Fact Sheet

Climate Change at a Glance

- Increased warming: Eleven of the last twelve years rank among the warmest years in global surface temperature since 1850. The rate of warming averaged over the last 50 years is nearly twice that for the last 100 years. The average global temperature went up by about 0.74°C during the 20th Century with the warming affecting land more than ocean areas.
- There is more carbon dioxide in the atmosphere: Carbon dioxide is the dominant contributor to current climate change and its atmospheric concentration has increased from a pre-industrial value of 278 parts-per million (ppm) to 379 in 2005.
- More water, but not everywhere: More precipitation has been observed in the eastern parts of North and South America, northern Europe and northern and central Asia in recent decades. But the Sahel, the Mediterranean, southern Africa and parts of southern Asia have experienced drying. More intense and longer droughts have been observed over wider areas since the 1970s.
- Sea level is rising: The Intergovernmental Panel on Climate Change is highly confident that the rate of observed sea level rise increased from the 19th to 20th century, and the total 20th century rise is estimated to be 0.17 metre. Geological observations indicate that sea level rise over the previous 2,000 years was far less. The average temperature of the global ocean has increased to depths of at least 3,000 metres.
- Less snow cover: Snow cover is decreasing in most regions, particularly in spring. The maximum extent of frozen ground in the winter/spring season has decreased by about 7 per cent in the Northern Hemisphere since 1900, and on average rivers that freeze do so some 5.8 days later than a century ago and their ice breaks up 6.5 days earlier.
- Glaciers are melting: Mountain glaciers and snow cover have declined, on average, in both hemispheres, and have contributed to sea level rise by 0.77 millimetres a year from 1993 to 2003. Shrinkage of the ice sheets of Greenland and Antarctica have contributed to a sea level rise of 0.4 millimetres a year between 1993 and 2003.
- Arctic is warming: Average Arctic temperatures increased at almost twice the global average rate in the past 100 years. Satellite data since 1978 show that the average Arctic sea ice extent has shrunk by 2.7 per cent per decade.

New Projections Indicate Faster Warming…

- Continued greenhouse gas emissions at or above the 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.
- The degree of warming depends on the degree of emissions: If carbon dioxide concentrations were stabilized at 550 ppm — double the pre-industrial levels — the average warming expected would likely be in the range of 2-4.5°C, with the best estimate of 3°C, or 5.4°F. A warming of 0.2°C per decade is expected for each of the next two decades for a range of scenarios that do not include deliberate reductions in greenhouse gas emissions.
- Other greenhouse gases contribute to warming and if their combined effect were equivalent to a carbon dioxide level of 650 ppm, the global climate would "likely" warm by 3.6°C, while a level of 750 ppm would produce warming of 4.3°C. Projections depend on factors such as economic growth, population, new technologies and other factors.

...and Greater Consequences

- Warmer global temperatures are already causing profound changes in many of the earth's natural systems. Approximately 20-30 per cent of plant and animal species assessed so far are likely to be at increased risk of extinction if increases in global average temperature exceed 1.5-2.5°C.
- A temperature increase of 3°C during this century would have largely negative consequences for biodiversity ecosystems that produce essential goods and services, such as water and food supply.
- As a result of warmer temperatures, springtime events are occurring earlier, such as increased run-off and peak discharge in many glacier- and snow-fed rivers, "greening" of vegetation and migration and egg-laying by birds. More animal and plant species have also been observed shifting toward higher latitudes.
- More precipitation in the high latitudes: Increases in precipitation are very likely in the high latitudes while decreases are likely in most subtropical land regions.
- Model based estimates for sea-level rise due to ocean expansion and glacier melt by the end of the century (compared to 1989-1999 levels) have narrowed from previous assessments to 18-58 cm. However, larger values cannot be ruled out if recently observed movements of ice sheets were to increase as temperature rises.
- Contraction of the Greenland ice sheet is projected to contribute to sea level rise into the 22nd century and the ice sheet could face complete elimination if global average warming of 1.9-4.6°C is maintained for a millennium. In that case, sea level would rise by up to 7 metres.

For more information: www.un.org/climatechange

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Fact Sheet

The Causes of Climate Change

Climate change refers to a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.

United Nations Framework Convention on Climate Change

Quick facts:

A natural blanket of greenhouse gases in the atmosphere keeps the planet warm enough for life as we know it — at a comfortable15°C today.

