

## INDIA CLIMATE CHANGE FACTSHEET



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### Background and definitions

NIDOS members requested information sheets on the impact of climate change on a number of countries where NIDOS members work. This factsheet is one of these and, as with the others, covers the key climate impacts in the country, what the government there is trying to do in terms of climate adaptation measures and what other agencies including NGOs and NIDOS members are also doing. The following outlines briefly the current international approach to supporting Southern governments with Climate Adaptation programmes and the international context for climate change campaigns.



**The United Nations Framework Convention on Climate Change (UNFCCC)**, which came into force in 1994, established the first intergovernmental framework aiming to tackle climate change. This treaty ensures that member states work collaboratively in order to develop initiatives that not only reduce negative impacts associated with climate change, but also build capacity to cope with effects of increasing temperatures. The *Kyoto Protocol*, enforced in 2005, enshrined this commitment in legislation and presented legally binding targets which imposed requirements for ratified member states to reduce green house gas (GHG) emissions. The commitment period for the Kyoto Protocol ends in 2012. <http://unfccc.int/2860.php>

**National Adaptation Programmes of Action (NAPA)** In order to help developing nations plan for tackling the effects of climate change, the UN established NAPAs. NAPAs build the capacity of developing nations to identify priority actions required for effective adaptation to climate change. The aim of NAPAs is to decrease developing nation's climate change adaptation costs and climate change vulnerability more generally.

**Next steps – Copenhagen:** At a UN Conference of Parties in Bali 2007, ratified member states made the crucial decision to begin new negotiations aiming to establish tougher targets on reducing GHG emissions and ensure that ratified member states fulfil obligations. Negotiations were reviewed in Poznan, Poland, in 2008 and will conclude in **Copenhagen, Denmark, on December 7<sup>th</sup> – 18<sup>th</sup> 2009** and should strengthen global ambitions and commitments to cut GHG emissions and also include mechanisms enabling developing countries to have low carbon development that does not undermine efforts to tackle poverty. Many NGOs are currently campaigning to ensure that Government commitments represent more than just fine words, but instead represent firm action.

## CLIMATE CHANGE IN INDIA

EXTRACT FROM

### **INDIA'S NATIONAL ADAPTATION PROGRAMME OF ACTION (NAPA)**

(see <http://napa-pana.org/?q=en/node/6>) (pp19 - 21)

#### **Some Projection of Climate Change over India for the 21st Century**

Some modelling and other studies have projected the following changes due to increase in atmospheric GHG concentrations arising from increased global anthropogenic emissions:

- Annual mean surface temperature rise by the end of the century ranging from 3 to 5 °C under A2 scenario and 2.4 to 4 °C under the B2 scenario of the IPCC, with warming more pronounced in the northern parts of India, from simulations by the Indian Institute of Tropical Meteorology (IITM), Pune.
- Indian Summer Monsoon (ISM) is a manifestation of complex interactions between land, ocean and atmosphere, The simulation of ISM's mean pattern as well as variability on interannual and intraseasonal scales has been a challenging ongoing problem. Some simulations by IITM, Pune, have indicated that summer monsoon intensity may increase beginning from 2040 and by 10% by 2100 under A2 scenario of IPCC.
- Changes in the frequency and/or magnitude of extreme temperature and precipitation events. Some results show that fine-scale snow albedo influence the response of both hot and cold events, and that peak increase in extreme hot events are amplified by surface moisture feedbacks.

#### **Impacts on Water Resources**

Changes in key climate variables, namely temperature, precipitation and humidity, may have significant long-term implications for the quality and quantity of water. River systems of the Brahmaputra, the Ganga and the Indus, which benefit from melting snow in the lean season, are likely to be particularly affected by the decrease in snow cover. A decline in total run-off for all river basins, except Narmada and Tapi, is projected in India's NATCOM I. A decline in run-off by more than two-thirds is also anticipated for the Sabarmati and Luni basins. Due to sea level rise, the fresh water sources near the coastal regions will suffer salt intrusion.

#### **Impacts on Agriculture and Food Production**

Food Production in India is sensitive to climate changes such as variability in monsoon rainfall and temperature changes within a season. Studies by Indian Agricultural Research Institute (IARI) and others indicate greater expected loss in the Rabi crop. Every 1 °C rise in temperature reduces wheat production by 4-5 million tonnes. Small changes in temperature and rainfall have significant effects on the quality of fruits, vegetables, tea, coffee, aromatic and medicinal plants, and basmati rice. Pathogens and insect populations are strongly dependent upon temperature and humidity, and changes in these parameters may change their population dynamics. Other impacts on agricultural and related sectors include lower yields from dairy cattle and decline in fish breeding, migration, and harvest. Global reports indicate a loss of 10-40% in crop production by 2100.

