

Investigating the impacts of

Climate Change in India



Climate change in India represents an additional stress on ecological and socioeconomic systems that are already facing tremendous pressures due to rapid urbanisation, industrialisation, and economic development. With its large and growing population, and an economy that is closely tied to its natural resource base, India's population is vulnerable to the impacts of climate change such as changes in forest and water resources and sea level rise. Understanding climate change scenarios for India, and their impacts, is therefore critically important for policymakers to protect lives, as well as the assets upon which India's economy is dependent.

Equally important for policymakers is to understand the impact of industrialisation on climate change itself. As the country industrialises, India's production of greenhouse gases (GHGs) that contribute to climate change will increase. Awareness by policymakers about climate change and its possible effects on industry, people, and livelihoods will be important as they seek to balance economic growth and development with a changing resource base.

Background

At the UN General Assembly Special Session in June 1997, the UK Prime Minister Tony Blair drew attention to the problem of global warming and stated that industrialised countries must work with developing countries to help combat climate change.

As a result of this commitment, the UK's Department for Environment, Food and Rural Affairs (DEFRA) and India's Ministry of the Environment and Forests (MoEF), established a three year joint research programme on the impacts of climate change in India.

The project has built on India's existing expertise to:

- assess the sectoral impacts of climate change;
- resolve some uncertainties in current climate change prediction models; and
- make a valuable contribution to international climate science.

Through this project, researchers from India carried out scientific studies to build a comprehensive picture of the possible future impacts of climate change in India. In addition to funding research under this programme, DEFRA also funded programme management and capacity building through collaboration between Indian and UK researchers.

The Research Projects

Eight inter-related research projects were carried out as a part of this collaborative programme, and summary keysheets for each of these projects are presented along with this overview.

Two of the eight projects developed climate change scenarios and socio-economic scenarios for India, and this data was used by the other six projects to ensure consistency in assessing climate change impacts. The other six projects then looked at the impacts of climate change on specific topics, namely sea level, water resources, agriculture, forests, industry, and human health (Figure 1.1).



Scenario keysheets

Two projects assessed the overall predicted climate change impacts and socio-economic scenarios in India.

The climate change scenarios (see Keysheet 2) were developed using the Regional Climate Models (RCMs) developed by the Hadley Centre for Climate Prediction and Research, UK, for the Indian subcontinent. These were tested by comparing existing data on climate changes with predicted changes according to the model, and incorporated the projected socio-economic scenarios for India (eg population and economic growth) that can drive greenhouse gas emissions and thus influence climate change. This research provides projections of rainfall, temperature, monsoon characteristics and extreme events for all regions of India.

Socio-economic scenarios were developed in parallel (see Keysheet 3). The research outlines four potential development scenarios for India, and their associated population and economic growth (factors which will affect climate change). These scenarios are consistent with national growth plans in the short and medium term and sit within the overall context of the long-term socio-economic scenarios developed by the Intergovernmental Panel on Climate Change (IPCC). The research also gathered data on factors that are relevant to the six topical projects, such as water use, timber demand, and food demand.