Human-caused emissions of greenhouse gases have made the blanket thicker, trapping heat and leading to a global warming.

Fossil fuels are the single biggest source of human-generated greenhouse gas emissions.

- The Earth's average temperature seems to have been remarkably stable for the past 10,000 years, varying by less than 1°C, allowing human civilization to thrive at what is today a comfortable 15°C. But the very success of our civilization risks disrupting the climate that has served us so well until now.
- The "blanket" of greenhouse gases that occurs naturally in the troposphere — representing less than one per cent of the entire atmosphere — serves the vital function of regulating the planet's climate. When solar energy in the form of visible light strikes the Earth, it warms the surface. Being much cooler than the sun, the Earth emits this energy back out to space in the form of infrared, or thermal, radiation. Greenhouse gases block the infrared radiation from escaping directly into space. The resulting "natural greenhouse effect" keeps the planet some 30°C warmer than it would otherwise be, which is essential for life as we know it.
- The problem we now face is that since the start of the industrial revolution some 250 years ago our emissions of greenhouse gases have been making this blanket thicker at an unprecedented speed. This has caused the most dramatic change in the atmosphere's composition for at least 650,000 years. Unless we make significant efforts to reduce our emissions of greenhouse gases, the global climate will continue to warm rapidly over the coming decades and beyond.

The Enhanced Greenhouse Effect

- The reason these "artificial" emissions are such a problem is that, in the long term, the Earth must get rid of energy at the same rate at which it receives energy from the sun. Since a thicker blanket of greenhouse gases helps to reduce energy loss to space, the climate system must adjust somehow to restore the balance between incoming and outgoing energy. The result is known as the "enhanced greenhouse effect".

- The climate adjusts to the thicker blanket of greenhouse gases in large part through a "global warming" of the Earth's surface and lower atmosphere. This rise in temperature is accompanied by other changes, for example in cloud cover and wind patterns. Some of these changes may enhance the warming further (positive feedbacks), while others may counteract it (negative feedbacks). These various interactions complicate scientists' efforts to determine precisely how the climate will change over the decades to come.

Greenhouse Gas Emissions

- Fossil fuels formed by long-dead plants and animals are the single biggest source of humanity's greenhouse gas emissions. Burning coal, oil and natural gas releases billions of tons of carbon every year that would otherwise have remained hidden in the Earth's crust, as well as large amounts of methane and nitrous oxide. More carbon dioxide is released when trees are cut down and not replaced.
- Meanwhile, massive herds of livestock emit methane, as do rice farms and waste dumps. The use of fertilizers produces nitrous oxide. Long-lived gases such as CFCs, HFCs and PFCs, used in air conditioning and refrigeration, are manufactured by industry and eventually enter the atmosphere. Many of these greenhouse gas-emitting activities are now essential to the global economy and form a fundamental part of modern life.

Assessing the Science: The Intergovernmental Panel on Climate Change

- The United Nations, through the United Nations Environment Programme and the World Meteorological Organization, established the Intergovernmental Panel on Climate Change (IPCC) in 1988 to investigate and analyze the best published science on the issue. Since 1990 the IPCC has produced authoritative reports every five or six years assessing the state of the science through observations and projections of future trends.
- The IPCC does not conduct new research, but rather, its mandate is to make policy-relevant assessments of the existing worldwide literature on the scientific, technical and socio-economic aspects of climate change. The IPCC reports draw on the work of thousands of experts from all regions of the world.
- The Fourth Assessment Report is coming out during 2007, in four volumes, each prepared by a separate working group.
- In preparing the reports, drafts are circulated to specialists with significant expertise and publications in the field. Their comments go back to the IPCC authors who in turn prepare a second review to governments and to all authors and expert reviewers. Governments and expert reviewers can provide comments restricted to the accuracy and completeness of the scientific/technical/socio-economic content and the overall balance of the drafts. The final document reflects differing views that are supported either scientifically or technically.
- Each report has a Summary for Policymakers, approved line by line by the government delegations of IPCC member countries during a plenary session of the Working Group who produced it. Lead authors of the report are present, ready to explain the scientific facts supporting the statements contained in the Summary. Changes can only be made if there is agreement with the lead authors, to make sure that they are consistent with the underlying scientific and technical assessment. The Summary represents the point of agreement on the report's key findings: participating governments acknowledge that there is enough scientific evidence worldwide to support the document's statements.

