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Economic Justice : Climate Change

Adaptation to Climate Change in India

A Study of Union Budgets

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Abstract

The strategy to deal with the adverse impacts of climate change requires strategic planning and action on the part of government, particularly in a developing country like India, which needs to embark on a low-carbon growth path along with building resilience of society to adverse impacts of climate change. The maleficent impact of climate change on the developmental prospects of less developed and developing countries is amplified enormously by the existence of widespread poverty and weather-dependent livelihood activities by significantly large number of people. The study focuses on the Union Budgets of India for the fiscal years 2006-07 to 2009-10, in order to ascertain the fiscal priorities ascribed to different sectors of adaptation and provide a robust baseline on government expenditure on adaptation in India.

The expenditure on adaptation estimated by the study across all the sectors for adaptation stands at 1.7 per cent of GDP for 2006-07 which increased to 2.68 per cent of GDP as per 2009-10 budget estimates. Expenditure on human capabilities viz. poverty alleviation, health improvement and disease control and risk management, constitutes more than 80 per cent of the total expenditure on adaptation in India and scant focus is being devoted to strengthening of ecosystem services. The study also finds that sectors that are crucial to any adaptation intervention such as food security, rural and urban housing for the poor and educational infrastructure have received inadequate attention in the policy response on adaptation. The study concludes that resources devoted to vulnerable sectors are more development oriented and adaptation priorities in these sectors need to be identified and prioritised within the developmental allocations apart from provisioning of additional resources. Strengthening of ecosystem services should be adequately prioritised within the adaptation policy framework and community participation in management of these need to be actively promoted through policy formulations.

About this working paper:

The Oxfam India-CBGA collaborative study was undertaken to understand the existing public finance framework and it coherence with the policy framework of the Government of India on adaptation to climate change through a study of the Union Budgets for years 2006-07 to 2009-10 on adaptation. The authors of the study are - Kaushik Ganguly and Gyana Ranjan Panda, working as policy analysts at Centre for Budget and Governance Accountability (CBGA), New Delhi and can be reached at gangulykaushik@yahoo.com and panda.gyana77@gmail.com respectively. The study was peer reviewed by Dr. Purnamita Dasgupta, Institute of Economic Growth (IEG), New Delhi and Dr. Avanish Kumar, Management Development Institute (MDI), Gurgaon

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Foreword

Climate change is already devastating the lives of many poor and underprivileged people in India on a very large scale. About two thirds of Indians derive their livelihoods from climate-sensitive sectors such as farming, fisheries and forestry and the changing climate is adversely affecting their livelihood base, especially in rain-fed and flood–prone areas. It therefore becomes a paramount priority to understand these climate risks in different climatic zones and evolve a comprehensive policy framework on adaption.

The global consensus on dealing with climate change and its likely consequences has been on adopting a two pronged strategy, viz. mitigation and adaptation. However, both these strategies call for investment and planning for specific vulnerabilities. Decisive action can unlock a green new deal for low-carbon transformation and for building resilience to the impacts of climate-change.

In this context, we realized that the perspective on strategies to deal with climate change needs to be complemented by well-founded understanding of the role and relevance of public policies and investments in this sphere. This led Oxfam India to collaborate with the Centre for Budget and Governance Accountability (CBGA) to undertake an in-depth assessment of government budgets in India from the lens of adaptation to climate change. The present report, which focuses on the Union Budgets of India over the last few years, is the output of this collaboration.

The Study by CBGA has highlighted a set of parameters for evaluating government budgets in the country from the lens of climate change and it has also tried to measure, based on those parameters, the responsiveness of Union Budgets to the adaptation needs emerging from climate change.

The Study finds that sectors that are crucial to any adaptation interventions such as food security, health, rural and urban housing for the poor, and infrastructure for education have received inadequate attention from policymakers in India. These critical sectors need to be integrated into the country's adaptation policy network and the policies and budgets for adaptation need to be embedded as an intrinsic part of the policies and budgets for poverty reduction programs.

I hope this report would add significant value to the discourse on public policies and investments in the sphere of adaptation to climate change.

Nisha Agrawal

CEO, OXFAM INDIA

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– Kaushik Ganguly and Gyana Ranjan Panda

List of Abbreviations

AIBP	Accelerated Irrigation Benefit Programme
ARWSP	Accelerated Rural Water Supply Programme
BCGs	Bacillus Calmette-Guérin
BE	Budget Estimates
BPL	Below Poverty Line
CACP	Commission for Agricultural Costs and Prices
CAD	Command Area Development
CETPs	Common Effluent Treatment Plants
CRSP	Central Rural Sanitation Programme
CS	Central Sector
CSOs	Civil Society Organisations
CSS	Centrally Sponsored Schemes
DDP	Desert Development Programme
DoA&C	Department of Agriculture & Cooperation
DoB	Department of Biotechnology
DoHR	Department of Health Research
DoLR	Department of Land Resources
DPAP	Drought Prone Areas Programme
FAR	Fourth Assessment Report
FCI	Food Corporation of India
GDP	Gross Domestic Product
HDI	Human Development Index
HDR	Human Development Report

