



Summary

Why Climate Change is a Serious Issue for Orissa?

With a 480 km coast line that is prone to climate-mediated cyclones and coastal erosion and water resources dependent on monsoons, Orissa is relatively more vulnerable to climate change. Water-consuming rice is its main crop and therefore its agriculture is vulnerable to the vagaries of climate-induced weather changes. Though 38 percent of the state's geographical area is recorded as forests, much of these forests are degraded. Vector-borne diseases, particularly malaria, are fairly rampant and climate change may make the prevalence of the disease even more widespread.

Indeed, climate change has the potential to derail the current growth strategy and deepen poverty in Orissa. Continuing climate variation is predicted to alter the sectoral growth, including the ability of the poor to engage in farm and non-farm sector activities. The direct impacts of extreme climate-induced events could include loss of life, livelihoods, assets and infrastructure. All of these could affect the state's economic growth and nullify the effectiveness of macro economic policies and pro poor initiatives.

Climate Risks in Orissa

- High variability of rainfall, leaving people with two peak periods of food shortage
- Drought and dry spells at an interval of every two years in Western Orissa with a major drought every 5-6 years
- Flash floods during rainy season
- Heat waves in summer
- Intense coastal flooding and cyclones

What the Government of Orissa (GoO) is doing?

Context

Of late Orissa has made significant progress in economic and fiscal terms. The Gross State Domestic Product (GSDP) during the 10th five year period (2002-2007) has grown by 8.5 percent per annum which is slightly more than the national rate. Private investment of funds in the state has increased, employment opportunities have grown and growth is also leading to poverty reduction. A remarkable fiscal turnaround was achieved through the state's own efforts and complemented by performance-linked support from the central government. The state's 11th Five Year Plan focuses on addressing the challenges in achieving sustainable, shared economic growth and accelerating human development. GoO recognizes that climate change should not undermine the process of economic development.

Process

Orissa took an early initiative to formulate the State Climate Change Action Plan (CAP). The Chief Minister appointed a High Level Coordination Committee headed by the Chief Secretary to steer its preparation. Eleven sectoral missions were identified and inter-departmental representation ensured co-ordination among sectors. Individual working groups under the chairmanship of concerned departmental Secretaries who are also members of high level coordination committee, deliberated on the issues. The support for the process was available from the World Bank and DFID. The Working Groups interacted with experts in various sectors. Key priorities consistent with those of the National Action Plan on Climate Change (NAPCC) were identified (Agriculture, Coastal Zones and Disasters, Energy, Fisheries and Animal Resources, Forestry, Health, Industry, Mining, Transport, Urban Planning and Water Resources). These key priorities were vetted through a series of stakeholder consultations

High-Level Coordination Committee

Chief Secretary	Chairman
Development Commissioner	Member
Agriculture Production Commissioner	Member
Principal Secretary, Finance Department	Member
Principal Secretary, Housing and Urban Department	Member
Principal Secretary, Fisheries and ARD,	Member
Principal Secretary, Steel and Mines Department	Member
Commissioner-cum-Secretary, Agriculture Department	Member
Commissioner-cum-Secretary, Commerce & Transport Department	Member
Commissioner-cum-Secretary, Health and Family Welfare Department	Member
Commissioner-cum-Secretary, Revenue & Disaster Management Department	Member
Commissioner-cum-Secretary, Energy Department	Member
Commissioner-cum-Secretary, Industry Department	Member
Commissioner-cum-Secretary, Water Resources Department	Member
Managing Director OSDMA	Member
Principal Secretary, Forest & Environment Department	Member Convener

held at Bhubaneswar, Berhampur, Anugul and Balasore in which representatives of business as well as civil society organisations participated. A synthesis workshop in Bhubaneswar collated and discussed all the feedback received and relevant inputs were incorporated in the CAP.