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The Consequences for the Future

Observational evidence from all continents and most oceans shows that many natural systems are being affected by regional climate changes, particularly temperature increases.

"Climate Change 2007," Intergovernmental Panel on Climate Change

Quick facts:

The poorest communities are most vulnerable to the impacts of climate change.

The average global sea level is projected to rise by 28-58 cm due to ocean expansion and glacier melt by the end of the 21st century (compared to 1989-1999 levels).

20-30 per cent of species are likely to face an increased risk of extinction.

There will be greater heat waves, new wind patterns, worsening drought in some regions, heavier precipitation in others.

Higher Temperatures, More Risk

- In all regions of the world, the faster temperatures rise, the greater the risk of damage. The climate does not respond immediately to emissions, which can last for years or decades in the atmosphere. And because of the delaying effect of the oceans – which absorb and eventually release heat more slowly than the atmosphere – surface temperatures do not immediately respond to greenhouse gas emissions. As a result, climate change will continue for hundreds of years after atmospheric concentrations have stabilized.

Adverse Changes in the Hydrological Cycle

- Rising temperatures are already accelerating the hydrological cycle. A warmer atmosphere holds more moisture, becomes less stable and produces more precipitation, particularly in the form of heavy rain bursts. Greater heat also speeds up evaporation. The net effect of these changes in the cycling of water will be a decline in the quantity and quality of freshwater supplies in all major regions. Meanwhile, wind patterns and storm tracks are likely to change. The intensity (but not the frequency) of tropical cyclones are expected to increase, with larger peak wind speeds and heavier rains.

Increased Health Risks

- Climate change will increasingly alter the distribution of malarial mosquitoes and other carriers of infectious diseases affect the seasonal distribution of some allergy-causing pollen and increase the risks of heat waves. On the other hand, there should be fewer deaths due to the cold.

Threats to Biodiversity

- Wildlife and biological diversity – already threatened by habitat destruction and other human-generated stresses – will face new challenges from climate change. Many ecosystems are already responding to higher temperatures by advancing towards the poles and up mountainsides. Some species will not survive the transition, and 20-30 per cent of species are likely to face an increased risk of extinction. The most vulnerable ecosystems include coral reefs, boreal (sub-arctic) forests, mountain habitats and those dependent on a Mediterranean climate.

Rising Sea Level

- The best estimate for how much further the sea level with rise due to ocean expansion and glacier melt by the end of the 21st century (compared to 1989-1999 levels) is 28-58 cm. This will worsen coastal flooding and erosion.
- Larger sea-level increases of up to 1 metre by 2100 cannot be ruled out if ice sheets continue to melt as temperature rises. There is now evidence that the Antarctic and Greenland ice sheets are indeed slowly losing mass and contributing to sea level rise. About 125,000 years ago, when the polar regions were significantly warmer for an extended period than at present, melting polar ice caused the sea level to rise by 4 to 6 metres. Sea-level rise has substantial inertia and will continue for many centuries.
- The oceans will also experience higher temperatures, which have implications for sea life. Over the past four decades, for example, North Atlantic plankton have migrated pole-ward by 10 degrees of latitude. Similarly, the acidification of the oceans as they absorb more carbon dioxide will impair the ability of corals, marine snails and other species to form their shells or skeletons.

Hitting the Most Vulnerable

- The poorest communities will be the most vulnerable to the impacts of climate change as they have fewer resources to invest in preventing and mitigating the effects of climate change. Some of the most at-risk people include subsistence farmers, indigenous peoples and coastal populations.

Regional Impacts

It is more difficult to anticipate how climate change will evolve at the regional than at the global level. Nevertheless, enormous strides have been made in recent years, allowing scientists to conclude that:

- Africa — Very vulnerable to climate change and climate variability due to endemic poverty, weak institutions, and complex disasters and conflicts. Drought has spread and intensified since the 1970s, and the Sahel and southern Africa have already become drier during the 20th century. Water supplies and agricultural production will likely be severely compromised. Yields in some countries could drop by as much as 50 per cent by 2020, and some large regions of marginal agriculture are likely to be forced out of production. Forests, grasslands and other natural ecosystems are already changing, particularly in southern Africa. By the 2080s, the amount of arid and semi-arid land in Africa will likely increase by 5-8 per cent.
- Antarctica — This continent has proven more difficult to understand and predict. With the exception of the rapidly warming Antarctic Peninsula, both temperatures and snowfall have remained relatively constant for the continent as a whole over the past 50 years. Because this frozen continent contains almost 90 per cent of the planet's freshwater, researchers are watching carefully for any signs that its glaciers and ice sheets may be melting.
- The Arctic — Average temperatures in the Arctic have increased almost twice as fast as the global average over the past 100 years. The average extent of Arctic sea ice has been shrinking by 2.7 per cent per decade and large areas of the Arctic Ocean could lose year-round ice cover by the end of the 21st century if human emissions reach the higher end of current estimates. The Arctic is also particularly important because changes there have important global implications. For example, as ice and snow melts, the Earth's albedo (reflectivity) is decreased, trapping heat that would otherwise be reflected and warming the earth's surface even further.

- Asia — More than a billion people could be affected by a decline in the availability of freshwater, particularly in large river basins, by 2050. Glacier melt in the Himalayas, which is projected to increase flooding and rock avalanches, will affect water resources in the next two to three decades. As glaciers recede, river flows will decrease. Coastal areas, especially heavily populated mega-delta regions, will be at greatest risk due to increased flooding from the sea and, in some cases, from river flooding.
- Australia and New Zealand — Increasing stress on water supplies and agriculture, changing natural ecosystems, less seasonal snow cover and shrinking glaciers. Over the past few decades there have been more heat waves, fewer frosts and more rain in north-west Australia and south-west New Zealand; less rain in southern and eastern Australia and north-eastern New Zealand; and an increase in the intensity of Australian droughts. The climate of the 21st century is virtually certain to be warmer with more frequent and intense heat waves, fires, floods, landslides, droughts and storm surges.
- Europe — Glaciers and permafrost are thawing, growing seasons are lengthening and weather extremes – such as the disastrous heat wave of 2003 – are more frequent. Researchers believe that Europe's northern regions will experience warmer winters, greater precipitation, expanding forests and greater agricultural productivity. Southern regions near the Mediterranean will see hotter summers, less precipitation, more droughts, retreating forests and reduced agricultural productivity. Europe contains a great deal of low-lying coastland vulnerable to rises in sea-level, and many plants, reptiles, amphibians and other species are likely to become endangered by the end of the century.
- Latin America — The tropical forests of eastern Amazonia and southern and central Mexico are expected to be gradually replaced by savannah. Parts of north-east Brazil and most of central and northern Mexico will become more arid due to a combination of climate change and human land management. By the 2050s, 50 per cent of agricultural lands are highly likely to be experiencing desertification and salinization.
- North America — Climate change will further constrain water resources, already stretched by growing demand from agriculture, industry and cities. Rising temperatures will further diminish the mountain snow pack and increase evaporation, thus altering the seasonal availability of water. Lower water levels in the Great Lakes and major river systems will affect water quality, navigation, recreation and hydropower. Wildfire and insect outbreaks will continue to intensify in a warmer world with drier soils. Over the 21st century, pressure for species to shift north and to higher elevations will fundamentally rearrange North American ecosystems.
- Small island states — Particularly vulnerable to climate change, their limited size makes them more prone to natural hazards and external shocks, in particular to rises in sea-level and threats to their freshwater resources.

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Fact Sheet

Reducing the Emissions that Cause Climate Change

In the context of climate change, mitigation is a human intervention to reduce the sources or enhance the sinks of greenhouse gases.

United Nations Framework Convention on Climate Change

Quick facts:

Without additional action, emissions of the six main greenhouse gases are projected to rise by 25-90 per cent by 2030 compared to 2000.

With the right policies, the rise in the level of greenhouse gases in the atmosphere can be slowed and ultimately stabilized.

If global CO_2 emissions peak by 2015 and fall to 50-85 per cent of 2000 levels by 2050, global mean temperature increases could be limited to 2-2.4°C above pre-industrial levels.