IAY	Indira Awas Yojana
ICDS	Integrated Childs Development Scheme
ICMAM	Integrated Coastal & Marine Area Management
INM	Integrated Nutrient Management
IPCC	Intergovernmental Panel on Climate Change
ISSHU	Interest Subsidy Scheme for Housing the Urban Poor
IWDP	Integrated Wasteland Development Project
IWMP	Integrated Watershed Management Programme
JE	Japanese Encephalitis
JFMCs	Joint Forest Management Committees
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
MDM	Mid Day Meal
MDGs	Millennium Development Goals
MIS	Market Intervention Scheme
MoEF	Ministry of Environment and Forest
MoES	Ministry of Earth Sciences
MoWR	Ministry of Water Resources
MPCE	Monthly Per capita Expenditure
NAFED	National Agricultural Cooperative and Marketing Federation of India Ltd
NAIS	National Agricultural Insurance Scheme
NAP	National Afforestation Programme
NAPCC	National Action Plan on Climate Change
NFSM	National Food Security Mission
NGOs	Non-Governmental Organizations
NREGP	National Rural Employment Guarantee Programme

NREGS	National Rural Employment Guarantee Scheme
NRHM	National Rural Health Mission
PMGSY	Pradhan Mantri Gram Sadak Yojana
PSS	Price Support Scheme
PURA	Providing Urban Amenities in Rural Areas
RE	Revised Estimates
RKVY	Rastriya Krishi Vikas Yojana
SC	Scheduled Castes
SGSY	Swarnajaynti Gram Swarojgar Yojana
SHGs	Self Help Groups
SJSRY	Swarna Jayanti Shahri Rojgar Yojana
SM-BSUP	Sub Mission on Basic Services to Urban Poor
SNP	Supplementary Nutrition Programme
SSA	Sarva Shiksha Abhiyan
ST	Scheduled Tribes
TPDS	Targeted Public Distribution System
TSC	Total Sanitation Campaign
UNDP	United Nations Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
VPD	Vaccine Preventable Diseases

Executive Summary

Developing countries like India are saddled with huge developmental deficits with a significantly large segment of the population having very low incomes and lack of access to basic necessities of life and livelihood making them excessively vulnerable to the impacts of climate change. Consequently, the resource requirement and policy direction for adaptation in these countries are expected to be given utmost priority in their evolving policy discourses on climate change. Given that climate change has the potential to erode the gains in development in these countries, additional resources would be needed for their adaptation measures. Additional resources would also be required to embark on a low carbon growth path without compromising the growth potential of these countries, which is also essential for sustained efforts towards holistic development. Against this backdrop, the present study reviews the framework on adaptation in India and provides an estimation of the public resources devoted to this sector.

Background and Objective of the Study

India being one of the most populous countries in the world with vast majority of the population living with low human development attainments, the magnitude of vulnerability to climatic shock is immense. The vulnerabilities and their policy response is even more complicated, given its geographical spread, diverse terrain, climatic zones and even more heterogeneous, the demographic and socio-economic characteristics of the population spread across these zones.

As a crucial policy document for tackling climate change in India, National Action Plan on Climate Change (NAPCC) 2008, enumerates several policy measures the government intends to take for adaptation. It also recognizes climate sensitive sectors within the economy and lists activities that are already being taken up to minimize the impact of climate change. NAPCC claims that Central government spending on adaptation exceeds 2.6 percent of GDP as of 2006-07 and broadly identifies the focus areas which are a) crop improvement, b) drought proofing, c) forestry, d) water, e) coastal regions, f) health, g) risk financing, h) disaster management. An impediment in assessing the facts put forward by the government through the NAPCC is that it stops short of providing details of programmes/ schemes considered adaptation measures or a detailed analysis of how these address vulnerabilities to climate change in India. Given the lack of clarity in the policy document, the apprehension is that a bulk of the government spending in the aforementioned sectors may be more development oriented with little or no adaptation focus.

Given the circumstances, the present study on public provisioning on adaptation was conceived with the following broad objectives:

- Identification of the currently ongoing programmes/schemes of the government in focus areas outlined within the government policy documents.
- Assessment of the nature of these programmes/ schemes in terms of their developmental or adaptation focus.

- Budgetary analysis of sectoral public spending on adaptation based on the above assessment for the years 2006-07 to 2009-10.
- Critical assessment of the present framework of government interventions on adaptation to climate change.

Methodology

The process of identification of programmes/ schemes for adaptation is underpinned by the primary assumption that the government initiatives for the sake of development also build resilience within communities to deal with the adverse impacts of climate change and induce behavioural changes in use of and access to natural resources. The study in the process of scheme identification has categorically selected schemes, which directly address specific vulnerabilities in the selected sectors.

The classification of selected programmes/ schemes correspond to climate sensitive sectors identified by NAPCC with the only additional sector included being *coastal, marine and ocean management*. These sectors constitute the focal point of India's existing adaptation policy and form the core of most government interventions in social and economic sectors. In the process of identification of schemes, the study has compared their stated objectives and the specific issues in vulnerable sectors, which these schemes seek to address (Refer Annexure II).

Based on the classification of the schemes, the study has quantified budgetary allocations of each climate sensitive sector in terms of their percentage share in the overall budgetary allocation and percentage of the Gross Domestic Product (GDP) in current prices. Additionally the study also quantifies the adaptation focus of 21 different climate sensitive government ministries/departments to assess the degree to which the adaptation is entrenched within the existing interventions of these bodies (Refer Annexure IA and IB).