Agriculture

Agriculture holds a predominant position in the state's economy. About 80-85 percent of the state's population is rural and depend on agriculture. The agriculture sector contributes about 26 percent of the GSDP. With almost 60 percent of land under rain fed agriculture and with water-dependent rice, as its main crop, the agriculture sector is particularly vulnerable to the vagaries of climate change. Further, paddy fields in the coastal areas are prone to frequent erosion, salinisation and inundation. Climate projections indicate that drier areas will become drier and flood prone areas will be subject to more flooding. Other problems such as pest and disease outbreaks are also likely to increase due to climate variability.

Agriculture - Key Priorities

- Rapid screening and strategy assessment of State Agriculture Policy
- Establishing an effective institutional delivery mechanism to promote best practices on climate change
- Undertaking capacity building
- Continuing the livelihood-focused, people-centric integrated watershed development in rain fed areas
- Increasing the area under perennial fruit plantation
- Developing water use-efficient micro irrigation methods and individual / community farm ponds
- Improving monitoring and surveillance techniques
- Developing sustainable soil, water and crop management practices
- Breeding studies on major crops for tolerance /resistance
- Conducting climate-linked research studies

Coastal Zones and Disasters

Orissa has long been prone to disasters. Frequent droughts, floods and cyclones are recurrent features in the state and have had a crippling effect on the economy. In 1999 a severe cyclone followed by a super severe cyclone lashed the entire coast of Orissa causing large scale loss of life. Whilst the extent to which climate change will exacerbate floods and droughts is not yet fully understood, it is clear that their frequency and intensity will increase. While Orissa has done pioneering work on disaster management through the Orissa State Disaster Management Authority (OSDMA), the first of its kind in the country, there is a considerable need to improve own understanding of the climatic impacts on disasters and to build capacity of communities to adapt, manage and mitigate their impacts.

Coasts & Disasters - Key Priorities

- Flood mapping, flood forecasting and downscaled climate change projections modeling
- Assessment of erosion prone areas with the help of Digital Elevation model
- Studying coastal erosion
- Conducting micro-level vulnerability assessment
- Constructing flood shelters in unconventionally vulnerable locations
- Needs assessment and constructing multipurpose cyclone shelters
- Developing a hydrological framework
- Dredging and river mouth widening to improve flood management
- Strengthening coastal protection methods
- Developing a techno-legal regime for construction of disaster resilient housing and public infrastructure
- Integrating climate change risk in the state's disaster management policy
- Setting up an integrated training and capacity building protocol
- Assessment of risks due to lightning and thunderstorm
- Improving flash flood management
- Prediction through appropriate modeling the impact of sea level rise on coastal ecosystem
- Study of impact of global warming on the biodiversity of coastal ecosystem with special emphasis on flagship species

Energy

The need for energy is increasing in Orissa which is poised for rapid industrial development. With abundant reserve of coal, power generation is bound to be a priority. Orissa is also on the way to becoming a major energy supplier to the grid and this could come at a high cost in terms of both local environmental quality and contribution to global emissions. The State has had the distinction of being the first state in the country for ushering in sweeping reforms in power sector, which had the objective to provide consumers with reasonably cheap, reliable and uninterrupted supply of power. There are already several initiatives to promote renewable energy, reduce Transmission & Distribution (T&D) losses and to promote energy efficiency in the state. All these efforts become much more important in the climate change context.

Key priorities - Energy

- Generating cleaner energy through clean coal approaches
- Institutional development (Capacity building/ restructuring) of Energy Department
- Reduction of Transmission & Distribution losses
- Promoting demand side management & energy efficiency
- Fly ash utilization and emission reduction from power plants
- Promotion of Small and Medium Hydel plants
- Harnessing biomass potential
- Promotion of Grid based wind power generation
- Maximize solar power generation
- Development of Biogas and manure management

Fisheries and Animal Resources

Being water dependent, the fisheries sector in Orissa will be impacted by climate change. The livelihoods of the fisher folks will be affected most, not only due to sea level rise and climate mediated hazards, but also due to erratic rainfall that affects the open reservoirs and ponds/tanks. Animal resources - support a large part of rural livelihoods - will be impacted by heat stress and other climatic impacts. Methane emission from the livestock is a key concern.