- Without additional action by governments, emissions of the six main greenhouse gases - carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, PFCs and HFCs - are set to rise dramatically. Between 1970 and 2004, emissions of these gases increased by 70 per cent.
- By adopting stronger climate change policies, governments could slow and reverse these emission trends and ultimately stabilize the level of greenhouse gases in the atmosphere. For example, stabilizing greenhouse gas levels at 445-490 ppm (parts per million) — the most ambitious target that was assessed – would require global CO_2 to peak by 2015 and to fall to 50-85 per cent of 2000 levels by 2050. This could limit global mean temperature increases to 2-2.4°C above pre-industrial levels.
- Stabilizing greenhouse gases levels at 535-590 ppm would require global CO_2 emissions to peak by 2010-2030 and return to -30 per cent to +5 per cent of 2000 levels by around 2050. This could limit the temperature increase to 2.8-3.2°C. If emissions peak later, more warming can be expected. By way of comparison, the current (2005) level of greenhouse gases is about 379 ppm.
- Mitigation efforts over the next two to three decades will determine to a large extent the long-term global mean temperature increase and the corresponding climate change impacts that can be avoided. Properly designed climate change policies can be part and parcel of sustainable development and the IPCC's findings confirm that sustainable development paths can reduce greenhouse gas emissions and reduce vulnerability to climate change.

Reducing Emissions Requires Help from all Sectors of the Economy

- There is no single solution to climate change — The IPCC concludes that no single economically and technologically feasible solution would, on its own, suffice for reducing greenhouse gas emissions from different sectors. At the same time, it is clear that coordinated action at the international level is needed to harness the full effect of clean technologies and energy efficiency.

- Energy —US$ 20 trillion is expected to be invested in upgrading global energy infrastructure from now until 2030 to meet rising demand, which will grow by about 60 per cent in that time according to the International Energy Agency. The additional cost of altering these investments in order to reduce greenhouse gas emissions is estimated to range from negligible to an increase of 5-10 per cent. The way in which these energy needs are met will determine whether climate change will remain manageable. Mitigation efforts over the next two to three decades will determine to a large extent the long-term global mean temperature increase and the corresponding climate change impacts that can be avoided.

  - The wide deployment of climate-friendly technologies is critical. Existing clean technologies need to be rapidly adopted by the private sector and deployed widely, including through technological cooperation between industrialised and developing countries. Addressing climate change will, however, require continuous improvement through innovation and the development of new technologies.

  - Cleaner technologies and energy efficiency can provide win-win solutions, allowing economic growth and the fight against climate change to proceed hand in hand. With the continued dominant role of fossil fuels in the global energy mix, energy efficiency, cleaner fossil fuel and carbon capture and storage technologies are needed to allow their continued use without jeopardising climate change objectives.

  - Renewable energy can help. According to UNEP and New Energy Finance (NEF), sustainable energy investment has increased markedly over the past couple of years, with wind, solar and biofuels attracting the highest levels of investment. This reflects technology maturity, policy incentives and investor appetite. Investor appetite suggests that existing technology is ready for scale-up and that renewable energy can become a larger part of the energy mix without waiting for further technology development

  - To fully meet the mitigation challenge across the globe, such a scale-up needs to be promoted and the further diffusion of technologies needs to be supported, including through enhanced cooperation between industrialised and developing countries. For this to happen, governments need to further concretize and support a market-friendly, clear and predictable playing field for private investors.

  - Governments need to promote a range of energy options — These could include encouraging natural gas over more carbon-intensive fossil fuels as well as mature renewable energy technologies such as large hydro, biomass combustion and geothermal. Other renewable sources include solar assisted air conditioning, wave power and nanotechnology solar cells, although they all still require more technological or commercial development. Yet another option could be carbon capture and storage technology, which involves capturing carbon dioxide before it can be emitted into the atmosphere, transporting it to a secure location, and isolating it from the atmosphere, for example by storing it in a geological formation.

- Buildings — Approximately 30 per cent of the projected baseline emissions in the residential and commercial sectors – the highest rate amongst all sectors studied by the IPCC – could be reduced by 2030 with a net economic benefit. Energy consumption and embodied energy in buildings can be cut through greater use of existing technologies such as passive solar design, high-efficiency lighting and appliances, highly efficient ventilation and cooling systems, solar water heaters, insulation, highly-reflective building materials and multiple glazing. Government policies on appliance standards and building energy codes could further provide incentives and information for commercial action in this area.

