



Climate change and human development

Executive summary

This year has been a year of intense climate diplomacy. Two very important reports were published: the Synthesis Report of the Fourth Assessment Report of the IPCC which unequivocally affirmed the warming of our climate system, linking it to human activity; and the Human Development Report 2007/2008 which states that climate change is the defining human development issue of our generation, threatening to reverse progress made in human development in many developing countries. This Strategy Insights summarises the most important findings of these two reports.

Introduction

Climate change, which has long been on the international agenda, is certainly starting to receive the very high attention that it merits. The year 2007 has indeed been a year of intense climate diplomacy and a year during which a number of important reports addressing climate change were published. In November, the long-awaited *Synthesis Report of the Fourth Assessment Report of the Intergovernmental Panel on Climate Change* (IPCC, 2007) was released, which unequivocally affirmed the warming of our climate system, linking it directly to human activity. The *Synthesis Report* is based on the assessment carried out by the three Working Groups of the IPCC, which was published in three underlying reports, ie, *Climate change 2007: The physical science basis* (contribution of Working Group I) – summarised in a previous *Strategy Insights* 5(1), 2007; *Climate change 2007: Impacts, adaptation and vulnerability* (contribution of Working Group II); and *Climate change 2007: Mitigation* (contribution of Working Group III).

Almost concurrently with the release of the IPCC's *Synthesis Report*, the *Human Development Report 2007/2008* by the United Nations Development Programme (UNDP, 2007) was published, which addresses climate change and its impact on human development. At the time of writing, 190 nations are meeting in Bali at the United Nations Climate Change Conference, seeking a breakthrough to a new global pact to fight climate change. At the top of the conference's agenda is the need to reach consensus on how to curb greenhouse gas emissions beyond 2012, when the current phase of the Kyoto Protocol will end.

The purpose of this *Strategy Insights* is twofold:

- To provide a short summary of the most important findings of the IPCC's *Synthesis Report*.
- To briefly discuss the impact of climate change on human development and to provide some recommendations as listed in the *Human Development Report 2007/2008* on how to curb climate change.

Main findings of the IPCC's *Synthesis Report*

In this section the most important findings of the *Synthesis Report* of the IPCC are summarised with regard to observed changes in climate and their effects; causes of climate change; projected climate change and its impacts; and adaptation and mitigation options.

Observed changes in climate and their effects

'Warming of the climate system is unequivocal, as is now evident from observations of increases in global average air and ocean temperatures, widespread melting of snow and ice, and rising global average sea level' (IPCC, 2007:1).

- 'Eleven of the last 12 years (1995-2006) rank among the 12 warmest years since 1850. The temperature increase is widespread over the globe and is greater at higher northern latitudes'.
- 'Global average sea level has risen since 1961 at an average rate of 1.8mm/yr and since 1993 at 3.1mm/yr'.
- 'Satellite data since 1978 show that annual average Arctic sea ice extent has shrunk by 2.7% per decade, with larger decreases in summer of 7.4% per decade. Mountain glaciers and snow cover on average have declined in both hemispheres'.
- 'From 1900 to 2005, precipitation increased significantly in eastern parts of North and South America, northern Europe and northern and central Asia but declined in the Sahel, the Mediterranean, southern Africa and parts of southern Asia. Globally, the area affected by drought has *likely*¹⁾ increased since the 1970s'.
- 'It is *very likely* that over the past 50 years: cold days, cold nights and frosts have become less frequent over most land areas, and hot days and hot nights have become more frequent'.
- 'Average Northern Hemisphere temperatures during the second half of the 20th century were *very likely* higher than during any other 50-year period in the last 500 years and *likely* the highest in at least the past 1 300 years' (IPCC, 2007:1).

'Observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases' (IPCC, 2007:2).

- 'There is *high confidence*²⁾ that some hydrological systems have been affected through increased runoff and earlier spring peak discharge in many glacier- and snow-fed rivers'.
- 'In terrestrial ecosystems, earlier timing of spring events and poleward and upward shifts in plant and animal ranges are with *very high confidence* linked to recent warming. In some marine and freshwater systems, shifts in ranges and changes in algal, plankton and fish abundance are with *high confidence* associated with rising water temperatures' (IPCC, 2007:2).