A methodological departure that this study has made in comparison to government estimation is that it has viewed research and development as a separate crosscutting issue and quantified it separately. In this regard, the study has identified, government support to institutions engaged in research and development and capacity building in the sectors enumerated above (Refer Annexure III).

Limitations of the Study

In selection of programmes/schemes, the study has taken an approach, which relies mainly on the stated objectives and guidelines of the schemes for assessing their potential as adaptation measures and budgetary allocations on the selected schemes in order to quantify the government response on adaptation. Therefore, the study has not attempted to comment on additional financial support for the selected sectors to deal with climate change.

Another limitation of the study is that the data reported and analyzed are revised estimates of budgetary allocations as presented in the Union Budget. Actual expenditure data on all government programmes/schemes across the sectors studied being unavailable, the study has not delved into issues of utilization within these sectors.

Further, the study captures only the allocations made in the Union Budget while a large chunk of public expenditure is also incurred by the state government and the local bodies out of their own resources. However, since the Union Budget is the source of more than 50 percent of public spending in India, analysis of the Union Budget can serve as a signpost on the overall policy stance of the government on adaptation.

Framework on Adaptation in India: Some Key Parameters

Vulnerabilities arising out of climate change are multidimensional and interlinked with vulnerability in one sector compounding those in others. Additionally, socio-economic circumstances like poverty, inequality and social discrimination over property rights and access to resources create a catalytic atmosphere for social attrition, unequal and unsustainable competition for scarce natural resources, perpetuating the vulnerabilities of natural ecosystems and human environments to climatic shocks and changes.

The multi-dimensional nature and complexity of the issues involved necessitate differentiation between programmes /schemes that address adaptation to climate change on the lines of their intended outcomes particularly those that address and augment human capabilities and schemes, which focus on better management of natural resources.

In this regard, it is important to identify linkages between the schemes in different sectors or identification of vulnerabilities, which require independent interventions to economize and exploit commonalities and synergies between the focal areas. Equally important are identification of vulnerabilities which pervade across sectors (e.g. gender concerns and information dissemination). Apart from the above considerations, the importance of decentralized planning, monitoring and implementation cannot be denied in the context of India given the diversity of issues that needs to be addressed and the requirement for stylized interventions for different parts of the country. This is particularly important for efforts pertaining to disaster mitigation and conservation of natural resources.

Assessment of Public Spending on Adaptation

Keeping in sharp focus the benchmarks for a suitable framework for adaptation in India, the study identified nine broad areas of concern and selected around 146 schemes and programmes that address adaptation needs in India. The nine areas are a) poverty alleviation, livelihood and food security; b) land development, drought proofing, irrigation and flood control; c) health improvement and disease control; d) risk financing; e) water resource management, f) coastal and marine resources management; g) agriculture and allied services; h) forestry and biodiversity conservation; and i) disaster management.

The expenditure on adaptation estimated by the study across all the sectors for adaptation stands at 1.7 per cent of GDP for 2006-07 which is in wide variance with the estimation put forward by the government at 2.6 per cent of GDP for 2006-07. For the four financial years (2006-07 to 2009-10) reviewed, expenditure on adaptation increased from 1.7 per cent of GDP in 2006-07 to 2.68 per cent of GDP as per 2009-10 budget estimates.

The increase in expenditure on adaptation is largely buoyed by the increased allocation in certain areas in the sector of poverty alleviation, for e.g. the National Employment Guarantee Scheme allocation in which has more than doubled. There has also been a significant rise in the allocation within the sector of land development, drought proofing and flood control, specifically on account of the programme Integrated Watershed Management Programme (IWMP).

The total expenditure on adaptation can be broadly classified into two areas. One major area is addressing enhancement in human capabilities constituted by poverty alleviation, health improvement and disease control and risk management. The second area pertains to conservation and management of natural resource and human dependence on these. This is constituted by agriculture and allied services; land development, drought proofing and flood control; water resources; forestry and biodiversity conservation; coastal, and marine resources management and disaster management.

Expenditure on adaptation pertaining to human capabilities constitutes more than 80 per cent of the total expenditure on adaptation as of 2009-10 budget estimates and constitutes around 2.22 per cent of GDP out of the total of 2.68 per cent of GDP as per 2009-10 budget estimates. The existing budgetary allocation for improvement in ecosystem services in the context of adaptation is meagre at 0.46 percent of GDP as per 2009-10 budget estimates.

Moreover, the framework on adaptation adopted by India and put forth by the NAPCC has some serious lacunae. While the budgetary measures on adaptation seem to be skewed towards poverty alleviation, the policy statements on existing initiatives on adaptation and the proposed national missions are silent on how poverty alleviation should be integrated into the adaptation framework and its linkages with other sectors can be established. Sectors that are crucial to any adaptation intervention such as food security, rural and urban housing for the poor and educational infrastructure have received inadequate attention in the policy response on adaptation.

The missions proposed in the NAPCC which focus on adaptation, are largely directed towards improvement in sustainability of ecosystem services. Whether the missions will subsume existing interventions or these will have additional measures, supported by, additional budgetary allocation has not been clarified.

