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The Intergovernmental Panel on Climate Change, IPCC

The IPCC's Third Assessment Report provides the best scientific information to date as to how the emissions of greenhouse gases are affecting our climate. Here is a brief description of the IPCC and its most recent findings.

Recognizing the problem of a potential global climate change, the World Meteorological Organization (WMO) and the United Nations Environment Programme (UNEP) established the Intergovernmental Panel on Climate Change, IPCC, in 1988.

The role of the IPCC is to assess the scientific, technical and socio-economic information relevant for the understanding of the risk of human-induced change. It does not carry out research nor does it monitor climate-related data or other relevant parameters. It bases its assessment mainly on peer-reviewed and published scientific and technical literature.

The IPCC has three Working Groups and a Task Force:

- Working Group I assesses the scientific aspects of the climate system and climate change.
- Working Group II addresses the vulnerability of socio-economic and natural systems to climate change, the negative and positive consequences of climate change, and options for adapting to it.
- Working Group III assesses options for limiting greenhouse-gas emissions and otherwise mitigating climate change.
- The Task Force on National Greenhouse Gas Inventories is responsible for the IPCC National Greenhouse Gas Inventories Programme.

The IPCC completed its First Assessment Report in 1990. The Report played an important role in the establishing of the Intergovernmental Negotiating Committee for a UN Framework Convention on Climate Change by the UN General Assembly. The Convention was adopted in Rio de Janeiro in 1992.

The Second Assessment Report, Climate Change 1995, provided key input to the negotiations that led to the adoption of the Kyoto Protocol in 1997.

The Third Assessment Report (TAR) was adopted in September 2001. Some 2000 scientists representing a variety of disciplines the world over took part in this assessment, and the results were further reviewed both from the political and scientific aspect by representatives of the participating countries. This is the most all-embracing assessment of research that has ever been made.

A Fourth Assessment Report is scheduled to be ready by 2007.

The IPCC also prepares Special Reports and Technical Papers on topics where independent scientific information and advice is deemed necessary (see Publications, p.14). It also supports the climate convention through its work on methodologies for National Greenhouse Gas Inventories.

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Global temperature could rise by 6 degrees in next hundred years

Report from Working Group I to the IPCC's Third Assessment Report

A much-quoted sentence in the second assessment report (1995) from the IPCC says: "The balance of our evidence suggests a discernible human influence on global climate."

Knowledge has subsequently accumulated in a variety of respects, concerning both natural and man-induced effects. Although some uncertainty still remains, there is now a much greater consonance between measured effects and those obtained by modelling. In the third assessment report (2001) the IPCC researchers draw the following conclusion:

"In the light of new evidence and taking into account the remaining uncertainties, most of the observed warming over the last fifty years is likely to have been due to the increase in greenhouse-gas concentrations."

In this last report they say the global average surface temperature has risen by 0.6 (+/-0.2) ºC the last hundred years. They also say it is very likely that the 1990s were the warmest decade, globally regarded, and 1998 the warmest year ever recorded since 1861, when instrumental records started. In the course of the last century the sea level had risen by 1-2 decimetres. No clear trend had been found as regards the frequency of tornadoes, days with thunder, or hail storms, but here the data is said to be limited.

As for future trends, an increase of 1.4-5.8 ºC in the average temperature of the air at surface level is predicted for the period from 1990 to 2100. That figure takes account of all the thirty-five emission scenarios used by the IPCC, as well as various assumptions as to the climate's responsiveness to changes in the amount of greenhouse gases in the atmosphere.

The fact that a higher temperature rise is said to be on the way compared to earlier estimates – according to the second assessment report a rise of 1.0-3.5 ºC would be likely – does not mean that the emissions of greenhouse gases are now expected to be higher. The main explanation for the now higher figures is that the emissions of sulphur dioxide are expected to be lower worldwide. The concentrations of sulphate particles will consequently be lower, and their cooling-off effect reduced (the particles reflect back incoming solar radiation).