'There is *medium confidence* that other effects of regional climate change on natural and human environments are emerging, although many are difficult to discern due to adaptation and non-climatic drivers' (IPCC, 2007:3).

Causes of climate change

'Global GHG [greenhouse gas] emissions due to human activities have grown since pre-industrial times, with an increase of 70% between 1970 and 2004' (IPCC, 2007:4).

'Global atmospheric concentrations of CO₂ [carbon dioxide], methane (CH₄) and nitrous oxide (N₂O) have increased markedly as a result of human activities since 1750 and now far exceed pre-industrial values determined from ice cores spanning many thousands of years' (IPCC, 2007:4).

- 'Atmospheric concentrations of CO₂ (379ppm) and CH₄ (1774ppb) in 2005 exceed by far the natural range over the last 650 000 years. Global increases in CO₂ concentrations are due primarily to fossil fuel use, with land-use change providing another significant but smaller contribution. It is *very likely* that the observed increase in CH₄ concentration is predominantly due to agriculture and fossil fuel use'.
- 'There is *very high confidence* that the net effect of human activities since 1750 has been one of warming' (IPCC, 2007:4).

'Most of the observed increase in globally-averaged temperatures since the mid-20th century is *very likely* due to the observed increase in anthropogenic GHG concentrations. It is *likely* there has been significant anthropogenic warming over the past 50 years averaged over each continent (except Antarctica)' (IPCC, 2007:5).

'Advances since the TAR [*Third Assessment Report*] show that discernible human influences extend beyond average temperature to other aspects of climate. Human influences have:

- *very likely* contributed to sea level rise during the latter half of the 20th century
- *likely* contributed to changes in wind patterns, affecting extra-tropical storm tracks and temperature patterns

¹⁾ In this *Synthesis Report*, the following terms have been used to indicate the assessed likelihood of an outcome or a result: *virtually certain* >99% probability of occurrence, *extremely likely* >95%, *very likely* >90%, *likely* >66%, *more likely than not* >50%, *unlikely* <33%, *very unlikely* <10%, *extremely unlikely* <5%.

²⁾ In this *Synthesis Report*, the following levels of confidence have been used to express expert judgements on the correctness of the underlying science: *very high confidence* represents at least a 9 out of 10 chance of being correct; *high confidence* represents about an 8 out of 10 chance of being correct.

- *likely* increased temperatures of extreme hot nights, cold nights and cold days
- *more likely than not* increased risk of heat waves, area affected by drought since the 1970s and frequency of heavy precipitation events' (IPCC, 2007:6).

'Anthropogenic warming over the last three decades has *likely* had a discernible influence at the global scale on observed changes in many physical and biological systems' (IPCC, 2007:6).

Projected climate change and its impacts

'There is *high agreement* and *much evidence* that with current climate change mitigation policies and related sustainable development practices, global GHG emissions will continue to grow over the next few decades' (IPCC, 2007:6).

'Continued GHG emissions at or above current rates would cause further warming and induce many changes in the global climate system during the 21st century that would *very likely* be larger than those observed during the 20th century' (IPCC, 2007:6).

- 'For the next two decades a warming of about 0.2 °C per decade for a range of SRES [Special Report on Emission Scenarios] emissions scenarios. Even if the concentrations of all greenhouse gases and aerosols had been kept constant at year 2000 levels, a further warming of about 0.1 °C per decade would be expected' (IPCC, 2007:6).

'There is now higher confidence than in the TAR in projected patterns of warming and other regional-scale features, including changes in wind patterns, precipitation, and some aspects of extremes and sea ice' (IPCC, 2007:8).