Fisheries and Animal Resources - Key Priorities

- Vaccination against contagious diseases,
- Deworming and early disease warning system, emphasis on Green fodder, pasture development and grazing,
- Training on fodder production, fodder conservation, rotational grazing, Rain Water harvest technology, Methane gas harvesting technology, biogas tanks management
- Conservation of local hardy animals,
- Gobar Gas tanks/packing to cylinders
- Easy and handy Methane Harvest at farmers point
- Enhancing Disease Early Warning Systems with climate change considerations
- Application of biotechnology and skilled animal breeding for development of better adopted species
- Capacity building of livestock keepers
- Research on disease early warning system relevant to livestock
- Impact of climate change on inland and coastal aquaculture
- Development of infrastructure for early warning systems in coastal areas for fishermen

Forests

Forests provide livelihoods to a large proportion of tribal populations and rural poor. The forests also have important ecological functions, checking soil erosion and reducing the impact of droughts, floods and cyclones (mangroves).

Mining and other industrial projects are bound to have some adverse effects on forests, and would create conflicts between wild animals and local inhabitants due to fragmentation of forests. Forestry sector is also particularly important both from climate mitigation as well as adaptation perspectives. While no assessment of the impact of climate changes on Orissa's forests has yet been undertaken, it is nonetheless necessary to evaluate the long-term effects of climate change on forests and determine what the community might do in response.

Forestry - Key Priorities

- Increasing reforestation / afforestation activities in degraded forest areas
- Protecting existing forest stocks to act as carbon sink with stronger conservation
- Increasing planting on non-forest land and also exploring where new and increased tree planting could create barriers to storm and cyclone impacts in coastal zones
- Covering bald-hills with suitable species mix
- Increasing and protecting existing mangrove cover along the coast
- Assessing fire management strategies
- Improving tree planting and forest management to integrate with watersheds and water resources management
- Working to establish new systems to support for community users.
- Undertaking studies on indigenous trees species to assess their vulnerability to climate change
- Assessing additional threats to biodiversity and wildlife
- Obtaining access to updated knowledge on climate change science and policy developments
- Capacity building of Panchayati Raj institutions/communities/JFM institutions to adapt to climate change
- Monitoring carbon stock and biodiversity at regular intervals

Health

In Orissa, increased health risks will arise due to climate change. There is already high prevalence of malaria and vector-borne diseases in certain areas. With erratic nature of rainfall and extending seasons, these may become more widespread. Climate change has the potential to aggravate vector-borne, water-borne and food-borne diseases. The intensity and frequency of extreme events such as heat waves and cyclones could further expose the vulnerable population to health risks.

Health - Key Priorities

- Capacity Building of the health sector on climate change
- Integrating climate change considerations in the State Health policy
- Strengthening approaches to manage vector borne disease that have worsened due to climate change impacts
- Strengthening approaches to deal with heat wave conditions exacerbated due to climate change
- Strengthening approaches to deal with the physical and psychological impacts due to extreme weather conditions caused by climate change
- Addressing drought, nutrition & food security due to increased risk of drought, consequent decline in agriculture and increased malnutrition & food security
- Undertaking measures to manage water borne disease that have worsened due to climate change impacts
- Research & studies on climate change and health impacts
- Addressing food safety that is undermined as a result of increased ambient temperatures and extreme events
- Studying the interlinkages between air quality and climate change, and implications on health

Industry

The industrial sector in Orissa mainly comprises mineral-based industries. Since these industries are energy-intensive, the acceleration of industrialization is closely linked to carbon emission. There is significant potential for improving energy efficiency through the use of cleaner production technologies, methods and practices. The workers in mineral-based industries have to work in extremely hot conditions and with the likely increase in the average temperatures due to climate change, this will also become an occupational health issue in future. With the prediction of increased intensity and frequency of extreme weather events, protection of coastal industrial assets will have to be accorded greater attention.

