing countries and their populations; (ii) significantly consumed and diminished the resources of developing countries; and (iii) led to steep increases in anthropogenic GHG emissions.

48. Extreme weather events have different consequences in developed than in developing countries as a result of their important differences in the ability to adapt. Although developed countries suffer important economic losses as a consequence of extreme weather events (sometimes even higher than developing countries in absolute terms), measured in relative wealth, losses in developing countries are significantly higher. Some studies concluded that from 1984 to 2003, losses as percent of national income were three times higher in low- and middle-income countries, which encompass 80% of the world population, than in high-income countries<sup>78</sup>. The fact that absolute economic losses are higher in developed countries than in developing countries reflects the degree of wealth disparities among different regions of the world.

49. Developing countries, in particular those more densely populated, experienced the majority of human life losses caused by natural disasters. Between 1988 and 1997, natural disaster caused 50,000 deaths a year, and more than 97% of all these deaths were in developing countries. Poor people are the most common victims in natural disaster, in part because they usually live in more disaster-vulnerable zones or have low quality infrastructures. In addition, natural disasters often slow economic development, which in turn, further diminishes poor countries chances to reduce poverty. Lost of poor people livelihood regularly have long-term negative effects on their low living standards<sup>79</sup>.

---

<sup>76</sup> IPCC 2001, *Adaptation and Vulnerability*, *supra note* 4, at 895.

<sup>77</sup> Frédéric Gagnon-Lebrun & Shardul Agrawala, *Adaptation in Developed Countries*, *supra note* 73, at 11.

<sup>78</sup> I. Burton *et al.*, *Adaptation to Climate Change*, *supra note* 71, at 3.

<sup>79</sup> World Bank, *World Development Report 2001: Attacking Poverty* 170 (2001) [hereinafter *World Development Report 2001*]

50. In the South, social, environmental and economic limitations aggravate country vulnerability to the effects of climate variations<sup>80</sup>. The inadequate ability of developing countries to cope with extreme weather events is associated with underdevelopment, overpopulation, poverty, and environmental degradation. As the IPCC observed: “[w]hether it is expressed as the economic assets, capital resources, financial means, wealth, or poverty, the economic condition of nations and groups clearly is a determinant of adaptive capacity<sup>81</sup>.”

51. In other words, the ability to adjust to extreme weather events is “highly dependent on the level of economic development”<sup>82</sup>. By this standard, developed countries tend to be better able adapt to climate change because their higher levels of development produce greater adaptive capacity<sup>83</sup>.

### C. Technological Level, Innovation and Availability

52. Technological level, innovation and human capital are closely linked to productivity gains, sustained economic growth and employment. As consequence of this, developed countries have been speeding up their transition towards knowledge-based economies to increase economic growth and become more competitive in the world market<sup>84</sup>.

53. The ability of countries to adapt effectively to climate change can also depend on the availability of and access to appropriate technologies. A number of adaptive measures directly or indirectly entail the use of appropriate technologies<sup>85</sup>. Thus, knowledge creation, diffusion and utilization is not only a necessary requirement for development, it is also a key determinant of climate change adaptive capacity.

54. Developed countries tend to be better equipped in terms of technology than developing countries because they have more resources to invest in knowledge creation, dissemination and utilization<sup>86</sup>. Technological development is largely dependant on expenditures for research and development (R&D). This is illustrated by the fact that in 2003, Japan invested 3.1% of its GDP in R&D, the United States invested 2.6% of GDP, and the EU 1.9% of GDP with the goal to increase its R&D investment up to 3% of its GDP by 2010.<sup>87</sup> Although some developing countries such as China are making strong investments in knowledge

<sup>80</sup> S. La Trobe, & P. Venton, Natural Disaster Risk Reduction: The Policy and Practice of Selected Institutional Donors 17 (Tearfund, 2003) [hereinafter Natural Disaster Risk Reduction]

<sup>81</sup> IPCC 2001, Adaptation and Vulnerability, *supra note 4*, at 895.

<sup>82</sup> F. Sperling, Poverty and Climate Change, *supra note 17*, at 6.

<sup>83</sup> I. Burton *et al.*, Adaptation to Climate Change, *supra note 71*, at 5.

<sup>84</sup> EU Commission, Towards a European Research Area Science, Technology and Innovation: Key Figures 2005, 17 (Office for Official Publications of the European Communities, 2005). Available online at: <http://europa.eu.int> [hereinafter Technology and Innovation]

<sup>85</sup> IPCC 2001, Adaptation and Vulnerability, *supra note 4*, at 896.

<sup>86</sup> *Id.*

<sup>87</sup> EU Commission, Technology and Innovation, *supra note 84*, at 10.

and innovation, the majority of developing countries do not have enough resources available to support high levels of endogenous R&D projects.

55. Although some developing countries have traditional knowledge useful for adaptation purposes, adaptation-relevant technologies available and used in developed countries may not always be accessible to developing countries. In fact, the key issue with respect to technology transfer in the context of the UNFCCC is the issue of defining and having a common agreement on what would be effective technology transfer, assessing whether such transfer is taking place or not, and, if not, determining why such transfer is not taking place, and then agreeing on a multilaterally agreed approach to solving the problem. This would mean, among other things, also looking at other related issues such as:

- financing of climate-friendly technology transfers under the UNFCCC
- defining actual modalities of climate technology transfer under the UNFCCC (both public sector and market-based)
- the link between intellectual property rights (IPRs) and technology transfer (include shared ownership, compulsory licensing, innovation and development)
- technology transfer and trade (including trade restrictions on developing country tech, export restrictions of developed country tech, NTBs, standards, performance requirements)
- climate technology needs requirements of developing countries for adaptation and development
- policy regimes for promoting received technology innovation and development in developing countries.