- 'Regional-scale changes include:
 - warming greatest over land and at most high northern latitudes and least over Southern Ocean and parts of the North Atlantic Ocean
 - *very likely* increase in frequency of hot extremes, heat waves, and heavy precipitation
 - *likely* increase in tropical cyclone intensity
 - *very likely* precipitation increases in high latitudes and *likely* decreases in most subtropical land regions' (IPCC, 2007:8).
- 'There is *high confidence* that by mid-century, annual river runoff and water availability are projected to increase at high latitudes and decrease in some dry regions in the mid-latitudes and tropics. There is also *high confidence* that many semi-arid areas (eg Mediterranean basin, western United States, southern Africa and northeast Brazil) will suffer a decrease in water resources due to climate change' (IPCC, 2007:8).
- Examples of some projected impacts for Africa are the following
 - 'By 2020, between 75 and 250m people are projected to be exposed to increased water stress due to climate change.
 - By 2020, in some countries, yields from rain-fed agriculture could be reduced by up to 50%.
 - Towards the end of the 21st century, projected sea-level rise will affect low-lying areas with large populations. The cost of adaptation could amount to at least 5-10% of GDP.
 - By 2080, an increase of 5-8% of arid and semi-arid land in Africa is projected under a range of climate scenarios' (IPCC, 2007:10).

'Altered frequencies and intensities of extreme weather, together with sea level rise, are expected to have mostly adverse effects on natural and human systems' (IPCC, 2007:12).

'Anthropogenic warming and sea level rise would continue for centuries due to the timescales associated with climate processes and feedbacks, even if GHG concentrations were to be stabilised' (IPCC, 2007:13).

- 'Contraction of the Greenland ice sheet is projected to continue to contribute to sea level rise after 2100.
- Current global model studies project that the Antarctic ice sheet will remain too cold for widespread surface melting and gain mass due to increased snowfall' (IPCC, 2007:13).

'Anthropogenic warming could lead to some impacts that are abrupt or irreversible, depending upon the rate and magnitude of the climate change' (IPCC, 2007:13).

- 'Partial loss of ice sheets on polar land could imply metres of sea level rise, major changes in coastlines and inundation of low-lying areas, with greatest effects in river deltas and low-lying islands'.

- 'Climate change is *likely* to lead to some irreversible impacts. There is *medium confidence* that approximately 20-30% of species assessed so far are *likely* to be at increased risk of extinction if increases in global average warming exceed 1.5-2.5 °C (relative to 1980-1999)' (IPCC, 2007:13).

Adaptation and mitigation options

'A wide array of adaptation options is available, but more extensive adaptation than is currently occurring is required to reduce vulnerability to climate change. There are barriers, limits and costs, which are not fully understood' (IPCC, 2007:14).

'Adaptive capacity is intimately connected to social and economic development but is unevenly distributed across and within societies' (IPCC, 2007:14).

'Both bottom-up and top-down studies indicate that there is *high agreement* and *much evidence* of substantial economic potential for the mitigation of global GHG emissions over the coming decades that could offset the projected growth of global emissions or reduce emissions below current levels. While top-down and bottom-up studies are in line at the global level there are considerable differences at the sectoral level' (IPCC, 2007:14).

'A wide variety of policies and instruments are available to governments to create the incentives for mitigation action. Their applicability depends on national circumstances and sectoral context' (IPCC, 2007:18).

'Many options for reducing global GHG emissions through international cooperation exist. There is *high agreement* and *much evidence* that notable achievements of the UNFCCC and its Kyoto Protocol are the establishment of a global response to climate change, stimulation of an array of national policies, and the creation of an international carbon market and new institutional mechanisms that may provide the foundation for future mitigation efforts' (IPCC, 2007:19).

'In several sectors, climate response options can be implemented to realise synergies and avoid conflicts with other dimensions of sustainable development. Decisions about macroeconomic and other non-climate policies can significantly affect emissions, adaptive capacity and vulnerability' (IPCC, 2007:19).

'There is *high confidence* that neither adaptation nor mitigation alone can avoid all climate change impacts; however, they can complement each other and together can significantly reduce the risks of climate change' (IPCC, 2007:20).

'Many impacts can be reduced, delayed or avoided by mitigation. Mitigation efforts and investments over the next two to three decades will have a large impact on opportunities to achieve lower stabilisation levels. Delayed emission reductions significantly constrain the opportunities to achieve lower stabilisation levels and increase the risk of more severe climate change impacts' (IPCC, 2007:20).

