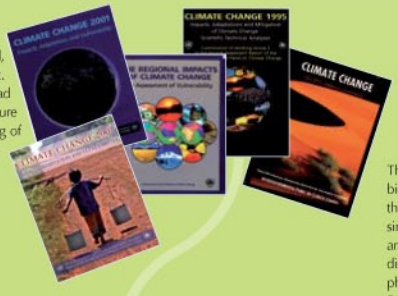
20 YEARS OF THE IPCC

Working Group II - Impacts, Adaptation and Vulnerability

- The issues have remained largely the same over the past two decades: impacts on key areas such as food, water, human settlements and health and how can we adapt.
- An increasing number of studies published in recent years has lead to an improved understanding of observed effects, the nature and location of projected impacts, and allows mapping of projected impacts against future warming trends.

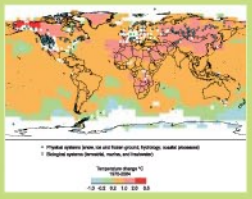


First Assessment Report - 1990 (FAR)
Second Assessment Report – 1995 (SAR)
Third Assessment Report – 2001 (TAR)
Fourth Assessment Report – 2007 (AR4)

Biophysical systems have changed

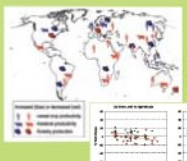
The TAR stated that changes in regional climate over the past 50 years have affected biological and hydrological systems in many parts of the world. At the time of the AR4, a global assessment of data since 1970 has shown "it is likely that anthropogenic warming has had a discernible influence on many physical and biological systems". Examples include:

- non-polar glacier retreat
- earlier plant flowering and longer growing season in Europe
- poleward and upward (elevation) migration of plants, insects and animals
- earlier bird arrival and egg laying
- increased incidence of coral bleaching
- increased economic losses due to extreme weather events.



However, there is marked scarcity of data from developing countries

Some systems and sectors are likely to be especially affected



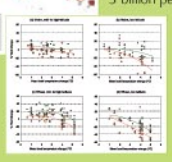
Agriculture in low latitudes

Food production needs to double to meet the needs of an additional 3 billion people in the next 30 years.

SAR and TAR projected crop yield decrease throughout tropics and sub-tropics, but increase in mid-latitudes.

According to AR4, crop productivity is projected to increase slightly at mid- to high-latitudes for local mean temperature increases of up to 1-3ºC, and then decrease beyond that in some regions.

At lower latitudes, especially seasonally dry and tropical regions, crop productivity is projected to decrease for even small local temperature increases (1-2ºC), which would increase the risk of hunger.

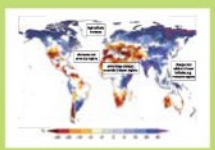


Water resources in some dry regions in mid latitudes and the dry tropic

One third of the world's population is now subject to water scarcity. Climate change is projected to exacerbate water stress due to changes in rainfall, snow, ice and evapotranspiration.

The number of people living in severely stressed river basins is projected to increase from 1,4-1,6 billion in 1996 to 4.3-6.9 billion in 2050 (SRES A2 scenario) (AR4).

However, quantitative projections at river-basin scale remain uncertain.

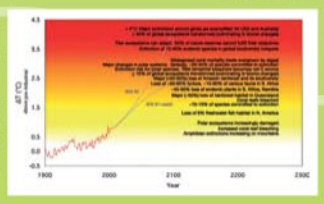


Altered frequencies and intensities of **extreme events** such as floods, drought, heat waves are expected to have mostly adverse effects on natural and human systems. Low-lying coastal systems are particularly vulnerable, due to threat of sea level rise and increased risk from extreme weather events, potentially displacing tens of millions of people.

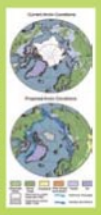
The **health status** of millions of people is projected to be affected through, for example, increases in malnutrition, deaths, diseases and injury due to extreme weather events; burden of diarrhoeal diseases; and through the altered spatial distribution of some infectious diseases.

Ecosystems and biodiversity

Climate Change will lead to changes in the productivity and composition of ecological systems, with coral reefs, sea ice biomes, tundra, boreal forests and mountain regions, mediterranean-type ecosystems and tropical rainforests being most vulnerable (TAR, AR4). According to the TAR, estimated 10-15% of the world's species will be committed to extinction over next 30 years. The AR4 concluded that approximately 20-30% of plant an animal species assessed so far are likely to be at increased risk of extinction if increases in global average temperature exceed 1,5-2,5ºC.



Some of the most vulnerable places and people can be identified



FAR and SAR identified lower latitudes as most vulnerable, the TAR developing countries and small islands. At the time of the AR4, the spatial resolution of projected impacts has further improved and most vulnerable regions were identified.

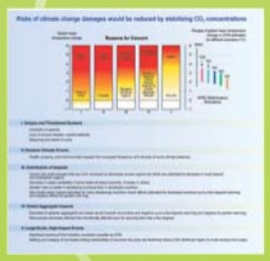
- The Arctic: high rates of projected warming
- Africa: low adaptive capacity and many projected impacts
- Small islands: high exposure of people and infrastructure
- Asian and African mega-deltas: large populations and high exposure to sea level rise, storm surges and river flooding

The poor will be affected most

The TAR conclusions that the impacts of climate change will fall disproportionately upon developing countries and poor persons in all countries was confirmed by the AR4.

The risks of climate change damages increase with the magnitude of climate change

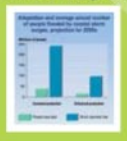
The reasons for concern identified in the TAR remain a viable framework to consider key vulnerabilities. Recent research has updated some of the TAR findings.



The timing of projected impacts: A new development in AR4

The lower the level of stabilization of greenhouse gas concentrations, the greater the benefits in terms of avoided damages. However, comprehensive, quantitative estimates of the benefits of stabilization at various levels do not yet exist.

Adaptation has the potential to reduce adverse effects of climate change but will not prevent all damages



Climate change is not just an environmental issue, but a development issue

- There are both beneficial and adverse effects of climate change, but the larger the changes and rate of change in climate, the more the adverse effects predominate
- Impacts are very much affected by socio-economic conditions and development pathways, and are likely to be exacerbated by multiple stresses
- Climate change can affect sustainable development and constrain the attainment of Millennium Development Goals; conversely sustainable development can reduce vulnerability
- A mix of mitigative and adaptive actions is needed soon, because impacts may otherwise exceed adaptive capacity
- The capacity of a country to adapt can be enhanced when climate policies are integrated into national economic, social, environmental and development policies

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