56. Regarding IPRs as a technology transfer barrier, there are some research that suggest that they are not necessarily so for most climate-relevant sectors. However, there are also others that argue that there may be both tangible and intangible costs that serve as barriers to technology transfer associated with IPRs, in addition to the development implications that IPRs have in general for developing countries which need to be taken into account as well. One important aspect of IPRs as it relates to technology transfer that often is not thought about or highlighted is the potential for developing countries to use compulsory licensing which is allowed under TRIPS. Another one is the issue of modalities on shared R&D, facilitated licensing, and shared IPR for climate technologies.

57. Under the UNFCCC (Art. 4.5), technology transfer is a treaty obligation that developed country Parties must comply with. This means, for developing countries, that developed country Parties should put in place public policy measures that would ensure that such technology transfer does take place - whether through direct public sector-to-public sector transfers or encouraging and promoting their private sector to effect such transfers to either the public or private sectors of developing countries. Technology transfers to the public sector could be in the form of, for example, transfers of tech to developing country

government agencies tasked with undertaking specific climate adaptation or mitigation actions or to government R&D agencies/materials production facilities for purposes of licensed reproduction of the technology. It also implies that measures for technology transfer under the UNFCCC must necessarily be easy to use and actually facilitates such transfer - i.e. no policy conditionalities, no middleman modalities (e.g. no going through the World Bank or other institutions), etc. But to a large extent, North-South technology transfer for both mitigation and adaptation is not happening.<sup>88</sup>

#### D. Adequate Information and Human Capital

58. Information is an essential ingredient for climate adaptation. This important element is also related to technology. Information services are important factors that can be used by decision-makers, individuals, policymakers, and public sector agencies to reduce uncertainty and improve adaptive measures<sup>89</sup>. But there is a “notable lack of geographic balance in data” between developed and developing countries on the physical and biological environment and their relationship to climate changes<sup>90</sup>. Therefore, information services should be improved in developing countries and support in this regard should be provided to developing countries consistent with Art. 4.1(g) and (h) and Art. 5 of the UNFCCC.

59. As for human capital, lack of trained and skilled personnel can further reduce the ability of a nation to shape and apply adaptation measures. Skilled professionals are not only needed to significantly improve developing countries adaptive capacity; good engineers, architects, planners are also essential for the effective implementation of adaptation-related decisions. Therefore, it is important to help improve the education levels in developing countries. In general developed countries have higher levels of skilled personnel than developing countries and therefore have a greater adaptive capacity. In other words, developed countries have sufficient economic resources required to develop, install, operate, and maintain technologies for improving well being.<sup>91</sup> By contrast, developing countries often lack economic resources to invest on research and formal instruction. The consequence of this is low levels of educational attainment and limited human capital to stimulate creation and development of appropriate technologies.<sup>92</sup> In this regard, support should be

---

<sup>88</sup> UNFCCC, *Technologies for Adaptation to Climate Change 11* (UNON Publishing Services, 2006)

<sup>89</sup> R. de Guzman, “Development and Climate Change: Strategic Policy Considerations from the Climate Perspective”, in *Development and Climate Change: Managing Risk, Realizing Opportunities*. Side Event during the ECOSOC Substantive Session, 13 July 2007, Geneva, Switzerland. Available online at:

[http://www.southcentre.org/Events/2007Jul\\_Dev\\_Climate\\_Change.htm](http://www.southcentre.org/Events/2007Jul_Dev_Climate_Change.htm)

<sup>90</sup> IPCC 2001, *Adaptation and Vulnerability*, *supra note 4*, at 2.

<sup>91</sup> I. M. Goklany, “Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation and Sustainable Development”, *Mitigation and Adaptation Strategies for Global Change*, Vol. 12, No. 5, June 2007, pp 755-786 [hereinafter *Reduce Vulnerability and Advance Adaptation*].

<sup>92</sup> I. M. Goklany, *Reduce Vulnerability and Advance Adaptation*, *supra note 92*, at 755-786.

provided to developing countries for education, training and public awareness consistent with the provisions of Art. 6 of the UNFCCC.

E. Sustainable Development and Poverty Eradication: Overriding Priorities of Developing Countries

60. The UNFCCC recognizes the especial needs of developing countries stating that “economic and social development and poverty eradication are the first and overriding priorities of developing countries.”<sup>93</sup> Art. 3.4 of the UNFCCC states that “Parties have a right to, and should, promote sustainable development. Policies and measures to protect the climate system against human-induced change should be appropriate for the specific conditions of each Party and should be integrated with national development programmes, taking into account that economic development is essential for adopting measures to address climate change.”

61. The costs of mitigation depend on timing, socioeconomic conditions, technological develop-paths, and the GHG stabilization level desired.<sup>94</sup> Energy options and associated investments will also determine the cost and level of stabilization of GHG<sup>95</sup>. For most developing countries, with their low income level, their limited technology availability and associated investments, mitigation often is not the main priority and they are not in any position to accept obligatory emission reductions targets without impacting on their human and economic development<sup>96</sup>. In fact, the impact of mitigation costs on their economies could be considerable. For instance, considering stabilization between 445 and 755 ppm CO<sub>2</sub>-eq, mitigation costs are estimated at between a 3% decrease in global GDP and a small increase in 2030, and a 5.5% decrease and a 1% gain in 2050<sup>97</sup>. In comparison, the total collapse of the economy of three of the most vulnerable developing countries to climate change effects (Bangladesh, the Bahamas, and Vietnam) will produce less than 1% decrease of global GDP<sup>98</sup>. Specifically mitigation costs for developed countries of meeting Kyoto targets have been estimated in a decrease of about 0.2% and 2% of their projected GDP in 2010, in absence of emissions trading between Annex B countries; or about 0.1% and 1.1%, with full emissions trading<sup>99</sup>. But, if developing countries were required to meet Kyoto emission reduction goals, it is very likely that mitigation costs would

<sup>93</sup> UNFCCC, *supra note 5*, art. 4.7

<sup>94</sup> IPCC 2001, Adaptation and Vulnerability, *supra note 4*, at 3.