Although, there is a strong focus on the part of the government on decentralized planning and larger role of local bodies in plan implementation, centrally determined rigid programme guidelines and uniform unit cost of service delivery has often compromised the effectiveness of programmes/ schemes. Decentralized planning is necessary for better implementation in all the sectors of adaptation but particularly in areas, which are disaster prone. As real time response to natural disasters is crucial for disaster mitigation and management, development of local level capacities and infrastructure to cope with such exigencies needs to be strengthened.

Remarks

India has taken several bold steps to bridge the yawning gap in its development sector. However, the initiatives so far have fallen short of the requirements of a fast

growing nation with huge developmental backlogs. The overt focus on adaptation to climate change has only re-emphasized the existing deficits in various development sectors and deficits that are prone to get bigger given the adverse impacts of climate change. It is also widely acknowledged that adverse impacts of climate change is likely to erode developmental gains and make existing developmental initiatives costlier. This evidently means that existing developmental schemes and their financial allocation may prove to be insufficient and additional resources may need to be devoted. Availability of additional resources in turn should be based on vulnerability assessment of different sectors of the economy. It is worthwhile to note that despite adaptation to climate change fast becoming a policy imperative, efficacy of any adaptation policy and its cost-effectiveness will largely depend on the country embracing a sustainable development and growth path.

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Chapter 1

Introduction

1.1 Overview

The most important crisis, facing humanity across the globe, is climate change[1] and its impact on the immediate human environment and natural ecosystems. Globally, the impacts of climate change include among others, rising temperatures, shifts in rainfall pattern, melting of glaciers and sea ice, sea level rise and an increased intensity and frequency of extreme weather events. The changes in the atmospheric processes and ecosystems also has socio-economic ramifications like shifts in crop growing seasons or crop losses, increased incidence of vector-borne diseases, depletion of water resources and severe water shortages in some places while flooding and inundation in others. Moreover, rising sea levels may cause increased incidence of storm surges, erosion of coastlines and decline in habitable space for people living in coastal areas and island states. Overall climate change has the potential to erode the gains in development made over ages and increase susceptibility of humankind to climatic events for earning a sustainable livelihood, particularly in developing and less developed countries.

The Fourth Assessment Report, IPCC (2007), has pointed out that historic emission of greenhouse gases in the atmosphere has already committed the Earth to some level of climate change. Over the last century atmospheric concentration of carbon dioxide increased from a pre-industrial value of 278 parts per million to 379 parts per million (ppm) in 2005 and globally average temperature has risen by 0.74 degree Celsius. The report also gives a detailed projection for the twenty-first century, which shows that the Earth will witness a continual and accelerating trend in global warming and best estimates indicate that the planet could become warmer by 3 degree Celsius by 2100 if enough measures to reduce concentration of GHGs is not timely implemented.

Historically, humankind has adapted to climate variability around them for sustenance and such behavior has played a crucial role on the evolution of socio-economic, political and cultural lives of people across the globe. However, the present warming trend witnessed across the globe is faster and abrupt than any other witnessed in recorded history and thereby the potential and capacity of people to adapt to the changes brought about by the global warming is limited unless aided through active

[1] "Climate Change" in Intergovernmental Panel on Climate Change (IPCC) parlance refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties and that persists for an extended period, typically decades or longer. It refers to any change in climate over time, whether due to natural variability or as a result of human activity. As per UN Framework Convention on Climate Change (UNFCCC) usage, it refers to change of climate that is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and that is in addition to natural climate variability observed over comparable time periods.

policy directions. Therefore, there is an urgent need to formulate policies at the national level as well as at the global platform.

1.2 Context and Rationale of the Study

Notwithstanding the fact that India is a party to the global initiative on climate change under the aegis of UNFCCC and is bound by the global consensus underlying the Convention, the necessity for a firm and forthright policy framework on adaptation is largely guided by the country's own internal realities and contradictions facing its economic and social goals. India, despite witnessing high economic growth in the post-economic reform era, has vast swathe of its population living below poverty line, with predominant livelihood option for people being agriculture and other weather dependent activity.

According to the NSS 61st round 2004-05, around 73 percent of the households belongs to rural India constituting around 75 percent of the total population. Poverty in India has a predominantly rural face with 73 percent of people living below poverty line residing in rural areas. More importantly, apart from income poverty, a large section of the population suffer from unequal access to crucial social services like health, education, proper housing and food security which impair their ability to adapt to adverse climatic conditions. Crucial human development indicators as per the Human Development Report 2009 (UNDP, 2009), portray a bleak picture for the country with its Human Development Index reported to be 0.612 as of 2007 with Life Expectancy at Birth being 63.4 years, Combined Gross Enrolment Ratio in Education at 61 percent and per capita GDP (in PPP US $) being 2,753. The overall HDI Rank of the country in the world is 134 as per HDR 2009. The status of food and nutritional security in the country is also depressing with 1.9 percent of households living with inadequate food as of 2004-05 and 45.9 percent of children under 3 years of age suffering from malnutrition as of 2005-06 (Economic Survey, 2008-09). In terms of access to basic infrastructure only 42 percent of households use piped drinking water (NFHS III, 2005-06) and 44.5 percent of households as of 2005-06 have access to toilet facilities (Economic Survey, 2008-09).

Therefore, while autonomous adaptation response by individuals might play an important role in countering the impacts of adverse climatic conditions, such responses are bound to be inadequate without policy response from the government, given the large developmental deficits that exist across the country. Under these circumstances, public investment and expenditure for development may be reprioritized and augmented taking into account the additional requirements in sectors providing socio-economic services, which are highly climate sensitive.