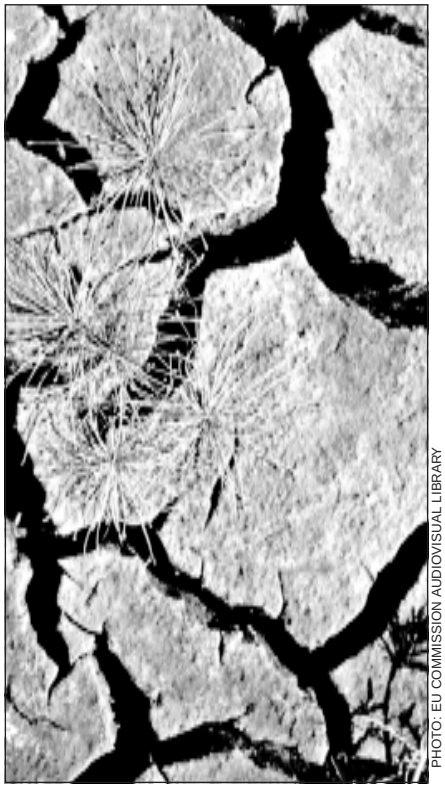


PHOTO: EU COMMISSION AUDIOVISUAL LIBRARY

While rainfall is expected to increase generally, drought may worsen in Africa and central Asia.

The projected rate of warming is much larger than anything that happened during the 20th century. It appears, too, to have been without precedent in the last 10,000 years.

It should be noted that there will not be an even warming-up everywhere. The temperature will be more likely to increase over land than over the sea, with the greatest increases in winter temperatures in the far north – especially in the northern parts of North America and northeastern and central Asia, where the global mean warming is likely to be exceeded by more than 40 per cent.

Fears are often expressed as to what will happen to the big ocean currents that carry heat from lower latitudes out towards the poles when the climate becomes warmer. According to the IPCC, most of its modelling points towards a falling away of heat transports northwards – and yet to a net warming-up in Europe, due to the increased concentrations of greenhouse gases in the atmosphere generally.

No complete cut-off of the thermohaline circulation is envisaged before 2100. The IPCC nevertheless warns that beyond 2100 this heat transport could completely, and possibly irreversibly, shut down in either hemisphere, if the increase in greenhouse-gas concentrations in the atmosphere is large enough and continues long enough.

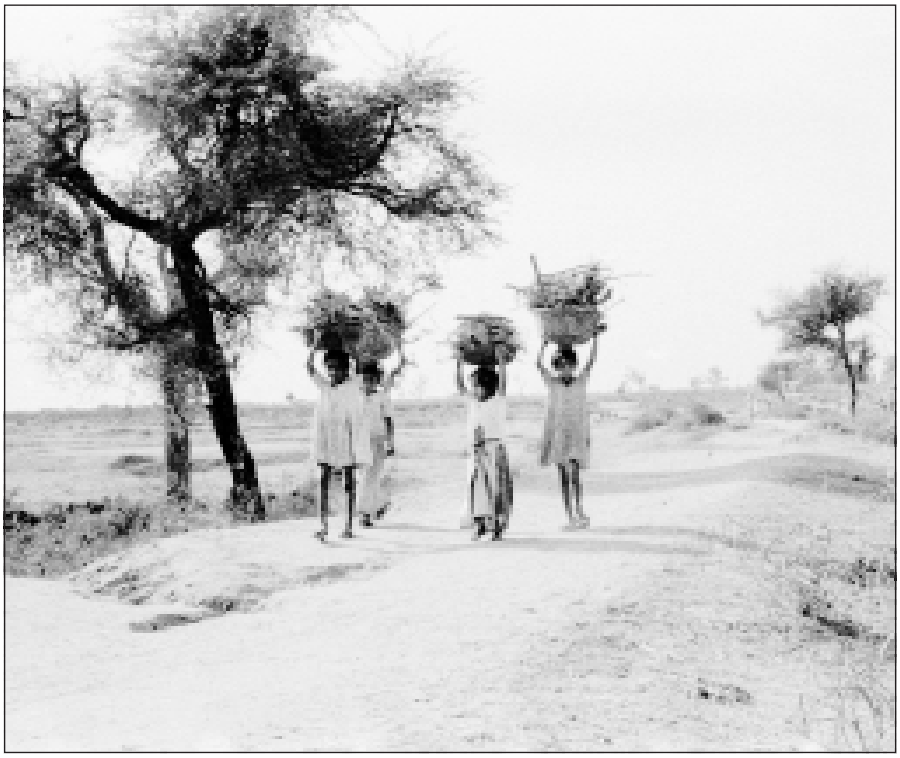
The rise of 9-88 centimetres that is projected to take place in sea level between 1990 and 2100 is somewhat less than previously anticipated. But here, too, the IPCC issues a warning. The sea level will continue to rise for centuries after the temperature had become stabilized.