<sup>95</sup> *Id.*, at 4

<sup>96</sup> William Chandler *et al.*, Climate Change Mitigation in Developing Countries (Pew Center on Global Climate Change, 2002)

<sup>97</sup> IPCC 2007, Adaptation and Vulnerability, *supra note 1*, at 16.

<sup>98</sup> Bangladesh’s Gross domestic product based on purchasing-power-parity (PPP) share of world total is 0.506 percent, the Bahamas’ is 0.010 percent, and Vietnam’s is 0.452 percent. IMF, “World Economic Outlook Database”, April 2007. Available online at: [www.imf.org](http://www.imf.org)

<sup>99</sup> IPCC 2001, Adaptation and Vulnerability, *supra note 4*, at 10.

be increased by several per cent of their GDP<sup>100</sup>. In a situation such as this, most developing countries would have difficulties progressing in the attainment of their development goals, exacerbating global economic development inequities.

62. Some recent studies of the World Bank observe that it is very likely that the number of poor in Africa, a continent that houses one-third of the poorest people in the world, will doubled by 2030<sup>101</sup>. Subjecting African countries to binding commitments for GHG emissions reductions would be tantamount to requiring Africa to stay poor. Furthermore, although some developing countries are making remarkable economic progress such as China and India lifting millions of peoples out of poverty, many more millions of people in these countries are still poor<sup>102</sup>.

63. If developing countries are to achieve their sustainable development goals, some increase in their GHG emissions due to increased energy use should be expected. Economic and population growth are both drivers with strong influence on GHG emissions entailing an increasing demand for energy, goods and services. Hence, emissions in developing countries are expected to grow as a result of their high population growth rates and their need to grow in economic terms to address poverty and development concerns<sup>103</sup>. It is important to emphasize that, emissions in most developing countries, in particular LDCs and small states, are minuscule and do not add important pressure to the climate system. Most developing countries combined contribute only 10 percent of annual global GHG emissions<sup>104</sup>. As the World Resources Institute observes “[t]he least developed countries and small island developing states, most of which have negligible emissions, are not critical to GHG mitigation efforts”<sup>105</sup>. Thus, although global GHG emissions need to be reduced in order to avoid surpassing “safe levels” of GHG concentration in the atmosphere, the reduction has to come in large part from developed countries and these reductions should be large enough to offset the needed emissions increase in developing countries, in particular those of LDCs and small islands.

64. Most of global GHG emissions come from a relatively small number of countries with large economies, large populations or both. Collectively, 25 countries account for 83 percent of global emissions, for 87 percent of world GDP, and represent 70 percent of the world population<sup>106</sup>. Within this group there are some developing countries whose emissions of GHG are increasing at fast rates,

<sup>100</sup> For instance, according to the IPCC, mitigation costs in Economies in transition (EITs) is often several GDP per cent higher than in developed countries. IPCC 2001, *Adaptation and Vulnerability*, *supra note 4*, at 10.

<sup>101</sup> World Bank, *Global Economic Prospects 2007: Managing the Next Wave of Globalization*, 69 (2007) [hereinafter *Global Economic Prospects 2007*].

<sup>102</sup> *Id.*, at 114

<sup>103</sup> *Id.*, at 38-39. This is also recognized in the preamble of the UNFCCC.

<sup>104</sup> Kevin A. Baumert *et. al.*, *Navigating the Numbers: Greenhouse Gas Data and International Climate Policy*, 113 (World Resources Institute, 2005) [hereinafter *Navigating the Numbers*]

<sup>105</sup> Kevin A. Baumert *et. al.*, *Navigating the numbers*, *supra note 159*, at 15.

<sup>106</sup> *Id.*, at 11.

in particular China and India. There are studies project that by 2030, 55 percent of global CO<sub>2</sub> emissions will come from developing countries.

65. What this means is that while developing countries should not be subjected to binding GHG emissions reductions commitments, all efforts should also be undertaken consistent with the UNFCCC to shift their economies to a low-carbon development pathway that would allow for lower levels of increases in their GHG emissions. It must be emphasized that developed countries are generally the highest *per capita* emitters as a result of their energy-intensive lifestyles. On the list of highest *per capita* emitters, China and India are listed as 99<sup>th</sup> and 140<sup>th</sup>, respectively. Although developing countries, mainly driven by China and India, may be experiencing faster per capita economic growth than developed countries, they are also experiencing higher population growth which, coupled with the large income gap between developed and developing countries, means that income convergence between developed and developing countries will largely remain elusive. In absolute terms, the economic differences gap between developing and developed countries will continue to be significant, although decreasing, in the future<sup>107</sup>.