#### **Impacts on Health**

(See [http://www.tyndall.ac.uk/publications/working\\_papers/wp63.pdf](http://www.tyndall.ac.uk/publications/working_papers/wp63.pdf))

Changes in climate may alter the distribution of important vector species (for example malarial mosquitos) and may increase the spread of such diseases to new areas. If there is an increase of 3.8 °C in temperature and a 7% increase in relative humidity the transmission windows, i.e. the months during which mosquitos are active, will be open for all 12 months in 9 states in India. The transmission windows in Jammu and Kashmir and in Rajasthan may increase by 3-5 months. However, in Orissa and

some southern states, a further increase in temperature is likely to shorten the transmission window by 2-3 months.

### **Impacts on Forests**

Based on future climate projections of Regional Climate Model of the Hadley Centre (HadRM3) using A2 and B2 scenarios and the BIOME4 vegetation response model, Ravindranath et. al. show that 77% and 68% of the forest areas in the country are likely to experience shift in forest types, respectively under the two scenarios, by the end of the century, with consequent changes in forests produce and, in turn, livelihoods based on those products. Correspondingly, the associated biodiversity is likely to be adversely impacted. India's NATCOM 1 projects an increase in the area under xeric scrublands and xeric woodlands in central India at the cost of dry savannah in these regions.

### **Vulnerability to Extreme Events**

Heavily populated regions such as coastal areas are exposed to climatic events, such as cyclones, floods (See [http://www.tyndall.ac.uk/publications/working\\_papers/wp63.pdf](http://www.tyndall.ac.uk/publications/working_papers/wp63.pdf)) and drought, and large declines in sown areas in arid and semi-arid zones occur during climate extremes. Large areas in Rajasthan, Andhra Pradesh, Gujarat and Maharashtra and comparatively small areas in Karnataka, Orissa, Madhya Pradesh, Tamil Nadu, Bihar, West Bengal and Uttar Pradesh are frequented by drought. About 40 million hectares of land are flood-prone, including most of the river basins in the north and north-eastern belts, affecting about 30 million people on average each year. Such vulnerable regions may be particularly impacted by climate change.

### **Impacts of Coastal Areas**

A mean Sea Level Rise (SLR) of 15-38cm is projected along India's coast by 2100. India's NATCOM 1 assessed the vulnerability of coastal districts to SLR, social exposure based on population affected, and economic impacts. In addition, a projected increase in the intensity of tropical cyclones poses a threat to the heavily populated coastal zones in the country. (NATCOM, 2004)

## **GOVERNMENT OF INDIA INFORMATION**

### **India Government National Action Plan on Climate Change**

<http://pmindia.nic.in/Pg01-52.pdf>

**India: Addressing Energy Security and Climate Change**, Ministry of Environment & Forests, Ministry of Power, Bureau of Energy Efficiency, Government of India, October 2007

[http://envfor.nic.in/divisions/ccd/Addressing\\_CC\\_09-10-07.pdf](http://envfor.nic.in/divisions/ccd/Addressing_CC_09-10-07.pdf)

### **MAIN GOVERNMENT MINISTRIES INVOLVED WITH CLIMATE CHANGE**

#### **Ministry of Earth Sciences**

<http://moes.gov.in/>

#### **Ministry of Environment and Forests**

<http://goidirectory.nic.in/exe.htm>

#### **Ministry of Environment and Forests Climate Change site**

<http://envfor.nic.in/cc/index.htm>

#### **Ministry of New and Renewable Energies**

<http://mnes.nic.in/>

#### **Ministry of Water Resources**

<http://wrmin.nic.in/>

**Ministry of Agriculture – Department of Agricultural Research and Education (DARE)**

<http://dare.nic.in/>

**Indian Agricultural Research Institute**

[www.iari.res.in/](http://www.iari.res.in/)

**Indian Institute of Tropical Meteorology**

<http://www.tropmet.res.in/>

## INTERNATIONAL ORGANISATIONS' RESEARCH PAPERS ON CLIMATE CHANGE IN INDIA

**World Bank technical paper: Measuring the impact of climate change on Indian agriculture**

<http://tinyurl.com/lqz6o2>

**OECD: Climate Change: India's Perceptions, Positions, Policies and Possibilities (2002)**

<http://www.oecd.org/dataoecd/22/16/1934784.pdf>

**DEFRA: Investigating the impact of Climate Change in India (2005)**

<http://www.oecd.org/dataoecd/22/16/1934784.pdf>

## ACADEMIC RESEARCH PAPERS ON CLIMATE CHANGE IN INDIA

***Impact of climate change on forests in India*, NH Ravindranath et al, published in Current Science 2006**

<http://www.ias.ac.in/currsci/feb102006/354.pdf>

***Climate Change impact assessment on hydrology of Indian river basins*, AK Gosain et al, published in Current Science 2006**

<http://www.ias.ac.in/currsci/feb102006/354.pdf>

## INDIAN NGOs WORKING ON CLIMATE CHANGE

**Centre for Science and Environment (CSE)**

A pressure group and training institution on all matters relating to climate change.