If the temperature rise over Greenland should be 5.5ºC, and remain so for a thousand years, it could lead to a general rise in sea level of another three metres. The same might happen in the case of the West Antarctic ice sheet, although the data for that is more uncertain.

Source: **Climate Change 2001:The Scientific Basis**. Contribution of Working Group I to the IPCC's Third Assessment Report.

Atmospheric concentrations of three main greenhouse gases.

	Pre-industrial (yr 1750)	Present (yr 2000)	Change
Carbon dioxide (ppm)	280	368	+31%
Methane (ppb)	700	1750	+150%
Nitrous oxide (ppb)	270	316	+17%



Poorest countries will suffer most

Report by Working Group II to the Third Assessment Report.

Far more people will be hurt than are likely to be favoured even by a slight increase in average global temperature. And the higher the rise, the more serious will be the effects, both for humans and nature.

It emerges clearly from the report that the poorest countries will be the most hard hit when the temperature rises. This is partly because their economies are largely dependent on activities, such as agriculture, that are sensitive to climate change. Moreover they have only small means of adapting themselves to changes such as rising sea levels or missing rainfall. They are also lacking in resources for the kind of preventive health care that might reduce the risk of outbreaks of climate-related diseases such as malaria.

The report includes a whole catalogue of possible threats to humans and ecosystems in various parts of the world, as well as making an attempt at determining the probability that any specific degree of global warming will cause certain effects. The scientists warn however that most of their work has been concentrated on the changes that are likely to take place at the lower end of the expected increase in temperature.

Ecosystems. Even the warming that is judged to have taken place during the last century (+0,6ºC) constitutes a threat to the most sensitive systems. These include coral reefs, atolls, mangrove swamps, boreal and tropical forests, polar and alpine ecosystems, prairie wetlands, and remnant native grasslands. The greater any coming temperature rise will be, the more ecosystems and species will be at risk.

Extreme weather events. The temperature rise already recorded is deemed responsible for an increase in the frequency of heat waves, droughts, floodings, etc. Hundreds of millions of people can be affected by floodings a result of a combination of rising sea level with more violent storms. And the more the temperature rises, the greater will be the effect in these respects too.

The spread of effects. Whereas a marked warming up is likely to have an adverse effect in most parts of the world, a small increase will be bad for some parts but will actually favour others. Generally speaking, however, more people will be harmed than benefited, even by a small increase in temperature.

Large-scale changes in the climate system. The risk of large-scale and possibly irreversible changes – say, in the transport of warmth northwards by the Gulf Stream – is judged to be ”very low” if there is little warming up. It will however increase in step with any rise in temperature. But no threshold can yet be determined above which transport would cease completely.

Source: **Climate Change 2001: Impacts, Adaptation and Vulnerability**. Contribution of Working Group II to the IPCC's Third Assessment Report.

Effects expected in Europe

The capacity to adapt is generally high as regards human systems in Europe. They are however more vulnerable in the southern and arctic regions.

In summer the water supply and soil humidity are likely to be affected in those parts of Europe that are already subject to recurrent drought. An increase in the precipitation is however expected both in the north and the south in winter.

Half of the alpine glaciers as well as great expanses of permafrost may vanish in the course of the present century.