66. Populations in developed countries will thus continue to produce and consume more than their fair share of global resources and will likewise continue to have higher *per capita* GHG emissions in comparison to developing countries. It is clear then that developed countries, which are the highest emitters and are better equipped to reduce emissions, should bear the heaviest burden of mitigation. For such mitigation to show that developed countries are, as required under the UNFCCC, taking the lead in modifying longer-term trends of anthropogenic GHG emissions, developed countries have effect substantial and deep policy-driven changes in the patterns of resource production and consumption, especially of fossil fuels, of their populations. Mere palliative mitigation actions such as those that may be obtained through investment in Clean Development Mechanism (CDM) projects in developing countries (which in themselves already shift the burden of mitigation to the recipient developing country) or voluntary market-based actions to reduce emissions most likely would not be sufficient. What is needed in developed countries, in order for them to live up to their historical responsibility for causing anthropogenic climate change and to comply effectively with their treaty-based mitigation obligations, would be such shifts in patterns of production and consumption.

67. Developing countries for their part can leapfrog their development process, avoiding GHG emissions-intensive industrialization path used by developed countries, and endeavor to shift to low carbon development pathways in order to avoid adding unnecessary pressure into the environment, including the climate system. Continuing current trends of “business as usual” both in developed and developing countries could have considerable negative consequences in the environment and human life.

<sup>107</sup> World Bank, Global Economic Prospects 2007, *supra note* 102.

68. In addition, although anthropogenic climate change is foremost a product of unsustainable development pathways of developed countries, it is also a common concern of humanity. In other words, the impacts of climate changes will be felt by all countries regardless of their degree of contribution to the problem. It is clear that developing countries have a responsibility towards their own present and future generations which entails taking necessary measures to avoid, according to their own needs and capacities, unsustainable development pathways and further global warming. Developing countries now have an opportunity in the climate change crisis to establish production and consumption patterns in their economies that move away from current fossil fuel-dependent systems – which are essentially closed systems that depend on non-renewable bioenergy – to systems that are fueled by renewable sources of energy. Such shift should be supported by developed countries consistent with treaty obligations under the UNFCCC.

69. More climate-friendly development pathways in developing countries would require a combination of measures in different economic sectors, including energy-efficiency measures, use of low carbon fuels, etc. In this context, access to information, financial resources, training and capacity building would be of the utmost importance<sup>108</sup>. But overall, among the best ways to pursue environmentally sound development while avoiding GHG intensive activities is to adopt state-of-the-art clean technologies<sup>109</sup>. For instance, from 1990 to 1998, GHG emissions dropped about 1.3% to 1.4% in part thanks to new technologies and practices<sup>110</sup>. The IPCC has concluded that there is sufficient technology (e.g. wind turbines, efficient hybrid engines, improved fuel cell, etc.) and economic potential to reduce GHG to level close or below those of 2000 by 2010 and even lower by 2020<sup>111</sup>. Technologies options with high mitigation potential earmarked to efficiency of end use devices, shift to low-carbon and biomass fuels, carbon removal and storage, etc. The IPCC also admits that both technology and economic potential is primary in the hands of developed countries, and observes that the poor in any country are faced with limited opportunities to adopt technologies.<sup>112</sup> Hence, as a complement of the set of compensatory adaptive measures required, developed countries should assist developing countries to enhance their mitigation potential providing financial resources, training, capacity building, and technology transfer<sup>113</sup>.

70. To support a shift to low-carbon sustainable development pathways in developing countries, an integrated approach to development and climate change policy needs to be undertaken both at the national and international

---

<sup>108</sup> *Id.*, at 12.

<sup>109</sup> *Id.*

<sup>110</sup> *Id.*, at 171.

<sup>111</sup> *Id.*

<sup>112</sup> IPCC 2001, *Adaptation and Vulnerability*, *supra note* 4, at 11.

<sup>113</sup> *Id.*, at 12. These actions, in any case, are treaty obligations by developed countries under the UNFCCC.

levels. Traditionally, development and climate change concerns have been addressed by policy-makers in different forums and in an uncoordinated manner. Yet the causal relationship between unsustainable development of developed countries and climate change is undeniable. It is also evident that climate change has important implications for development prospects. Furthermore, sustainable development is essential to address climate change, both in terms of adaptation and mitigation, and poverty-related manifestations, including the attainment of the MDGs<sup>114</sup>.

#### F. Integrating Development and Climate Change Policies

71. The linkages between environmental degradation and economic activities were identified in the literature in the 1960-70s<sup>115</sup>. These linkages were recognized by the international community in the Stockholm UN Convention on Human Environment 1972<sup>116</sup>, crystallized in the concept of sustainable development elaborated by the Brundtland Commission in the early 1980s<sup>117</sup>, and were finally incorporated to the international policy agenda as an economic-environmental-social paradigm in the 1992 Rio UN Conference on Environment and Development (UNCED)<sup>118</sup>.

72. Although the UNFCCC was adopted in the context of the UNCED, until recently development and climate change were approached by the international policy-making forums largely as independent matters. The UN, the World Bank, the IMF, the WTO, among other international institutions address, in one way or another, development and climate change issues, but rarely ever with a coherent or an integrated approach. Saleemul Huq *et al.* observe that two reasons explain why development and climate change have evolved separately.

73. The first reason is that these issues have been dominated by two different disciplines. On the one hand, the climate change phenomenon *per se* belongs to the realm of natural sciences. Climate change causes, effects, mitigation, adaptation have been studied by natural scientists since the 1980s up to today. Natural scientists knowledge on anthropogenic climate change led to the adoption of the UNFCCC in 1992 and have informed its subsequent processes ever since. In this context, development and poverty manifestations have not

<sup>114</sup> OECD, *Bridge Over Trouble Waters: Linking Climate Change and Development* 30 (2005); F. Sperling, *Poverty and Climate Change*, *supra note* 17, at 15 [hereinafter *Linking Climate Change and Development*]

<sup>115</sup> B. Russell, *Man, A Future?* (Harmondsworth Penguin Books, 1961); R. Carlson, *Silent Spring*, London: Hamish Hamilton, 1963; *The Club of Rome, The Limits of Growth* (New York: Universe Books, 1972).

