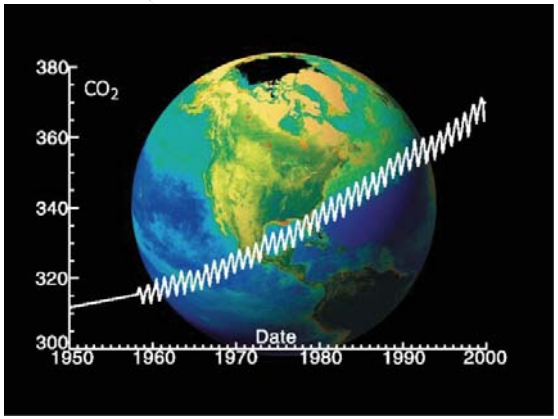
CLIMATE CHANGE

Following the work of the influential Intergovernmental Panel on Climate Change, it is now widely accepted that global warming is progressing rapidly, that human activities are contributing significantly to the rate of change, and that it will be difficult to slow or reverse the trend at least in the short term. Climate change is not new. Its effects can be seen through the geological record in the form of deposits from ice ages and hot periods that are known to have been associated with major changes to fauna and flora, ecosystems and biogeography with consequent extinctions of species.

Relatively small changes in average global temperatures can have major effects on weather conditions such as wind directions, storminess and rainfall. This can lead to soil erosion, drought, wildfire, river floods, landslides, avalanches and subsidence, as well as changes in terrestrial biogeography, species diversity and habitats. Thus, plants and animals adapted to extreme conditions in high latitudes, mountainous and arid areas, and people may be at greater risk. The relative distributions and compositions of forests and grasslands change. A mismatch may occur in areas with seasonal climates between birds and insects and the plants on which their food chain depends. The distributions of disease carrying insects may also extend. Effects are felt in agriculture as well as the natural environment, with implications for crop and livestock yields. As changes occur, it becomes necessary to adapt by raising different crops more suited to the new conditions. More seriously, areas that become more arid may fall out of agricultural use causing food shortages.



Increasing atmospheric CO_2 levels. (Source: UNEP)

Impacts are likely to be felt first and most strongly in "marginal environments" – those that are in a delicate balance at present. Thus, arid conditions may shift into southern Europe from North Africa while parts of the Sahara region of Africa may receive more rainfall and become more productive. Savannah areas may become more arid and begin to replace rain forest. This is likely to affect agricultural productivity. These trends could increase population movements and competition for scarce water resources. Both could lead to national and international conflicts. The Polar Regions are already being affected significantly by melting of ice sheets but also of permanently frozen ground. Mountain areas are already experiencing loss of glaciers and snow cover leading to increased rock fall and avalanche hazards as well as loss of economic activities such as winter sports.

Temperature rise leads to melting of polar ice, changing inputs of cold water into the oceans, thus changing the behaviour of ocean currents and consequently the behaviour of air masses above the oceans, causing new patterns of storms and rainfall. As oceanic waters warm, they also expand leading to appreciable rises in seas level that threaten coastal communities especially at times of storms and peak tides. Since many of the world's major cities are in low-lying coastal areas substantial numbers of people and properties are at risk. Coastal ecosystems in estuaries, salt marshes and mangrove swamps are also subject to inundation. A higher input of carbon dioxide into the oceans also leads to acidification that threatens the survival of major structures such as coral reefs which provide protection to shorelines from ocean waves. Changes also affect marine productivity with consequences for traditional fisheries

Energy production is a key factor in climate change. Demand for energy has increased and shows no sign of slowing in developed and developing countries. All rely on good sources of energy for their economic well-being and quality of life (heating and air conditioning). Therefore a key step in mitigation is to use alternative sources of energy such as wind, wave, solar and hydroelectric power and reducing the use of fossil fuels. Another alternative is nuclear power. None of these is free of environmental impacts but some may be tolerated in order to address climate change.

Better insulation of buildings would help to reduce the demand for energy as would more use of underground space for storage and other facilities. Energy production might be made more efficient but a key issue is whether technological advances can outpace environmental changes. For instances, carbon capture and storage by injecting carbon dioxide deep within the ground might help.

However, it should not be assumed that climate change will only be damaging. Some areas may experience changes that are beneficial. For example, crops that are now grown in tropical latitudes are now becoming viable in more northern and southern locations. Areas that are less attractive to tourists because of cool and rainy weather may become destinations of preference. However, overall, the costs and dangers are likely to outweigh these benefits.

It is clear, however, that climate change is already affecting much of the planet and that action is needed now if the most extreme effects are to be avoided. It is doubtful whether quick action and technological improvements will reduce the problem in the medium term, so it is important that strategies to adapt to changing conditions are adopted. But, to underpin action, the research base must be urgently invested in and improved. Spatial planning is identified as playing a key role in climate change adaptation. The development of adaptation measures requires the participation of multiple-stakeholders including researchers and practitioners. Preliminary cost-benefit analyses should also be looked into with the aim of estimating the costs of adaptation versus non-adaptation. These elements and more have been taken into account in an initiative that addressed climate change adaptation in the Baltic Sea Region, entitled "Developing Policies & Adaptation Strategies to Climate Change in the Baltic Sea Region" (ASTRA, 2005-2007), led by the Geological Survey of Finland (GTK). More information can be downloaded for free from www.astra-project.org. Contact: Philipp.schmidt-thome@gtk.fi

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Climate Change

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