- Transport — Technologies that could help reduce emissions range from direct injection turbocharged diesels and improved batteries for road vehicles to regenerative breaking and higher efficiency propulsion systems for trains to blended wing bodies and unducted turbofan propulsion systems for airplanes. Biofuels also have the potential to replace a substantial proportion of the petroleum that is currently being used by transport. Providing public transport systems and

promoting non-motorised transport can also reduce emissions. Management strategies for reducing traffic congestion and air pollution can also be effective in reducing private-vehicle travel.

- Industry — The greatest potential for reducing industrial emissions is located in the energy-intensive steel, cement, pulp and paper industries and in the control of non-CO_2 gases such as HFC-23 from the manufacturing of HCFC-22, PFCs from aluminium smelting and semiconductor processing, sulphur hexafluoride from use in electrical switchgear and magnesium processing, and methane and nitrous oxide from the chemical and food industries.
- Agriculture — Sequestering carbon in the soil represents about 89 per cent of the mitigation potential in this area. Other options include improved management of crop and grazing lands (e.g. improved agronomic practices, nutrient use, tillage and residue management), restoration of organic soils that are drained for crop production, and restoration of degraded lands. Lower but still significant reductions are possible with improved water and rice management; set-asides, land use change (e.g. converting cropland to grassland) and agro-forestry; and improved livestock and manure management.
- Forests — Arresting today's high levels of deforestation and planting new forests could considerably reduce greenhouse gas emissions at low costs. About 65 per cent of the total mitigation potential for forests lies in the tropics and 50 per cent can be achieved by simply avoiding deforestation. In the longer term, the best way to maintain or increase the ability of forests to sequester carbon is through sustainable forest management, which also has many social and environmental benefits. A comprehensive approach to forest management can ensure an annual sustained yield of timber, fibre or energy that is compatible with adapting to climate change, maintaining biodiversity and promoting sustainable development.
- Wastes — Post-consumer waste makes up almost 5 per cent of total global greenhouse gas emissions. Technology can directly reduce emissions by recovering gases emitted from landfills but also through improved landfill practices and engineered wastewater management. Controlled composting of organic waste, state-of-the-art incineration and expanded sanitation coverage can also help avoid generating these gases in the first place. It is estimated that 20-30 per cent of projected emissions from waste for 2030 can be reduced at negative cost and 30-50 per cent at low costs.

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Fact Sheet

Living with Climate Change

Adaptation is an adjustment in natural or human systems in response to actual or expected climatic stimuli or their effects, which moderates harm or exploits beneficial opportunities.

United Nations Framework Convention on Climate Change

Quick facts:

Early action to improve seasonal climate forecasts, food security, freshwater supplies, disaster and emergency response, famine early-warning systems and insurance coverage can minimize the damage from climate change.

Without adaptive efforts, a 2.5ºC increase in temperature is likely to result in a 0.5-2 per cent decrease in gross domestic product, with higher losses in most developing countries.

- Humans have been adapting to changing climatic conditions for centuries. However, the climate change that the world is presently experiencing is occurring far more rapidly than anything the Earth has experienced in the last 10,000 years.
- Vulnerable countries, communities and ecosystems are already feeling the effects of climate change. The risks associated with the climate-related changes are real and are already happening in many systems and sectors essential for human livelihood, including water resources, food security and health. Developing countries are the most vulnerable to these risks. In the most vulnerable communities, the impacts of climate change pose a direct threat to people's very survival. The devastating effects of extreme events, temperature increases and sea level rise will worsen with consequences for everyone, particularly the poor.
- Coping with an uncertain future — Adaptation is a process through which societies make themselves better able to cope with an uncertain future. Adaptation options are many and range from technological options such as increased sea defenses or flood-proof houses on stilts, to behaviour change at the individual level, such as the sparing use of water in times of drought. Other adaptation strategies include early warning systems for extreme events, improved risk management, insurance options and biodiversity conservation to reduce the impacts of climate change on people.
- Affected countries must develop strategies to effectively adapt to the impact of climate change, now and in coming years. Because of this many developing countries have given adaptation action a high, even urgent, priority. The international community is identifying resources, tools and approaches to support this effort.
- Sustainable development is vital — According to the IPCC, future vulnerability depends not only on climate change but also on the type of development that is pursued. Sustainable development can reduce vulnerability and to be successful, adaptation should be implemented in the context of national and international sustainable development plans.