<sup>116</sup> United Nations Conference on Human Environment, Stockholm, Swed., June 5-16, 1972, *Declaration of the United Nations Conference on the Human Environment*, Principle 11, U.N. Doc A/CONF.48/14 (June 16, 1972) [hereinafter *Stockholm Declaration*].

<sup>117</sup> The World Commission on Environment and Development, *Our Common Future* 43 (1987)

<sup>118</sup> United Nations Conference on Environment and Development, *Rio Declaration on Environment and Development*, princs. 4-5, U.N. Doc. A/Conf.151/5/Rev.1 (1992) [hereinafter *Rio Declaration*]

been given much attention. On the other hand, development-related insufficiencies have mainly been studied and addressed by social scientists. Climate change relevance for poverty eradication, gender equality, education, health care improvement, etc., was neglected by social scientists up until relatively recent times<sup>119</sup>.

74. The second reason is that development and climate change have different temporal and geographic scales. Among the development community, used to deal with issues of inherent urgent nature (e.g., famines, social disruptions, underemployment, etc.), climate change did not receive much attention because it was largely seen as a long-term threat<sup>120</sup>. The urgent character of most development-related problems calls for short to middle-term results and projections for development policies. Climate change models are usually long-term projections<sup>121</sup>. Furthermore, climate change studies are mostly global in nature, and it has not been up until recently that the need for regional or local climate assessments and predictions have been acknowledged by relevant forums. For its part, the elaboration of policies to cope with underdevelopment problems usually requires local or national specific information which is not always available<sup>122</sup>.

75. Other sources observe that, generally, climate change and development experts are part of different branches of national administrations with little of no communication with each other. Even in those cases where countries representatives are called to integrate in a single policy package a number concerns, competition among different issues (e.g., development, environment, human rights, etc.) could cause what has been called “mainstreaming overload”<sup>123</sup>.

76. In recent years a new trend is emerging. Different international bodies and institutions are beginning to be aware of the importance of development and climate change linkages<sup>124</sup>. This is an important first step. However, broader and more effective participation of international institutions is needed to favor the integration of development and climate change linkages within their respective mandates. In particular, the role of development as an essential enhancer of climate change adaptation and mitigation capacity in developing countries has to be incorporated and clearly acknowledged by relevant international forums and institutions.

---

<sup>119</sup> Saleemul Huq, Climate Change and Development Links 6-9 (IIED, 2006)

<sup>120</sup> OECD, Linking Climate Change and Development, *supra note* 113, at 24.

<sup>121</sup> Saleemul Huq, Climate Change and Development Links, *supra note* 118, at 9.

<sup>122</sup> *Id.*

<sup>123</sup> OECD, Linking Climate Change and Development, *supra note* 115, at 17.

<sup>124</sup> *Id.*

#### IV. CONCLUSION

77. Sustainable development is a legitimate aspiration of developing countries whose populations are affected by a wide range of poverty- and climate change-related impacts. It is also the greatest contribution that developing countries can make to achieve the objective of the UNFCCC.

78. In this context, a major concern is that, unless the current trends with respect to economic and social marginalization and environmental degradation are reversed, developing countries are likely to face even greater development challenges as a consequence of climate change. In the face of the magnitude of the projected consequences of climate change, and of the threat they represent to all countries, but in particular to those countries in which the most disfavored people in the world live, a strong response from all members of the international community is urgently needed.

79. The departing point of the needed international response must be the full and effective operationalization of the recognition that the participation of developing countries in international efforts to address global warming is premised on the achievement of their sustainable development goals. That is, sustainable development is the condition sine qua non for developing countries to be able to contribute substantially and effectively on global efforts to address climate change. This recognition should be the foundation for the establishment of "global partnership" to promote an integrated strategy and to improved collaboration between development and climate change communities.

80. The UN, in particular the UNFCCC, must continue to be the main multilateral framework for global approaches to climate change. In this context, the principle of common but differentiated responsibilities should be faithfully applied and reflected in any future normative commitments relating to climate change. Given their historic responsibility, developed countries should adopt more ambitious and effective reduction of GHG emissions to prevent global warming beyond 2°C by 2015. In addition, developed countries should provide adaptation compensatory financing as well as technology to developing countries to enable the latter to effectively undertake actions under the UNFCCC.

