

Climate Change

FACTS

- ✓ Global average surface temperature has increased by 0.6°C since 1900.
- ✓ Global snow cover has decreased 10% since 1960.
- ✓ Global mean sea level rose by 0.1 to 0.2 mm per year during the 20th century. Over the next hundred years, sea level is projected to rise by 0.09 to 0.88 meters.
- ✓ Global average temperature is projected to increase by 1.4°C to 5.8°C over the next 100 years.
- ✓ The number of floods, storms, landslides and droughts has increased dramatically in the past 5 years.
- ✓ Losses from catastrophic events could annually cost around US\$304.2 billion.
- ✓ Isotherms (bands of similar temperature) are expected to shift poleward 150-550 km by 2100 in mid-latitude regions.
- ✓ The US produces 24% of global greenhouse gas emissions.
- ✓ Carbon dioxide (CO₂), the most important of the greenhouse gases, accounts for some 65% of the "greenhouse effect".
- ✓ Over the coming decades, 40 of the world's poorest nations are likely to suffer food production losses of as much as 25% due to global warming.
- ✓ Cost estimates to implement the Kyoto Protocol (0.2 to 2% of GDP in 2010 for industrialized countries) are significantly lower than the cost of impacts.

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IS THE CLIMATE CHANGING?

An increasing body of observations indicates a warming world and other changes in the climate system. The Intergovernmental Panel on Climate Change concluded that most of this warming is attributable to human activities. The warming observed over the last 100 years is unusual and is unlikely to be entirely natural in origin.

Recent regional climate changes have already affected many systems. Glaciers in the Andes Mountains in South America have shrunk by almost a kilometre in the past 13 years. Sowing dates for rice production in Asia have changed. Alpine plants are moving upward on slopes, while many animal ranges are shifting poleward; trees are flowering and birds are laying eggs earlier.

Some parts of the world will experience more hot days, and fewer cold days. Precipitation will change, including larger year-to-year variations and more intense rainstorms. For each degree Celsius (°C) of warming, rainfall amounts generally increase on average 2.5%. The increasing frequency of floods and droughts, e.g. floods in Bangladesh and Mozambique, and extreme events such as Hurricane Mitch, are also affecting social and economic systems.

WHAT IS AT RISK?

The most immediately vulnerable natural systems are: glaciers, coral reefs, low-lying islands, polar and alpine ecosystems, cloud forests, mangroves, coastal wetlands and grasslands. While some species, like grasshoppers or other pests, may increase in abundance or range, climate change will increase existing risks of extinction of many threatened species and lead to loss of biodiversity. The faster and greater the climate changes, the more damage to ecosystems and human societies that depend on them.

Sea level rise may lead to increased flooding of low-lying land. Tuvalu, a small island state, would be inundated if sea levels rise by a metre. Fiji could experience damages of US\$23-\$52 million a year by 2050, equivalent to 2-4% of its current GDP.

Ecosystems and species will be affected. The widening of the Sahara led to a sharp decrease in the populations of the whitethroat, a migratory bird species, which crashed to about 10% of its numbers in 1968 and has not yet fully recovered. Ice break-up in western Hudson Bay now occurs an average of two weeks earlier compared to the mid-1970s, so that polar bears have less time to feed and store fat needed while on shore for four months before the ice re-freezes.

Health consequences can come from vectors moving into hitherto disease-free areas. Malaria, for instance, responsible for 300 to 500 million clinical cases each year resulting in 1.5 to 2.7 million deaths, is already moving to a wider geographical region.

Water supplies and food production in the tropics may be affected, putting 50 million people at greater risk of hunger by 2100, which may result in mass migration and political instability in the regions hardest hit.

Poverty will tighten its grip on local communities. Bangladesh, with a per capita GDP of US\$ 291, will bear an increased cost of floods even though its own emissions of the greenhouse gases are less than 0.1% of the global total.

The Amazon **forest fires** in 1998 could have been responsible for 10% of the net annual carbon emissions stemming from human activities worldwide that year. Such fires could become more frequent, with more carbon dioxide emitted by the burning biomass, thereby further contributing to climate change.

The Greenhouse Effect

The capacity of certain gases in the atmosphere to trap heat emitted from the Earth's surface, thereby insulating and warming the Earth is called the 'greenhouse effect'. Without the thermal blanketing of the natural greenhouse effect, the Earth's climate would be about 33°C cooler — too cold for most of today's living organisms to survive.

Now scientists are growing increasingly concerned that human activities are modifying this natural process, with potentially dangerous consequences. The 'enhanced greenhouse effect,' resulting from the burning of fossil fuels, as well as other activities such as forest clearing, releases some of the same gases that trap heat in the atmosphere, including carbon dioxide, methane, and nitrous oxide.

These atmospheric gases have risen to levels higher than at any time in the last 420,000 years. As these gases build up in the atmosphere, they trap more heat near the Earth's surface, causing the Earth's climate to become warmer.