Early Action Needed

- Taking early action can improve seasonal climate forecasts, food security, freshwater supplies, disaster and emergency response, famine early-warning systems and insurance coverage. These actions can minimize the damage from future climate change while generating many immediate practical benefits.
- Ability to adapt — While adaptation to climate change is important to all countries, it is particularly important to developing countries, whose economies heavily depend on climate-vulnerable sectors such as agriculture, and which have less capacity to adapt than industrialized countries.
- Averting economic loss — Without adaptive efforts, a 2.5°C increase in temperature is likely to result in a 0.5-2 per cent decrease in gross domestic product, with higher losses in most developing countries. As an example, Sierra Leone estimated that the full protection of all its vulnerable shores will require an estimated amount of US$ 1,100 million, which is about 17 per cent of its GDP. Making development projects more resilient to climate impacts is expected to increase project costs anywhere between 5 and 20 per cent.
- Limited assistance so far for planning — Estimates show that only a small portion of official development assistance-financed projects currently incorporate climate risk into planning.
- Delays mean greater risks — Delays in implementing adaptation, including delays in finance and support for adaptation in developing countries, ultimately means increased costs and greater dangers to more people in the future. Major events, such as droughts, monsoon failure or loss of glacial meltwater, could trigger large-scale population movements and large-scale conflict due to competition over scarcer resources such as water, food and energy.
- Adaptation strategies vital — Adaptation, at the national level, includes initiating an effective implementation strategy for adaptation, including enhancement of the scientific basis for decision making; methods and tools for the assessment of adaptation; education, training and public awareness on adaptation, including for young people; individual and institutional capacity-building; technology development and transfer; and promotion of local coping strategies. Beyond that, possible initial activities on adaptation could include appropriate legislation and regulatory frameworks, which promote adaptive-friendly action. Using climate change as a driver to undertake activities with multiple benefits can actually catalyse progress in achieving a country's sustainable development goals, while contributing to adaptation objectives.

Resources for Adaptation

Sustained financing for adaptation — Without targeted funding, adaptation runs the risk of not being effectively addressed and funding may be largely limited to "reactive" funding, such as short-term emergency relief, which would be unsupportive of sustainable development approaches and be very costly.

The member Governments of the UN Framework Convention on Climate Change (UNFCCC) have established a number of funding opportunities for adaptation projects including through the Global Environment Facility (GEF) Trust Fund and three special funds: the Least Developed Countries Fund, the Special Climate Change Fund and the Adaptation Fund under the Kyoto Protocol.

Examples of Adaptation

- Adaptation includes the partial drainage of the Tsho Rolpa glacial lake in Nepal, changes in livelihood strategies in response to permafrost melt by the Inuit in Nunavut, Canada, and the increased use of artificial snow-making by the ski industry in Europe, Australia and North America.
- In anticipation of future climate change, planners have considered sea-level rise in the design of infrastructure such as the Confederation Bridge in Canada and in coastal zone management in the USA and The Netherlands.
- Glacial retreat and glacial lake floods are major problems linked to climate change. In Bhutan, a GEF project being implemented by the United Nations Development Programme (UNDP) is enhancing adaptive capacity in the Punakha-Wangdi and Chamkar valleys by strengthening disaster management capability, artificially lowering waters in Lake Thortormi, and installing an early warning system.

- In Colombia, the Integrated National Adaptation project is promoting adaptation measures in the Las Hermosas Massif in the central range of the Andes, including by regulating water for hydropower generation and maintaining environmental services in this important mountain ecosystem.
- Kiribati is one of the world's most vulnerable countries, spread over 33 low-lying atolls in the central and western Pacific region. An adaptation programme is providing vulnerable communities with the information and means to enhance adaptive capacity, including improved management, conservation, restoration and sustainable use of biodiversity, improved protection and management of mangroves and coral reefs, and strengthening government capacity by fully integrating adaptation into economic planning.
- In Mozambique, a GEF project is integrating climate into sustainable land management practices to reduce the impacts of extreme weather events on populations and ecosystems.
- UNDP and the World Bank are launching a series of GEF projects to assist African communities to assess risks and options to adopt to drought, coastal flooding and health risks.

For more information: www.un.org/climatechange

Printed on recycled paper Issued by the UN Department of Public Information – DPI/2468 (E) - September 2007

Fact Sheet

The Need for a New Global Agreement on Climate Change

Quick facts:

As a modest first step in the right direction, the 1997 Kyoto Protocol has already helped stabilize and in some cases reduce greenhouse gas emissions in several industrialized countries of the world. However, the emission reduction targets established under the Kyoto Protocol apply only to a group of 36 industrialized countries and cover only a portion of global greenhouse gas emissions. The first commitment period of the Protocol expires after 2012.