### BIBLIOGRAPHY

- Adam , D., “50m Environmental Refugees by End of Decade, UN Warns”, *The Guardian*, Wednesday October 12, 2005.
- Ademola Oyejide, T., “Development Dimensions in Multilateral Trade Negotiations”, in Mike Moore (ed.), *Doha and Beyond: The Future of the Multilateral Trading System* (Cambridge University Press, 2004)
- Anderson, Kym, “Agriculture, Developing Countries, and the Doha Round”, in Ingco, Merlinda D. & Winters, L. Alan (eds.), *Agriculture and the New Trade Agenda: Creating a Global Trading Environment for Development* 113-135 (Cambridge University Press, 2004).
- Baumert, Kevin A. *et. al.*, *Navigating the Numbers: Greenhouse Gas Data and International Climate Policy* (World Resources Institute, 2005)
- Bender, E. K., “North and South: The WTO, TRIPS, and the Scourge of Biopiracy”, *Tulsa Journal of Comparative and International Law*, Vol. 11, Fall 2003, 281-319.
- Bread for the World Institute, *Hunger Facts: International*. Available online at: [www.bread.org](http://www.bread.org)
- Burton , I. *et al.*, *Adaptation to Climate Change: International Policy Options* (Pew Center on Global Climate Change, 2006)
- CARE, *Facts about children and poverty*, available online at: [www.care.org](http://www.care.org)
- Carlson, R., *Silent Spring*, London: Hamish Hamilton, 1963.
- Chandler, William *et al.*, *Climate Change Mitigation in Developing Countries* (Pew Center on Global Climate Change, 2002)
- Chang, Ha-Joon & Grabel, Ilene, *Reclaiming Development: An Alternative Economic Policy Manual* (Zed Books, 2<sup>nd</sup> impression, 2005)
- Charnovitz, S., “Trade and Climate: Potential Conflicts and Synergies”, in *Beyond Kyoto: Advancing the International Effort Against Climate Change* 141-170 (Pew Center on Climate Change, 2003)
- Chronic Poverty Research Center, *Chronic Poverty Report 2004-05*, (2006). Available online at: [www.chronicpoverty.org](http://www.chronicpoverty.org).
- Conforto, D., “Traditional and Modern-Day Biopiracy: Redefining the Biopiracy Debate”, *Journal of Environmental Law and Litigation*, Vol. 19, 2004, 357-396.

- Correa, C. M., *Intellectual Property Rights, the WTO and Developing Countries* (Zed Books Ltd., 2000)
- Earth System Research Laboratory, "Trends in Atmospheric Carbon Dioxide". Available online at: <http://www.esrl.noaa.gov/gmd/ccgg/trends/>
- EU Commission, *Towards a European Research Area Science, Technology and Innovation: Key Figures 2005* (Office for Official Publications of the European Communities, 2005). Available online at: <http://europa.eu.int>
- FAO, *The State of Food Insecurity in the World 2006: Eradicating World Hunger - Taking Stock ten years after the World Food Summit (2006)* Available online at: <ftp://ftp.fao.org/docrep/fao/009/a0750e/a0750e00.pdf>
- Franck Lecocq & Zmarak Shalizi, "How Might Climate Change Affect Economic Growth in Developing Countries?: A Review of the Growth Literature with Climate Lens", *Policy Research Working Paper* 4315 (The World Bank Development Research Group Sustainable Rural and Urban Development Team), August 2007.
- Gagnon-Lebrun, Frédéric & Shardul Agrawala, *Progress on Adaptation to Climate Change in Developed Countries: An Analysis of Broad Trends* (OECD, 2006)
- GEF, *Linking Adaptation to Development* (2006) Available online at: [www.thegef.org](http://www.thegef.org)
- Goklany, I. M., "Integrated Strategies to Reduce Vulnerability and Advance Adaptation, Mitigation and Sustainable Development", *Mitigation and Adaptation Strategies for Global Change*, Vol. 12, No. 5, June 2007, 755-786.
- Hayes, Peter, "Multiple Jeopardies: Emerging Global Rules for Climate Adaptation". Paper presented at the China-U.S. Climate Change Forum, University of California at Berkeley on 23 May 2006. Available online at: <http://www.nautilus.org/~rmit/forum-reports/0619a-hayes.html#n2>
- Hobsbawm, Eric, *The Edge of Extremes: A History of the World, 1914-1991* (Vintage, 1996)
- Hoerner, J. A. & Muller, F., "Carbon Taxes for Climate Protection in a Competitive World", *Environmental Tax Program of the Center for Global Change University of Maryland College Park*, June 1996.
- Holm Olsen, Karen, *The Clean Development Mechanism's Contribution to Sustainable Development: A review of the literature. Capacity Development for the Clean Development Mechanism.* Available online at: <http://www.cd4cdm.org/index.htm>

- Huq, Saleemul, *Climate Change and Development Links* (IIED, 2006)
- Ingco, Merlinda D. & Winters, L. Alan (eds.), *Agriculture and the New Trade Agenda: Creating a Global Trading Environment for Development* (Cambridge University Press, 2004)
- IPCC, *Climate Change 2001: Impacts, Adaptation, and Vulnerability* (2001)
- IPCC, *Climate Change 2001: Scientific Basis* (2001).
- IPCC, *Climate Change 2001: Synthesis Report* (2001).
- IPCC, *Climate Change 2007: Impacts, Adaptation, and Vulnerability* (2007)
- IPCC, *Climate Change 2007: Mitigation. Contribution of the Working Group III to the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* [B. Metz, O. R. Davison, P. R. Bosh, R. Dave, L. A. Meyer (eds), Cambridge University Press, 2007]
- Kägi, W. & Schmidtke, H., "Who Gets the Money? What Do Forest Owners in Developed Countries Expect from the Kyoto Protocol?", *Unasylva*, Vol. 56, 2005/3
- Khor, M., *El saqueo del conocimiento: propiedad intelectual, biodiversidad, tecnología y desarrollo sostenible* (Intermon Oxfam, 2003).
- La Trobe, S. & Venton, P., *Natural Disaster Risk Reduction: The Policy and Practice of Selected Institutional Donors* (Tearfund, 2003)
- Larry Lohmann (ed.), *Carbon Trading: A Critical Conversation on Climate Change, Privatization and Power* (Dag Hammarskjöld Foundation, 2006)
- McMichael, A. J. *et al.* (eds.), *Climate Change and Human Health: Risks and Responses* (WHO, 2003)
- Michael Richards, *Poverty Reduction, Equity and Climate Change: Global Governance Synergies or Contradictions?* (Overseas Development Institute, 2003)
- Millennium Ecosystem Assessment, *Ecosystems and Human Well-being: Synthesis* (Island Press, 2005)
- Moutinho, P. *et al.*, "Why Ignore Tropical Deforestation? A Proposal for Including Forest Conservation in the Kyoto Protocol", *Unasylva*, Vol. 56, 2005/3.
- Munari, F., "Technology Transfer and the Protection of the Environment", in Francioni, F. (ed.), *Environment, Human Rights & International Trade* (Hart Publishing, 2001).