Topical keysheets

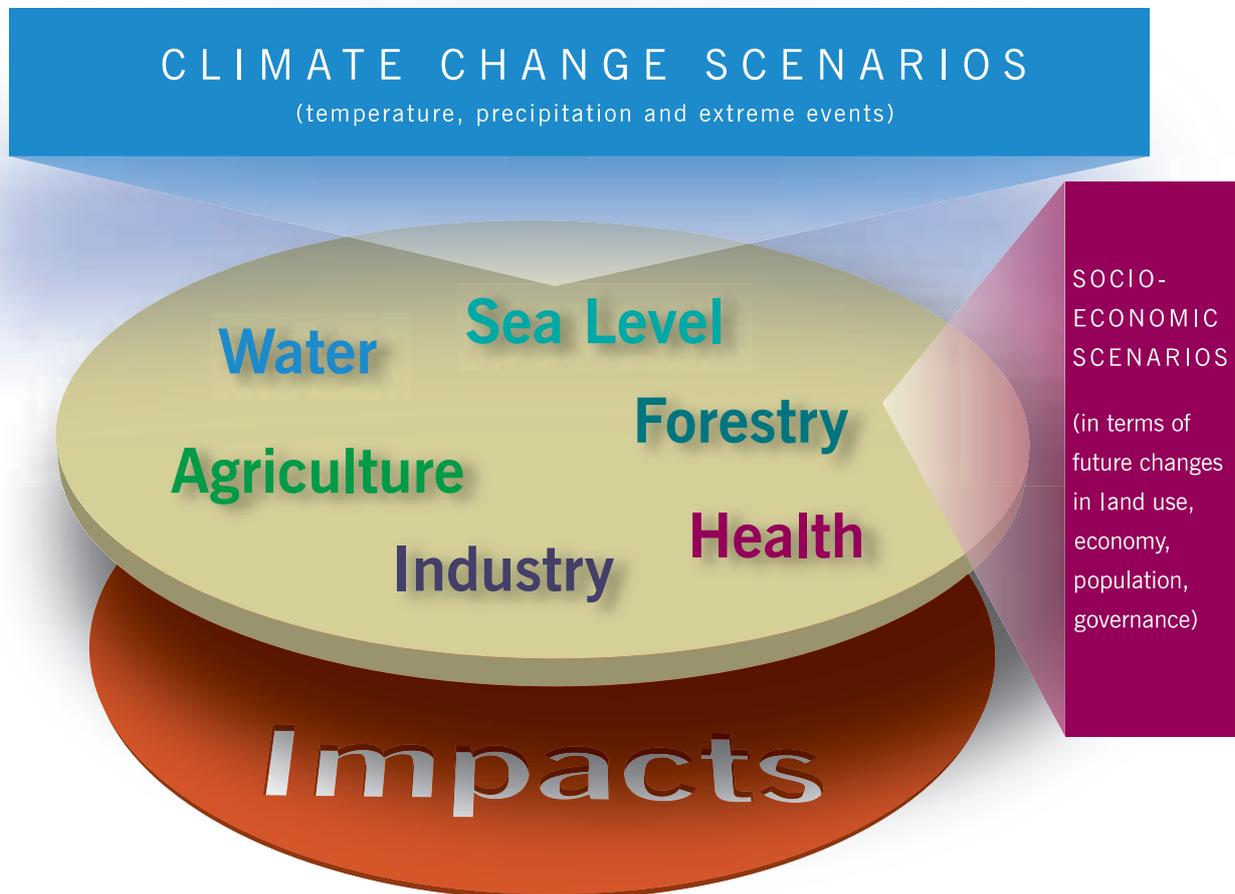
The other six research projects (see Keysheets 4 to 9) drew on these scenario exercises to create consistency across the projects. Each of these six projects identified the impacts of climate change on specific areas, for example water resources or agriculture, relying on the RCMs and the predicted overall impacts of climate change on India developed for the project. Predictions are typically reported for the medium-high emissions (A2) or medium-low emissions (B2) scenarios as outlined by the IPCC (see Keysheet 3) to give an indication of impacts of differing levels of greenhouse gases. In some cases the RCMs were coupled with more specific models, such as vegetation models for forestry impact, in order to provide more detailed and sector specific predictions.

These keysheets provide an overview of the key findings and policy implications from the research. Full reports can be obtained directly from the individual research institutions responsible (contact details are on the back page of each keysheet). Further details of the project can be found on the following web address:

<http://www.defra.gov.uk/environment/climatechange/index.htm>

Keysheet 1	Overview of Research Projects	Keysheet 6	Impacts of Climate Change on Agriculture; Indian Agricultural Research Institute (IARI) Delhi
Keysheet 2	Indian Climate Change Scenarios for Impact Assessment; Indian Institute of Tropical Meteorology (IITM) Pune	Keysheet 7	Impacts of Climate Change on Forests; Indian Institute of Science (IISc) Bangalore
Keysheet 3	Socio-Economic Scenarios for India; The Energy and Resources Institute (TERI) Delhi	Keysheet 8	Impacts of Climate Change on Industries, Energy and Transport; Indian Institute of Management (IIM) Ahmedabad
Keysheet 4	Impacts of Climate Change on Sea-Level Variability along the Coast of India; National Institute of Oceanography (NIO) Goa	Keysheet 9	Impacts of Climate Change on Human Health; National Physical Laboratory, New Delhi
Keysheet 5	Impacts of Climate Change on Water Resources; Indian Institute of Tropical Meteorology (IITM) Pune		

Figure 1.1
Research Projects



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FOR FURTHER INFORMATION PLEASE CONTACT:

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OVERVIEW	Keysheet 1
CLIMATE CHANGE SCENARIOS	Keysheet 2
SOCIO-ECONOMIC SCENARIOS	Keysheet 3
SEA LEVEL	Keysheet 4
WATER RESOURCES	Keysheet 5
AGRICULTURE	Keysheet 6
FORESTS	Keysheet 7
INDUSTRY	Keysheet 8
HUMAN HEALTH	Keysheet 9