El Niño Phenomenon

El Niño (Spanish for "little boy") is the name given by fishermen to the periodic seasonal warming of the eastern Pacific Ocean temperatures, particularly along the coasts of Ecuador and northern Peru. El Niño events often lead to profound effects far away, such as fires in Indonesia.

Scientists refer to the ENSO (El Niño-Southern Oscillation — a periodic seesaw in atmospheric pressure between the eastern equatorial Pacific and Indo-Australian areas. Scientists believe El Niño Southern Oscillation changes may be partly caused by the observed increases in greenhouse gases.

El Niños have been more frequent, persistent and intense since 1970. These El Niño events could in turn cause further climate change, by causing increased precipitation in some areas and intense dryness in others, thus changing the hydrologic cycle and hence the whole climate of the region.

WHAT HAS THE INTERNATIONAL COMMUNITY DONE TO ADDRESS CLIMATE CHANGE?

Following the First World Climate Conference in 1979, the Intergovernmental Panel on Climate Change (IPCC) was established in 1988 to further investigate human impact on the global climate. At the 1992 United Nations Conference on Environment and Development (the so-called Rio Earth Summit), the United Nations Framework Convention on Climate Change (UNFCCC) was signed by 154 governments. The main objective of the Convention is the reduction of greenhouse gas emissions, so as to avoid dangerous human-induced changes in climate.

To achieve this objective, Parties to the UNFCCC adopted the Kyoto Protocol to the UNFCCC in December 1997. The Protocol calls upon 39 industrialized countries to reduce carbon dioxide and other greenhouse gas emissions from the year 2008 to 2012 by 5% from 1990 levels. To reach this target, the Protocol allows international trading of emissions and the use of forests and other carbon sinks to remove carbon from the atmosphere.

The details of the Kyoto agreement have been negotiated over the last four years, including the failed talks in November 2000 in The Hague. Parties were able to resolve their differences and come to a broad political agreement on the most contentious issues at resumed negotiations in July 2001 in Bonn, Germany. The final details of the Bonn agreement are expected to be formally adopted at the next climate change meeting in November 2001 in Marrakech, Morocco.

REDUCE, ADAPT AND COUNTERACT

Greenhouse gases remain in the atmosphere for many years: even an immediate and dramatic cut in global emissions today may only be felt after decades. Many "no regrets" options can reduce greenhouse gas emissions over the next 100 years or more. However, their implementation requires socio-economic and institutional changes.

BEYOND CARBON

The whole history of human use of energy is a history of decarbonization of fuels. This is not part of any green revolution: people have simply used whatever fuels have been readily available, cheap and easy to use, moving from wood and hay to coal and then oil. Now a shift towards renewable sources of energy is needed. Increasing energy efficiency also makes good economic sense, even without climate change.

At present, only 8% of US and 6% of EU energy needs are provided by renewable sources. The EU is aiming for a share of 22% of green electricity by 2010. The US is projected to import nearly 100% of its petroleum in 10 to 15 years.

One short-term measure is using forests and agricultural lands to store carbon. These are short-term measures, but they will allow time for other options to be developed and implemented. Furthermore, carbon sequestration activities have to be supportive of biodiversity and livelihood values.

THE COST OF CHANGE

While progress to control the emission of greenhouse gases is slow, human societies and ecosystems are already feeling the impacts of a changing climate. Therefore adaptation options, such as potential contributions of targeted nature conservation, are critical to reduce vulnerability to climate change. The effective management of forests, water and coastal resources, including protected areas, can help to buffer the effects of climate change. Such efforts need to complement efforts to reduce greenhouse gas emissions.

Inclusion of climatic risks into national, regional and international development initiatives can promote equity and development that is more sustainable and that reduces vulnerability to climate change.

Carbon Sequestration

Carbon sequestration is a strategy to slow the build-up of greenhouse gases by keeping carbon dioxide out of the atmosphere by storing the gas or its carbon component somewhere else.

The simplest way to sequester carbon is to preserve trees and to plant more. A wide range of projections exist about the amount of carbon dioxide that can be absorbed by trees over the next decades.

Carbon is returned to the atmosphere through plant respiration, the breakdown of organic matter by decomposers in the soil, or forest fires. Therefore carbon stored in this way is a temporary phenomenon, although the time for which the carbon is stored can range from days to millennia. Carbon sequestration activities are most viable if they take biodiversity and livelihood values into account.