The Government of India, in line with the international consensus, has reaffirmed its commitment to climate friendly and sustainable development and growth. However, given the variegated nature of the climate systems, the topography and socio-economic features in different parts of the country, the response to vulnerabilities from climate change and policies for promoting sustainable development requires

taking into account regional peculiarities. As a crucial policy document for tackling climate change in India, National Action Plan on Climate Change (NAPCC) 2008, enumerates several policy measures the government intends to take for adaptation. It also recognizes climate sensitive sectors within the economy and puts forward a list of activities that are already being taken up to moderate the impact of climate change. The NAPCC claims that spending by the central government on adaptation exceeds 2.6 percent of GDP as of 2006-07.

In this context, the study examines the Union Budgets of Government of India in order to quantify the government spending on adaptation, to segregate developmental programmes from adaptation-oriented programmes and identify programmes or schemes in which adaptation concerns can be integrated to make them more effective.

The rationale for analyzing the Union Budget is underlined by three broad concerns, which this study seeks to take into account. First, in addressing the challenge of climate change, Government of India is the dominant stakeholder with more than 50 percent of public expenditure in India being provided through outlays in Union Budget. It also holds the Constitutional obligation to meet the requirement of the Fundamental Rights (Under Article 21) of 'Right to life' and the concept of "Public Trust Doctrine" in which certain common properties such as rivers, seashores, forests, and air are held by the government in trusteeship for the free and unimpeded use of the general public. Secondly, the study of the Budget is specifically important as it comprehensively shows as a signpost the adaptation policy priorities that the Government expresses for the common person. It mirrors the nature and character of the public provisioning for the adaptation and measures the extent of the budgetary outlays and expenditures upon various adaptation schemes and programmes implemented across Ministries and Departments. Lastly, the study of the budget is of significant advocacy value for the Civil Society Organisations (CSOs) to engage with the policy makers and legislators in the Budget Cycle[2] processes to make a positive impact on various existing policy decisions, in redefining the priorities in budgetary allocation and extent of public expenditure on the adaptation schemes and programmes.

1.3 Objectives of the Study

The study of Union Budget in the context of the background and rationale elaborated above is being undertaken to identify various schemes and programmes that are being implemented under different ministries and departments of the Government of India. This will also give a general idea about the areas of policy thrust by the government in

[2] Budget Cycle refers to the processes periodically undertaken by the government during a fiscal year and culminates into the formulation of the Union Budget, its presentation in the Parliament by the Finance Minister and its final approval by the Parliament. A budget cycle specifically corresponds to four different tasks, formulation of the budget, it legislation, execution and audit.

terms of financial allocation to different socio economic sectors, which are vulnerable to climate change. The broad objectives of study are:

- Identification of the currently ongoing programmes/schemes of the government in the focus areas outlined within the government policy documents.
- Assess the nature of these scheme/programmatic interventions in terms of their developmental or adaptation focus.
- Budgetary analysis of the sectoral public spending on adaptation based on the above assessment for the years 2006-07 to 2009-10.
- Critical assessment of the present framework of government interventions on adaptation to climate change.

1.3 Methodology

The process of identification of the schemes and programme for adaptation is premised on the primary assumption that the initiatives undertaken by the government for the sake of development also builds resilience within communities to deal with the adverse impacts of climate change and also induces behavioural changes in use of and access to natural resources. The applicability of this assumption however, is only limited to selection of existing schemes and programmes implemented by the Union Government and does not in any way reflect on the requirement of additional resources for the vulnerable sectors owing to the adverse impact of climate change. The question of additionalities can be addressed only after a detailed vulnerability assessment and an impact assessment of the government schemes/programmes has been conducted which is outside the ambit of the present study.

The study has undertaken classification of schemes and programmes implemented by the central government across nine sectors, which correspond to the vulnerable sectors of the economy. This classification corresponds with the vulnerable sectors identified by the NAPCC with the only additional sector included being the sector on *coastal, marine and ocean management*. These sectors constitute the focal point of India's adaptation policies and form the core to most of the government interventions in social and economic sectors. In the process of identification of schemes, the study has compared the stated objectives of the schemes and the specific issues in vulnerable sectors, which these schemes seek to address. The following table provides a glimpse of the nine vulnerable sectors identified and the corresponding issues addressed in the process of selection and classification of schemes and programmes operated by the government.

A methodological departure that this study has made in comparison to the government estimation is that it has viewed research and development as a separate crosscutting issue and has quantified it separately. In this regard, the study has identified, government support to institutions engaged in research and development and capacity building in the sectors enumerated above (Refer Annexure III). In this regard, unlike the NAPCC, in the case of vulnerabilities in agricultural sector the study has put emphasis

on other issues of agricultural sustainability apart from just crop improvement and research.