'There is *high agreement* and *much evidence* that all stabilisation levels assessed can be achieved by deployment of a portfolio of technologies that are either currently available or expected to be commercialised in coming decades, assuming appropriate and effective incentives are in place for their development, acquisition, deployment and diffusion and addressing related barriers' (IPCC, 2007:22).

'The macro-economic costs of mitigation generally rise with the stringency of the stabilisation target. For specific countries and sectors, costs vary considerably from the global average' (IPCC, 2007:22).

'Responding to climate change involves an iterative risk management process that includes both adaptation and mitigation and takes into account climate change damages, co-benefits, sustainability, equity, and attitudes to risk' (IPCC, 2007:23).

The impact of climate change on human development

From the findings of the IPCC report, it is clear that climate change is now a scientifically established fact. Although it is not easy to forecast the exact impact of greenhouse gas emission and there are indeed many unknowns and still a lot of uncertainty in the climate science when it comes to predictive capability, the *Human Development Report 2007/2008* (HDR) states that 'we now know enough to recognize that there are large risks, potentially catastrophic ones. We know the danger exists. We know the damage caused by greenhouse gas emissions is irreversible for a long time. We know it is growing with every day of inaction' (UNDP, 2007:v).

The HDR argues that climate change is the defining human development issue of our generation. 'All development is ultimately about expanding human potential and enlarging human freedom. It is about

people developing the capabilities that empower them to make choices and to lead lives that they value. Climate change threatens to erode human freedoms and limit choice' (UNDP, 2007: 1). The report notes that the first warning signs are already visible, especially in many developing countries, where millions of the world's poorest people already have to cope with the impact of climate change. Increased exposure to droughts, to more intense storms, to floods and environmental stress is holding back the efforts of the world's poor to build a better life for themselves and their children. Furthermore, climate change will undermine international efforts to combat poverty and is hampering efforts to deliver the MDG promise (UNDP, 2007: 1).

Five specific risk-multipliers for human development reversals are identified in the HDR:

- *Reduced agricultural productivity* – through its impact on agriculture and food security, climate change could leave an additional 600m people facing acute malnutrition by the 2080s, over and above the level in a no-climate change scenario.
- *Heightened water insecurity* – by 2080, climate change could increase the number of people facing water scarcity around the world by 1.8b.
- *Increased exposure to coastal flooding and extreme weather events* – rising sea levels and more intense tropical storm activity could increase the number of people experiencing coastal flooding by between 180m and 230m.
- *The collapse of ecosystems*, especially of marine ecosystems could adversely affect hundreds of millions of people dependent upon fish for their livelihoods and nutrition.
- *Increased health risks* – globally an additional 220-400m people could be at increased risk of malaria (UNDP, 2007: 27-30).

According to the HDR, these five drivers of major human development reversal will interact with each other, and together with pre-existing human development problems, will create powerful downward spirals (UNDP, 2007: 30).

Recommendations to curb climate change

Climate change confronts humanity with stark choices. 'We can avoid 21st Century reversals in human development and catastrophic risks for future generations, but only by choosing to act with a sense of urgency. The starting point for action and political leadership is recognition on the part of governments that they are confronted by what may be the gravest threat ever to have faced humanity' (UNDP, 2007: 15). The following are recommendations made by the HDR on how to curb climate change:

- Develop a multilateral framework for avoiding dangerous climate change under the post-2012 Kyoto Protocol.
- Put in place policies for sustainable carbon budgeting – the agenda for mitigation.
- Strengthen the framework for international cooperation.
- Put climate change adaptation at the centre of the post-2012 Kyoto framework and international partnerships for poverty reduction (UNDP, 2007: 17-18).

The HDR argues that climate change demands urgent action now to address a threat to two constituencies with little or no political voice: the world's poor and future generations (UNDP, 2007: 2). 'Fighting climate change is a cross-generational exercise. For the current generation, the challenge is to keep open the window of opportunity by bending greenhouse gas emissions in a downward direction' (UNDP, 2007: 16). In 2012, the current commitment period of the Kyoto Protocol expires. The successor agreement, currently under discussion at the Bali Climate Change Conference, could set a new course, imposing stringent limits on future emissions and providing a framework for collective international action.

References

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