- Musungu, Sisule F. & Oh, Cecilia, *The Use of Flexibilities in TRIPS by Developing Countries: Can they Promote Access to Medicines?* (South Centre/WHO, 2006)
- Myers, N., "Environmental Refugees: An Emergent Security Issue", *13<sup>th</sup> Economic Forum*, Prague, 23-27 May 2005, EF.NGO/4/0. Available online at: [www.osce.org](http://www.osce.org)
- NASA, *What's the Difference Between Weather and Climate?* Available online at: [http://www.nasa.gov/mission\\_pages/noaa-n/climate/climate\\_weather.html](http://www.nasa.gov/mission_pages/noaa-n/climate/climate_weather.html)
- National Board on Trade, *Climate and Trade Rules - Harmony or Conflict* (Kommerskollegium, 2004)
- Nordhaus, William D., "Geography and macroeconomics: New data and new findings", *PNAS*, Vol. 103, No. 10, March 7, 2006, 3510-3517.
- O'Brian, Robert & Williams, Marc, *Global Political Economy: Evolution and Dynamics* (Palgrave MacMillan, 2004)
- OECD, *Bridge Over Trouble Waters: Linking Climate Change and Development* 30 (2005)
- Oh, C., "Patentes y monopolios aumentan los precios: la crisis de la salud", *Revista del Sur*, No 119-120, 2001.
- Oxfam International, "Adapting to Climate Change: What's Needed in Poor Countries, and Who Should Pay", *Oxfam Brief Paper* 104, May 2007.
- Philippe Cullet, "Liability and Redress for Human-Induced Global Warming: Towards an International Regime", *Stanford Journal of International Law*, Vol. 43, June 2007, 99-121.
- Pierros, P. X. & Nüesch, S., "Trade in Electricity: *Spot On*", *Journal of World Trade*, Vol. 34, No. 4, 2000.
- R. de Guzman, "Development and Climate Change: Strategic Policy Considerations from the Climate Perspective", in *Development and Climate Change: Managing Risk, Realizing Opportunities*. Side Event during the ECOSOC Substantive Session, 13 July 2007, Geneva, Switzerland. Available online at: [http://www.southcentre.org/Events/2007Jul\\_Dev\\_Climate\\_Change.htm](http://www.southcentre.org/Events/2007Jul_Dev_Climate_Change.htm)
- Russell, B., *Has Man a Future?* (Harmondsworth Penguin Books, 1961)
- Sarma, L., "Biopiracy: Twentieth Century Imperialism in the Form of International Agreement", *Temple International and Comparative Law Journal*, Vol.

13, 1999, 107-136.

- South Centre, “Mandatory Disclosure of the Source and Origin of Biological Resources and Associated Traditional Knowledge under the TRIPS Agreement”, *Policy Brief*, No. 11, September 2007.
- South Centre, *The Agenda for Transfer of Technology: The Working Group of the WTO on trade and Transfer of Technology* (2005).
- Sperling, F. (ed.), *Poverty and Climate Change: Reducing the vulnerability of the poor through adaptation* (World Bank, 2003) World Bank, *Clean Energy and Development: Towards an Investment Framework* (2006)
- Srivastava, L. & Heller, T., “Integrating Sustainable Development and Climate Change in AR4”, IPCC Technical Paper, 10 August 2003.
- Stern, N., *The Stern Review: The Economics of Climate Change* (Cambridge University Press, 2007)
- Stiglitz, Joseph E., *¿Cómo hacer que la globalización funcione?*; translated by Amado Dieguez & Paloma Gómez Crespo (Satillana Ediciones, 2006) (Original title: *Making Globalization Work*)
- Stiglitz, Joseph E., *El malestar en la globalización*, translated by Carlos Rodríguez Braun (Satillana Ediciones, 2006) (Original title: *Globalization and its discontents*)
- The Club of Rome, *The Limits of Growth* (New York: Universe Books, 1972).
- The World Commission on Environment and Development, *Our Common Future* (1987)
- Thomas, Carolina, “Globalization and Development in the South”, in John Ravenhill (ed.), *Global Political Economy* (Oxford University Press, 2005)
- Thomas, Ch. D. *et al.*, “Extinction Risk from Climate Change”, *Nature*, Vol. 427, 8 January 2004, 145-148
- Torres, Hector R., “Reforming the International Monetary Fund: Why its Legitimacy is at Stake”, *Journal of International Economic Law*, Vol. 10, September 2007.
- Tortella, Gabriel, *Los orígenes del siglo XXI: Un ensayo de historia social y económica contemporánea* (Gadir, 2006)
- UN *et. al.*, *The Millennium Development Goals Report 2007*, (2007) Available online: <http://www.un.org/millenniumgoals/pdf/mdg2007.pdf>
- UN University, *Environmental Refugees: The Forgotten Migrants* (2007).