QUOTES

"Ratifying the Kyoto Protocol is the only way forward to curb emissions. It is time for industrialised country governments to show leadership on this issue and work out solutions in their discussions in Marrakech." – Achim Steiner, IUCN Director General

"We know that dramatic changes are still to come and they will result in huge economic costs. When we push an alarm button at IUCN, it's because there is a real cause for alarm." – Brett Orlando, IUCN Climate Change Focal Point

"Maintaining maximum biological diversity assumes far greater urgency as the world becomes increasingly threatened by rapid climatic change. The loss of each additional species reduces the options for nature and people to respond to changing conditions." – Jeffrey McNeely, IUCN Chief Scientist

"Cutting greenhouse gases is as optional as breathing." – Andrew Simms, Guardian

The ability of human systems to adapt to and cope with climate change depends on several factors

- GDP/capita (in purchasing power parity)
- Incidence of poverty
- Life expectancy
- Insurance mechanisms
- Degree of urbanization
- Access to public health facilities
- Access to education
- Community organizations
- Existing early warning and protection from natural hazards
- Institutional and decision-making frameworks
- Political stability

Those with the least resources have the least capacity to adapt and are the most vulnerable.

Cost estimates for industrialized countries to implement the Kyoto Protocol vary widely depending on the use of the market mechanisms in the Kyoto Protocol (emissions trading, joint implementation, and the Clean Development Mechanism). Without these mechanisms, estimates range from 0.2 to 2% of GDP in 2010 for industrialized countries. With these mechanisms, estimates range from 0.1 to 1.1% of GDP, though recent studies indicate that the costs of inaction far exceed the costs implied under the Kyoto Protocol.

IUCN'S RESPONSE

IUCN focuses on the causes and effects of climate change where it relates to biodiversity, ecosystems and poverty. As above examples illustrate, changes in the environment will affect the communities that depend on that environment for their livelihoods. Therefore, IUCN aims to ensure ecosystems and communities play their full part in responding to climate change. With its web of expertise, IUCN is ready and able to move from discussion to action on climate change.

IUCN helps understand climate change by providing knowledge and the most accurate and up-to-date information about the effect of climate change on species, ecosystems and communities.

IUCN provides the most authoritative and comprehensive status assessment of global biodiversity, linking it to most topical issues such as poverty, health, food security and political stability. Under rapidly changing conditions, biodiversity knowledge will be the key shield against climate-related impacts.

IUCN tests ecosystem approaches to flood, drought and disaster mitigation, coastal zone management, integrated water resource management, forest management, and protected areas – so that ecosystems serve as buffers for extreme events.

For example, IUCN promotes the 'software' strategy to cope with flooding, which means going along with the flow, making room for the rivers, giving them more storage capacity, removing the dykes, creating wider areas for flooding of land. This is what engineers are now doing along the Rhine and in California's Sacramento Valley, among other places.

IUCN recommends ways to ensure that carbon sequestration activities benefit people and nature.

The Mesoamerican Biological Corridor is a concrete response to mitigate climate change and conserve nature. It covers almost 21 million hectares, or 40% of the total territory of Central America, with an annual sequestration of over 45 million tons of carbon, equivalent to over US\$450 million of prospective benefits for the Mesoamerican region from entering the international carbon market.

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A WEB OF EXPERTISE

The IUCN Climate Change Strategy draws upon a network of experts in environmental science, natural resource management, policy, law, and education. Using this network, the Strategy gathers lessons from the field and translates them into policy recommendations, which in turn stimulate further action on the ground. The IUCN Climate Change Strategy demonstrates that ecosystem management approaches and participation will help combat the causes and effects of climate change.

Created in 1948, **IUCN – The World Conservation Union** brings together 79 states, 113 government agencies, 754 NGOs, 36 affiliates, and some 10,000 scientists and experts from 181 countries in a unique worldwide partnership. IUCN's mission is to influence, encourage and assist societies throughout the world to conserve the integrity and diversity of nature and to ensure that any use of natural resources is equitable and ecologically sustainable.

IUCN is the world's largest environmental knowledge network and has helped over 75 countries to prepare and implement national conservation and biodiversity strategies. IUCN is a multicultural, multilingual organization with 1000 staff located in 42 countries. Its headquarters are in Gland, Switzerland.

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CLIMATE CHANGE GLOSSARY

Greenhouse gas: a gas such as carbon dioxide, methane, ozone, or water vapour that contributes to the warming of the Earth's atmosphere by reflecting radiation from the Earth's surface.

Carbon Dioxide Fertilization: an increase in plant growth attributable to a higher-than-normal carbon dioxide concentration in the environment.

Greenhouse effect: the capacity of certain gases in the atmosphere to trap heat emitted from the Earth's surface, thereby insulating and warming the Earth.

Coral bleaching: a phenomenon affecting coral reefs by which they lose their natural colour as a result of high water temperatures or other environmental stressors such as pollutants.

Ecosystem: a dynamic complex of plant, animal and micro-organism communities and their non-living environment interacting as a functional unit.

Biological diversity - "biodiversity" means the variability among living organisms from all sources including, *inter alia*, terrestrial, marine and other aquatic ecosystems and the ecological complexes of which they are part; this includes diversity within species, between species and of ecosystems.

TO LEARN MORE

IUCN Climate Change Initiative (<http://www.iucn.org/themes/climate>)

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