The rapid growth in emissions from both developed and developing countries will counteract the emission reductions achieved from the group of industrialized countries which have ratified Kyoto. Without an ambitious new agreement, it will be difficult to reign in both the emissions of highly industrialized countries and of burgeoning emerging economies. It is therefore urgent to advance negotiations for a global post-2012 climate change agreement.

- The Kyoto Protocol's emission reduction targets for industrialized countries expire after 2012. But the Kyoto Protocol's emission reductions cover only a portion of global greenhouse gas emissions. The emissions of highly industrialized countries are at an unsustainable level and the emissions of economies in transition (not least of the countries of the former Soviet Union) have picked up again after years of decline. And while the per capita emissions of developing countries are low compared to the industrialized countries, the rapid growth in emissions from the large emerging economies need to be addressed under a new global agreement along with those of developed countries.
- With the mounting scientific evidence concerning climate change and its impacts, there is a growing sense of urgency for stronger international action. Although the Kyoto Protocol's first commitment period does not begin until 2008, a new climate change agreement must quickly be put in place.

The Complexities

- Developing countries vulnerable — Because developing countries have lower incomes than industrialized countries, developing countries are more vulnerable to climate change impacts and have less capacity to adapt to these impacts than developed countries. Further, while the emissions of developing countries as a whole are rising, the per capita levels of emissions are far less than those of industrialized countries. And the absolute level of emissions for most developing countries is extremely low. The next global agreement must address the needs of developing countries while safeguarding the economic interests of industrialized countries.
- Major emission reductions needed — Greenhouse gases will increase anywhere between 25 to 90 per cent in 2030 from 1990 levels. Deep reductions in emissions are possible, without undermining the global economy, through rapid and significant advancement and deployment in climate-friendly technologies — renewable energy and emerging technologies

such as carbon capture and storage. Such technologies will expand the options for reducing greenhouse gas emissions, and thus for international cooperation.

The Central Points for Negotiations

- Possible themes for negotiations — While it is too early to predict the specific design of a future climate agreement, it is possible to identify guiding principles and items to be included in a broadened regime. Concluding a strong multilateral agreement — one that will set a path for decades to come — by 2009 presents a formidable challenge but a reasonable timetable is possible. The Climate Change Conference to be held in Bali in December 2007 provides an opportunity to significantly advance a comprehensive agenda on climate change policy for the years after 2012. Basic principles should be established during 2008, and by 2009 the world community should conclude an agreement in order for it to be ratified by 2012.
- A post-2012 climate change regime needs to be broadened to allow all aspects of a global solution to the problem to be addressed, including:

  - A long-term global response in line with latest scientific findings and compatible with long-term investment planning needs of business;
  - Deep emission cuts by industrialized countries, which must continue to take the lead in line with their historic responsibility and economic capabilities;
  - Further engagement of developing countries, in particular those whose emissions already, or will in the near future, significantly contribute to atmospheric concentrations;
  - Incentives for developing countries to limit their emissions and assistance to adapt to the impacts of climate change while safeguarding socioeconomic growth and poverty eradication, and for this;
  - Flexibility through an enhanced carbon market to ensure the most cost-effective implementation and to mobilize the resources needed to provide the incentives to developing countries.

- Getting started — The G8 industrialized countries, together with the +5 developing countries — Brazil, China, India, Mexico, and South Africa — called on all Parties to actively and constructively participate in the negotiations on a comprehensive agreement at Bali. This year provides the world with an opportunity to constructively engage in the multilateral climate change process under the auspices of the UN and to collectively craft an effective and fair agreement that includes all valid interests and concerns.
- A UN high-level event on climate change — UN Secretary-General Ban Ki-moon is convening an informal high-level event in New York on 24 September 2007, the day before the general debate in the General Assembly, to facilitate an exchange of views and to galvanize political will for the Bali Conference. The event, while informal, seeks to reaffirm the importance of addressing climate change in a global forum and provide an opportunity to involve all countries in the multilateral process.

For more information: www.un.org/climatechange

Printed on recycled paper Issued by the UN Department of Public Information – DPI/2468 (E) - September 2007