Table 1.1: Vulnerable Sectors and Issues Addressed in Scheme Selection

Sl. No.	Sectors	Issues Addressed in Scheme Selection
1	Poverty Alleviation	Income security, livelihood security and food security (also includes nutritional support programmes).
2	Health Improvement & Disease Control	Disease surveillance, control of vector-borne diseases, immunisation, provisioning & upscaling of drinking water supply and improvement in sanitation.
3	Risk Financing	Health insurances, crop insurances and grant to NAFED for MIS/PSS.
4	Land development, Drought Proofing & Flood Control	Wasteland development, combating desertification, development of watersheds, irrigations and flood control measures.
5	Agriculture & Allied Services	Agricultural innovation, balanced use fertilizer, soil conservation and development of horticulture, fisheries and livestock.
6	Forestry & Biodiversity	Regeneration and conservation of forests, wetlands and mangroves, biodiversity conservation.
7	Water Resources	Groundwater management, major & medium irrigation, prevention of pollution of water bodies.
8	Disaster Management	Institutional support for research, documentation, capacity building and human resource development, programmes on early warning systems and measures to promote disaster preparedness
9	Coastal, Marine & Ocean Management	Protection of coastal environments and livelihood security along coastal stretches. It also involves monitoring, managing and information dissemination on coastal and marine resources.

An expenditure-tracking template (Refer Annexure IA) has been prepared for bifurcation of the total expenditure on each scheme/programme into the Plan and Non-Plan aspect of the expenditure. This helps in ascertaining nature of spending under different adaptation heads. Additionally a template (Refer Annexure IB) has also

been prepared to demonstrate the percentage of allocation on adaption provided by each of the climate sensitive ministries of Government of India.

Furthermore, the study team has also designed a template (Annexure II) particularly for the identification of the schemes and programmes concerning adaptation. The scheme template incorporates the following features: the nature of the schemes (Centrally Sponsored Schemes/ Central Sector Scheme/ Central Assistance to State Plan schemes); the year of sanction (the timing of the implementation of a particular scheme), the targeted beneficiaries (the potential recipient of the scheme) and the essential components and feature of the scheme. For the identification of those schemes/programs, it extensively relies upon the *Outcome Budgets* published by individual ministries and Demands for Grants of individual ministries/departments published as part of the Union Budget, to know the relevant key information about various components that each scheme intends to target in its effective implementation.

Table 1.2: Ministries/ Departments with Schemes/Programmes on Adaptation

1.	Department of Agriculture and	13.	Ministry of Water Resources
2.	Cooperation	14.	Ministry of Environment and Forest
3.	Department of Animal Husbandry,	15.	Department of Food and Public
4.	Dairying and Fisheries	16.	Distribution
5.	Department of Agricultural Research	17.	Ministry of Home Affairs
6.	and Education	18.	Ministry of Panchayati Raj
7.	Department of Rural Development	19.	Ministry of Science and Technology
8.	Department of Land Resources	20.	Department of Biotechnology
9.	Department of Drinking Water and	21.	Department of Space
10.	Supply	22.	Ministry of Tribal Affairs
	Department of Urban Development	23.	Ministry of Women and Child developme
11.	Ministry of Housing and Urban Poverty	24.	Ministry of Human Resources
12.	alleviation		Development
	Department of Health and Family		Ministry of Social Justice and Empowerm
	Welfare		
	Department of Health Research		

1.4 Limitations of the Study

The study primarily attempts to locate within the existing public expenditure, the government interventions which directly address certain vulnerabilities from the impacts of climate change. In this spirit, it is a parallel assessment of the government spending on adaptation and is premised on the assumption that these programmes are leading to certain degree of policy-induced adaptation to build resilience of communities against climate change. Therefore, in selection of programmes/schemes the study has taken an approach, which relies mainly on the stated objectives of the schemes and their guidelines in assessing their potential as adaptation measure and budgetary allocations on the selected schemes in order to quantify the government response on adaptation. Another limitation of the study is that the data reported and analysed are Revised Estimates (RE) of budgetary allocations as presented in the Union Budget. Actual expenditure data on all government programmes/schemes across the sectors studied being unavailable, the study has not delved into issues of utilization within these sectors.

A major limitation of the study is that it captures only the allocations made in the Union Budget while a large chunk of public expenditure is also incurred by the state government and the local bodies.out of their own resources. However, since the Union Budget is the source of more than 50 percent of public spending in India, analysis of the central government budget can serve the purpose of a signpost on the overall policy stance on adaptation in the country.

The parallel assessment of government spending however could not be compared with government estimation as put forward in the NAPCC due to the fact that the NAPCC stops short of providing the details of schemes and programmes considered as adaptation measure or a detailed analysis of how these programmes or schemes address vulnerabilities to climate change in India. In this regard, comparability of both the estimates may be considerably diluted given the lack of clarity in government estimates. However, this study is useful in providing a baseline in adaptation expenditure by providing a review of current trends, sectoral priorities in terms of allocations and a selection of ongoing schemes/programmes, which are directly related to adaptation.

The subsequent sections in the report are organized in the form of two separate chapters and an annexure. Chapter 2 broadly discusses the vulnerabilities to climate change in different socio-economic sectors, discusses certain benchmarks based on which adaptation policies needs to be reviewed and critically discusses the framework on adaptation in India including the budgetary estimation of adaptation as put forward in the National Action Plan on Climate Change (2007). Chapter 3 discusses in detail the programmes and schemes undertaken by the government in India which cater to the needs of adaptation across different sectors. It also quantifies the budgetary allocation for these different programmes/schemes thereby throwing light on the government's expenditure commitment on adaptation in India. Finally, the Annexure contains all the tables pertaining to the budgetary allocation of all the schemes across different sectors and also a template with details of the schemes selected as adaptation measures.