There will be a great increase in flooding, both from rivers and the sea, over large parts of Europe. Problems with erosion and loss of wetlands along the sealine will increase as a consequence of the predicted rise in sea level.

Agriculture will benefit in northern Europe but suffer in the south. Biotic zones will move to higher ground as well as northwards. Some species will be threatened by loss of habitat.

High temperatures and heatwaves may affect traditional summer tourist destinations, and less reliable snow conditions may spoil winter tourism.

Source: **Climate Change 2001: Impacts, Adaptation and Vulnerability**. IPCC Working Group II.

Climate change can be slowed

Report by Working Group III to the Third Assessment Report

Ways of curbing the increase of the greenhouse effect were dealt with by IPCC's Working Group III.

The technical possibilities of reducing emissions have, in the view of the scientists involved in the project, increased markedly since the last report in 1995.

Among the advances especially mentioned are developments in wind turbines, fuel cells, and underground storage of carbon dioxide , as well as the rapid elimination of industrial by-product gases.

The authors are of the opinion that it will be fully possible to bring down the emissions of greenhouse gases to levels below the present ones, and at no great cost.

In fact half of the measures would be profitable, but are being stopped by all kinds of hindrances, ranging from consumers' lack of interest to distorting subsidies and taxation.

The possibilities and costs vary considerably however from one country to an other.

Source: **Climate Change 2001: Mitigation**. Contribution of Working Group III to the IPCC's Third Assessment Report.

Looking to the future

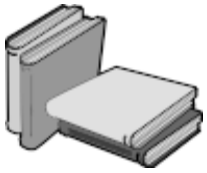
While the IPCC is silent as to the extent to which the emissions of greenhouse gases will have to be reduced if the aims of the climate convention are to be fulfilled, it does illustrate through a number of scenarios what emission levels will be needed for stabilizing the concentrations of these gases at various levels in the atmosphere.

They all show that to stabilize concentrations at a certain level, the emissions of carbon dioxide will have to be brought down in the next couple of hundred years to a fraction of what they are now – no matter what level is sought. Higher emissions might however be tolerated in the short term if higher concentrations are considered acceptable for the future.

To attain a relatively low concentration of carbon dioxide (450 ppm) it will be necessary to start reducing emissions globally almost at once. By 2100 they should have come down to some 2 billion tons of carbon per annum and then halved again in the following centuries. Today global emissions amount to about 8 billion tons a year.

A level of 450 ppm is estimated to lead to an equilibrium temperature increase, albeit after many centuries, of 1.5 to 3.9ºC above 1990 levels. According to estimates by environmentalist organizations, such a rise would constitute a great risk of serious changes in the world's ecosystems and a severe threat to a large part of the earth's population.

Further information: IPCC Third Assessment Report 2001. Climate Action Network 2002: "Preventing dangerous climate change", available from www.climatenetwork.org.



Recent IPCC publications

All the following titles are published by the Cambridge University Press, The Edinburgh Building, Shaftesbury Road, Cambridge CB2 2RU, England. Internet: www.cambridge.org/ipcc.

Extensive summaries are available in several languages in pdf format from www.ipcc.ch/ pub/reports.htm.

IPCC Third Assessment Report: Climate Change 2001

Available in four separate volumes:

Climate Change 2001: Synthesis Report. Contains the Synthesis Report itself, the Summaries for Policymakers and Technical Summaries of the three Working Group volumes, and supporting Annexes. 398 pp.

Climate Change 2001: The Scientific Basis. Contribution of Working Group I to the Third Assessment Report. 944 pp.

Climate Change 2001: Impacts, Adaptation & Vulnerability. Contribution of Working Group II to the Third Assessment Report. 1000 pp.

Climate Change 2001: Mitigation. Contribution of Working Group III to the Third Assessment Report. 700 pp.

IPCC Special Reports and technical papers, examples:

- Climate change and biodiversity. 2002.
- Methodological and Technological Issues in Technology Transfer. 2000.
- Emissions Scenarios. 2000.
- Land Use, Land-Use Change, and Forestry. 2000.
- Aviation and the Global Atmosphere.1999.