Available online: <http://www.ony.unu.edu/16May2007.html>

- UN, Monterrey Consensus on Financing for Development, The Final Text of Agreements and commitments adopted at the International Conference on Finance for Development, Monterrey, Mexico, 18-22 March 2002) Available online at: <http://www.un.org/esa/ffd/>
- UNCTAD, *The TRIPS Agreement and Developing Countries*, New York: United Nations, 1996.
- UNDP, Human Development Report 2005. International Cooperation at a Crossroads: Aid, Trade and Security in an Unequal World (Palgrave Macmillan, 2005)
- UNDP, Human Development Report 2006. Beyond scarcity: Power, poverty and the global water crisis (Palgrave Macmillan, 2006)
- UNEP, Global Environmental Outlook 2006: An Overview of our Changing Environment (2006)
- UNEP, Global Environmental Outlook 3: Past, Present and Future Perspectives (2002).
- UNEP, Sudan: Post-Conflict Environmental Assessment (2007)
- UNESCO *et al.*, The United Nations World Water Development Report (Berhahn Books, 2006)
- UNFCCC, Technologies for Adaptation to Climate Change 11 (UNON Publishing Services, 2006)
- UNICEF, Progress for children: a report card on nutrition number 4, (2006). Available online at: [http://www.unicef.org/publications/files/Progress\\_for\\_Children\\_-\\_No.\\_4.pdf](http://www.unicef.org/publications/files/Progress_for_Children_-_No._4.pdf)
- UNICEF, The State of the World's Children 2007: Women and Children the double dividend of gender equality 4 (2006). Available online at: [www.unicef.org](http://www.unicef.org)
- Wara, Michael, "Measuring the Clean Development Mechanism's Performance and Potential", *Working Paper 56* (Program on Energy and Sustainable Development at Stanford University), July 2006.
- Watal, Jayashree, "Intellectual Property Rights and Agriculture", in Ingco, Merlinda D. & Winters, L. Alan (eds.), *Agriculture and the New Trade Agenda: Creating a Global Trading Environment for Development*, 401-428 (Cambridge University Press, 2004).

- Wise, Timothy A. & Gallagher, Kevin P., “Doha Round’s Development Impacts: Shrinking Gains and Real Costs”, *Ris Policy Briefs*, No. 19, November 2005
- Wise, Timothy A. & Gallagher, Kevin P., “No Fast Track to Global Poverty Reduction”, *Global Development and Environment Institute Policy Brief*, No. 07-02, April 2007.
- World Bank, *Global Economic Prospects 2006: Economic Implications of Remittances and Migration* (2006)
- World Bank, *Global Economic Prospects 2007: Managing the Next Wave of Globalization* (2007)
- World Bank, *Managing Climate Risk: Integrating Adaptation into World Bank Group Operations* (World Bank/GEF Programme, 2006)
- World Bank, *World Development Indicators* (2007)
- World Bank, *World Development Report 2001: Attacking Poverty* (2001)
- World Bank, *World Development Report 2007: Development and the Next Generation* (2007)
- Zarrilli, Simonnetta, “Development Considerations in the Climate Change Debate: Trade and Energy”. Presentation in the Side Event Development and Climate Change: Managing Risks, Realizing Opportunities during the Economic & Social Council Substantive Session, 13 July 2007, Geneva.

READERSHIP SURVEY QUESTIONNAIRE  
SOUTH CENTRE ANALYTICAL NOTE

SUSTAINABLE DEVELOPMENT IN THE CONTEXT OF CLIMATE CHANGE:  
OVERRIDING PRIORITY OF THE SOUTH

An important objective of the South Centre is to provide concise and timely analytical inputs on selected key issues under ongoing negotiation in the WTO and other related multilateral fora such as WIPO. Our publications are among the ways through which we try to achieve this objective.

In order to improve the quality and usefulness of South Centre publications, we would like to know your views, comments, and suggestions regarding this publication.

Your name and address (optional): \_\_\_\_\_

What is your main area of work?

- |   |  |
|---|--|
| <input type="checkbox"/> Academic or research       | <input type="checkbox"/> Media                         |
| <input type="checkbox"/> Government                 | <input type="checkbox"/> Non-governmental organization |
| <input type="checkbox"/> International organization | <input type="checkbox"/> Other (please specify)        |

How useful was this publication for you? [Check one]

- Very useful  Of some use  Little use  Not useful

Why? \_\_\_\_\_

What is your assessment of the contents of this publication? [Check one]

- Excellent  Very Good  Adequate  Poor

Other comments: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Would you like to be on our electronic and/or hardcopy mailing lists?  Yes  No

If yes, please indicate:

- Electronic** – please indicate your name and email address:  
 **Hardcopy** – please indicate your name and mailing address:

**Personal Information Privacy Notice:** Your personal contact details will be kept confidential and will not be disseminated to third parties. The South Centre will use the contact details you provide solely for the purpose of sending you copies of our electronic and/or hardcopy publications should you wish us to do so. You may unsubscribe from our electronic and/or hardcopy mailing lists at anytime.

Please return this form by e-mail, fax or post to:

South Centre Feedback  
Chemin du Champ d'Anier 17  
1211 Geneva 19  
Switzerland

E-mail: [south@southcentre.org](mailto:south@southcentre.org)

Fax: +41 22 798 8531



**Chemin du Champ d'Anier 17  
Case postale 228, 1211 Geneva 19  
Switzerland**

**Telephone : (41 22) 791 8050  
Fax : (41 22) 798 8531  
Email : [south@southcentre.org](mailto:south@southcentre.org)**

**Website:  
<http://www.southcentre.org>**