Chapter 2

An Assessment of the Framework on Adaptation in India

A sound development policy ideally should form the bedrock of effective adaptation strategy in the long run. The Human Development Report (HDR) 2007-08 (UNDP, 2007) puts into perspective the challenges that climate change poses to the development issues of our present generation. As per HDR 2007-08, any kind of development should entail expansion of human potential and capabilities that empower them to make choices on the life they value. Climate change not only erodes the gains in development, it also constrains the freedom to choose especially, those whose capabilities in terms of income, education, healthcare and access to resources are limited. It thereby poses substantial risks for the achievement of sustainable development goals by increasing poverty and presenting impediments to the achievement of the Millennium Development Goals. Less developed or developing countries, with scarce resources and huge developmental requirements, already find it difficult to mobilize enough resources to cater to people living in acute poverty and destitution and therefore there is a strong need to integrate climate change oriented policies and concerns into development planning.

2.1 Vulnerability to Climate Change: A Review

The Fourth Assessment Report, IPCC (2007), has clearly dispelled doubts pertaining to the accelerated trend of global warming in the recent years. As per the report, eleven of the last twelve years (1995-2006) rank among the twelve warmest years in the instrumental record of global surface temperature (since 1850). Moreover, the linear warming trend over the 50 years from 1956 to 2005 (0.13 [0.10 to 0.16]°C per decade) is nearly twice that for the 100 years from 1906 to 2005. The major impacts of global warming are extensive and cut across environmental as well as socio-economic sectors.

With recent assessments, it is becoming increasingly clear that climate change will adversely influence the possibilities of sustainable development particularly for developing countries. The vulnerabilities compounded with pressures from rapid and unplanned urbanization, demand on natural resources from a burgeoning population, industrial growth and necessity of economic development poses immense challenges in the mainstreaming of sustainable development.

The vulnerabilities arising out of climate change are multidimensional and interlinked, with vulnerability in one sector compounding vulnerabilities in others. In addition, socio-economic circumstances like poverty, inequality and social discrimination over property rights and access to resources encourage social attrition, unequal and unsustainable competition for scarce natural resources, perpetuating, in turn, the vulnerabilities of natural ecosystems and human environments to climatic shocks and

changes. A policy framework that addresses these compounding forces needs to integrate policies pertaining to adaptation to climate change with its development policy. In this regard, an indicative set of vulnerabilities across five climate sensitive sectors and their associated socio-economic risks has been put forth in the following table, which a sustainable development framework needs to take into account to address issues of adaptation in these sectors.

Table 2.1: Vulnerability of Sectors and Associated Risks

Sectors	Vulnerability	Socio-Economic Risks
Agriculture & Food security	▪ Temperature Stress ▪ Erratic Precipitation ▪ Reduced soil moisture ▪ Flood/Drought Conditions ▪ Invasion of parasitic species or disease	▪ Increased risk of desertification & land degradation ▪ Decline in crop yield and production ▪ Decline in availability of food and increased incidence of malnutrition
Health	▪ Availability of fresh water ▪ Availability of sanitation facilities ▪ Vector borne diseases ▪ Thermal stress	▪ Increased morbidity & mortality ▪ Increased burden of health care on households in affected areas
Water Resources	▪ Availability of fresh water ▪ Reduced quality of available water resources ▪ Reduced stream flow ▪ Depletion in groundwater resources ▪ flood or drought conditions	▪ Stress on water storage ▪ Reduced supply of drinking water ▪ Increased morbidity ▪ Reduced availability of water for industrial and food production purposes ▪ Reduced potential of hydroelectric power generation
Oceans and Coastal Zones	▪ Salt water intrusions ▪ Storm surges and Flooding ▪ Cyclonic events ▪ Stability of wetlands and mangroves ▪ Ocean ecosystems like coral reefs	▪ Threat to inland freshwater resources ▪ Degradation of coastal infrastructure ▪ Threat to livelihood dependent on marine fisheries and aquaculture ▪ Dislocation of coastal and island population
Biodiversity	▪ Long dry spells ▪ Intensity of land use ▪ Fragmentation of habitats ▪ Species invasion ▪ Desertification and land degradation	▪ Loss of ecosystems services ▪ Loss of livelihood for people dependent on forestry resources ▪ Decline in ambient air and water quality leading to health hazards ▪ Extinction of species

Source of basic information: Fourth Assessment Report, IPCC (2007)

2.2 Policy Formulation on Adaptation to Climate Change: Some Parameters

The Human Development Report 2007/08 elucidates clearly that the critical challenge facing humanity from climate change, particularly in developing countries, is to balance the objective of attaining a decent standard of living without compromising the same for future generations. A pro-climate development policy therefore necessitates active government intervention at different levels of the economy essentially entailing two distinctive and converging approaches viz. a) approach focussing on human capabilities and b) approach focussing on better management and efficiency in exploitation of natural resources.

A framework on policy formulation on adaptation involving government programmes/schemes while taking a distinctive approach in addressing sectoral issues in improving human capabilities and human dependence on natural resources also needs to take into account measures addressing certain multi-sectoral issues through properly designed schemes or forging convergences in existing interventions. For effectiveness of the entire gamut of existing and new interventions, the system needs to be informed through a process of generating information and its dissemination for the benefit of policy makers and stakeholders involved.