<http://www.cseindia.org/>

**Indian Environment Portal**

An extremely useful site which lists all the latest papers and publications relating to climate change in India, managed by the Centre for Science and Environment (see above)

<http://indiaenvironmentportal.org.in/>

**The Nand and Jeet Khemka Foundation**

The Nand & Jeet Khemka Foundation is committed to addressing the environmental issues facing us today, both within India and globally. Much of their work is focused on taking action to combat the urgent challenge of stemming the impact of climate change.

<http://www.khemkafoundation.org/environment.php>

**Indian Youth Climate Network**

The Indian Youth Climate Network (IYCN) is a coalition uniting Indian youth and Indian youth oriented organisations who are concerned about climate change. They, as the future leaders of the country can generate awareness and establish consensus on what role India should play in the global debate, and

how it should address domestic issues of climate justice and adaptation. (See [http://www.aiaccproject.org/working\\_papers/Working%20Papers/AIACC\\_WP48\\_Leary\\_etal.pdf](http://www.aiaccproject.org/working_papers/Working%20Papers/AIACC_WP48_Leary_etal.pdf)). It is a monumental effort but one with immense potential. [www.iycn.in/](http://www.iycn.in/)

**Climate Action Network South Asia (CANSAs)** (lists member NGOs)  
South Asian NGOs and scientists concerned of Global Climate Change issues and engaged in the INC and UNCED processes responded to the emerging challenge and threat of climate change by establishing CAN South Asia CANSAs, in 1991. <http://www.can-sa.net/cansa/India.htm>

## INFORMATION FROM UK BASED NGOS

Oxfam's recent report *The Right to Survive* has revealed a 54 per cent increase in people affected by climate disasters by 2015, a staggering 375 million people, unless action is taken now. With Bangladesh already struggling to cope, this increase could overwhelm emergency responses and dwarf the international community's ability to respond quickly and effectively.

Flooding, cyclones and droughts are already hitting poor communities in Asia hard, together with hotter temperatures, erratic rains and disrupted planting seasons. In Bangladesh, frequent flooding has been aggravated above normal levels, last year alone affecting over nine million people. In India floods have waterlogged acres of land, destroying crops and overwhelming drainage and irrigation systems. Likewise, communities in the South Punjab in Pakistan are facing increasing problems due to flooding and aid groups in the region are predicting increasing losses of land and safe water. <http://www.oxfam.org/en/policy/right-to-survive-report>

## GB UNIVERSITY WORK ON CLIMATE CHANGE IN INDIA

### SWIMMER – University of Liverpool

Scientists, based at the University of Liverpool's Institute for Sustainable Water Integrated Management and Ecosystem Research (SWIMMER) and the School of Biological Sciences, are working in one of the largest river basins in India, the Godavari Basin in Andhra Pradesh, which displays a diversity of ecosystems and provides a good water model for other regions of India. Contact Professor Ed Malby [e.maltby@liv.ac.uk](mailto:e.maltby@liv.ac.uk)

## ADAPTATION

Published by the Ministry of the Environment, this article looks into the various adaptation strategies and projects currently being undertaken in India. <http://www.indiaenvironmentportal.org.in/files/climate-adapt-india.pdf>

### ADAPTATION TOOLS AND CASE STUDIES

Climate Change adaptation by design, A guide for sustainable communities [http://www.tcpa.org.uk/downloads/20070523\\_CCA\\_lowres.pdf](http://www.tcpa.org.uk/downloads/20070523_CCA_lowres.pdf)

### Climate Change adaptation

This dossier is intended to provide a summary of current thinking on climate adaptation issues with access to relevant and up to date resources and publications for researchers, practitioners, and policy formers. The guide is divided into four sections:

- An introduction to climate change adaptation
- Organisations working on climate adaptation issues
- Documents and publications related to seven themes in climate adaptation
- Adaptation resources organised by region of focus

<http://www.eldis.org/climate/index.htm>

### **Adapting to Climate Change in the Himalayas - Jhelum Basin experiences**

<http://www.youtube.com/watch?v=jXM3eMqQrWY>

## **NIDOS MEMBERS WORKING ON CLIMATE CHANGE IN INDIA**

### **Organisation**

### **Contact email address**

IIED	simon.anderson@iied.org
Save the Children	d.hamilton@savethechildren.org.uk
Islamic Relief	iruk@islamic-relief.org.uk
IVS GB	info@ivsgb.org
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Books Abroad	booksabroad@aol.com
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Signpost International	Davidm@Signpost-International.org
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Tearfund	peter.chirnside@tearfund.org
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