Industry - Key Priorities

- Integrating climate concerns in policies and plans
- Assessing GHG profiles of major industrial clusters
- Conducting heat-island study for Talcher and Jharsuguda area
- Training various stakeholders on climate change issues
- Implementing a system of compensatory water harvesting
- Streamlining institutional arrangement and strengthen OSDMA to tackle extreme climate events in coastal area
- Carrying out energy efficiency studies
- Promoting recovery, recycle and reuse of waste material
- Setting emission standards for thermal power plants

Mining

Mining is a major economic activity in the state and it contributes significantly to the growth process. Yet mining in Orissa has serious local environmental and social impacts. These include air pollution (particulates), water pollution (mine water discharges), social impacts (displacement and rehabilitation) and forest impacts (most of the mining area is in forest areas or in their vicinity). Mining being energy intensive is also a big contributor to global greenhouse gas emissions.

Mining - Key Priorities

- Incorporating climate concerns in State Mineral Policy
- Analyzing appropriate policies to promote energy-efficiency
- Realizing the potential of low-grade mineral beneficiation
- Strengthening environmental monitoring
- Protecting water bodies
- Expanding and maintaining green zones
- Building capacity and generating awareness
- Realizing energy-savings potential in mining

Transport

Increasing motorization with greater availability of affordable vehicles has resulted in a commensurate increase in the emissions from the transport sector. In the absence of railway connectivity to interior areas and without any inland water way worth the name, Orissa is largely dependent on the road network that is the least carbon friendly among different modes of transport. This has local pollution implications as well. No alternative such as less carbon-emitting CNG fuel exists in the state and effort to move to a more carbon-friendly mass rapid transport system is only at a very early stage.

Transport - Key Priorities

- Revising state transport policies
- Integrating urban and transport planning
- Enhancing the use of rail
- Moving towards low carbon fuel
- Piloting low carbon, green highways
- Encouraging fuel use efficiency and tightening enforcement
- Promoting non-motorized transport
- Sequestering carbon through avenue plantations
- Estimating carbon emissions from the sector
- Developing inland waterways

Urban Planning

The continuous exodus of rural population to urban areas in Orissa has contributed to urban growth. There is already a severe strain on the existing urban infrastructure. However, as the population living in urban areas in Orissa is significantly lower than the national average, GoO is in a unique position to chart out an urban development path that is based on lessons from past mistakes / experiences of other Indian cities (particularly the metropolitan cities). Given the climate change dimension, Orissa can go further by defining a climate-responsible urban development path.

Urban - Key Priorities

- Building capacity on climate change
- Incorporate climate considerations in water supply and sewerage design
- Working towards greater water-efficiency
- Preparing a climate-friendly MSW management plan
- Orienting towards energy-efficient street lighting through CDM
- Developing a climate-responsible master plans
- Strengthening infrastructure for promoting non-motorized transport
- Improvements to water harvesting in urban areas with restoration of water tanks and artificial recharge
- Developing models of urban storm water flows and capacities of existing drainage systems with climate change

Water

Impact of climate change on water resources in Orissa is likely to be due to the vagaries of monsoons creating variability in river flows and increased frequency/intensity in extreme events such as floods, droughts and cyclones. Heavy flood or drought occurs almost every alternate year due to disproportionate distribution of rainfall. In recent years, wide fluctuation in climate has been observed and irregular rainfall causing both floods and droughts is a major concern. The impact of droughts on farmers has been crippling in some areas.

Water Resources - Key Priorities

- Expansion of hydrometry network
- Development of flood forecasting models
- Downscaling of Global Circulation Model
- Increasing the water use efficiency in irrigation
- Constructing and protecting water harvesting structures
- Improving drainage systems
- River health monitoring and eco-systems environmental flow demand studies
- Raising awareness raising with Pani Panchayat through Farmers' Training Programme and creating agro-climatic stations
- Integrated Water Resources Management

Way Forward

The CAP will lead Orissa to move towards a carbon-conscious, climate resilient development path. A monitoring and evaluation framework will be put in place to supervise progress and effectiveness of interventions. Besides the existing provisions in the budget for activities which are climate and environment friendly, additional resources which may be required for undertaking mitigation and adaptation measures will also have to be located. A rough and ready estimate puts the resource requirement at Rs. 17000 crores over a period of five years. Efforts would be made to take advantage of global funds available for both adaptation and mitigation. Setting up a climate change cell/agencies would be considered to provide a single-window contact.