In this context, some normative considerations have been briefly discussed which cab be the underpinnings for any policy formulation for adaptation and also act as benchmarks for undertaking policy appraisal for developing countries like India.

Improving human conditions and capabilities: Sustaining the present gains in development and enhancing the standard of living is already a challenge that most developing countries are facing in Asia, Africa and Latin America. According to the Human Development Report 2007/08, erosion of human capabilities through the adverse impacts of climate change would only enhance the crisis and the risks associated with lack of human development in the less developed and developing countries of these regions. It is therefore evident that for a country like India, an adaptation policy framework needs to have at its core direct interventions in eradication of poverty and ensuring security of livelihood, food and nutrition and social services, in order to provide a safety net to the poor and marginalized.

Improving sustainability of ecosystems: The adaptation framework in addition to augmenting human capabilities, essentially needs to focus on management of the human dependence on nature and environment, focusing on sustainable use of natural resources, conservation of common property resources and ecosystems, reduction in human-animal conflicts and creation of buffers against natural calamities. Such an approach would involve policies that influence traditional agricultural practices, livestock and fisheries management, exploitation of forestry resources and most importantly management and harnessing of fresh water and coastal resources. Additionally, the second approach also needs to focus on waste management, prevention of environmental pollution, promote prudential use of land resource,

provide thrust on efficiency in energy use and diversification of power generation to alternate and renewable resources.

Both the approaches described above should entail distinctive, yet inter-dependent policy initiatives. Development of human capabilities can influence the way people access and use natural resources and conversely, availability and access to natural resources can also be a determining factor in human development. Therefore, keeping in view the objective of balancing equity considerations of present vis-à-vis future generations, policy exercises inclusive of planning, implementation and appraisal of government schemes and programmes need to distinguish between the two approaches and yet take a conjunctive view while assessing outcomes.

Table 2.2 Policy Framework on Adaptation: An Indicative Structure

Policy Objectives	Sectoral Focus	Multi Sectorality	Cross Sectorality
Improvement in human conditions and capabilities	▪ Income security ▪ Food security ▪ Improvement in nutritional status ▪ Health improvement ▪ Housing facilities ▪ Securing of education & health infrastructure ▪ Risk financing	▪ Development of watershed & irrigation potential ▪ Management of coastal resources ▪ Securing of coastal infrastructure ▪ Combating land degradation & desertification ▪ Disaster risk mitigation ▪ Security of livelihood dependent on natural resources ▪ Management & harnessing of freshwater resources ▪ Food grains Storage & warehousing ▪ Risk financing	▪ Improvement in education & awareness ▪ Research & development ▪ Consolidation of traditional knowledge & climate friendly practices ▪ Monitoring and surveillance of climate factors ▪ Early warning systems ▪ Monitoring of impacts of government programmes/ schemes ▪ Information dissemination
Improvement in sustainability of ecosystems	▪ Conservation of forestry resources ▪ Conservation of wetlands & mangroves ▪ Conservation of species ▪ Conservation of common property resources like grazing lands, watersheds ▪ Management of livestock & fisheries ▪ Crop improvement & diversification ▪ Waste management		

Sectoral Approach: Limitations on the availability of resources in developing countries that can be dedicated explicitly to adaptation measures may require existing developmental schemes to be characterized as per their intended thrust areas and benefits that can be reaped from convergences across different yet related sectors. In this regard, sectoral vulnerability issues and related schemes can be prioritised based on specificity of vulnerabilities and their linkages with other sectors.

In this context, UNFCCC (2008)[3] proposes that specific sectoral measures be adopted for individual sectors that are affected by climate change like better irrigation for agricultural vulnerability arising out of water scarcity, immunization for communicable and vector-borne diseases, coastal protection against inundation due to rising sea level and conservation of vulnerable ecosystems.

Moreover, adverse climate stimuli in one sector may have adverse effects on related sectors, which may require multi-sectoral approaches. For example, drought conditions may lead to decline in agricultural activity thereby affecting both food security through reduced food production and livelihood through decline in gainful employment opportunities. Such multi-sectoral linkages need to be addressed through integrated management of food security and agricultural sustainability. Multi sectoral adaptation mostly relates to management of natural resources and an approach could be linking management measures in adaptation in human capabilities with those identified as necessary under the other Rio Conventions like Convention for Biological Diversity (CBD) and United Nations Convention to Combat Desertification (UNCCD).

Policy formulation and government investment is also required for areas that have cross-sectoral impact on adaptation. These involve information generation through research and monitoring (like weather forecasting, disaster forecasting, remote sensing etc.) and innovation of more climate friendly technologies and processes (like seed improvement, effective vaccines, better marine harvesting technologies which disturb marine ecosystems to a lesser extent, improvement in water conservation and efficiency of usage etc.). The outputs of these research and development efforts also need to be disseminated and diffused among users to make an impact on ongoing efforts on adaptation.

Research, Development and Dissemination: A major problem associated with policy formulation to deal with environmental degradation, climate change and the associated risk, is that the impacts in the short run are often intangible and can be discerned only when the risks have cumulated enough over time to threaten the normal course of life, livelihood and the surrounding natural habitats. Therefore, policy formulation and devoting substantial resources to address both the drivers of climate change and its consequences may seem infeasible both politically and economically

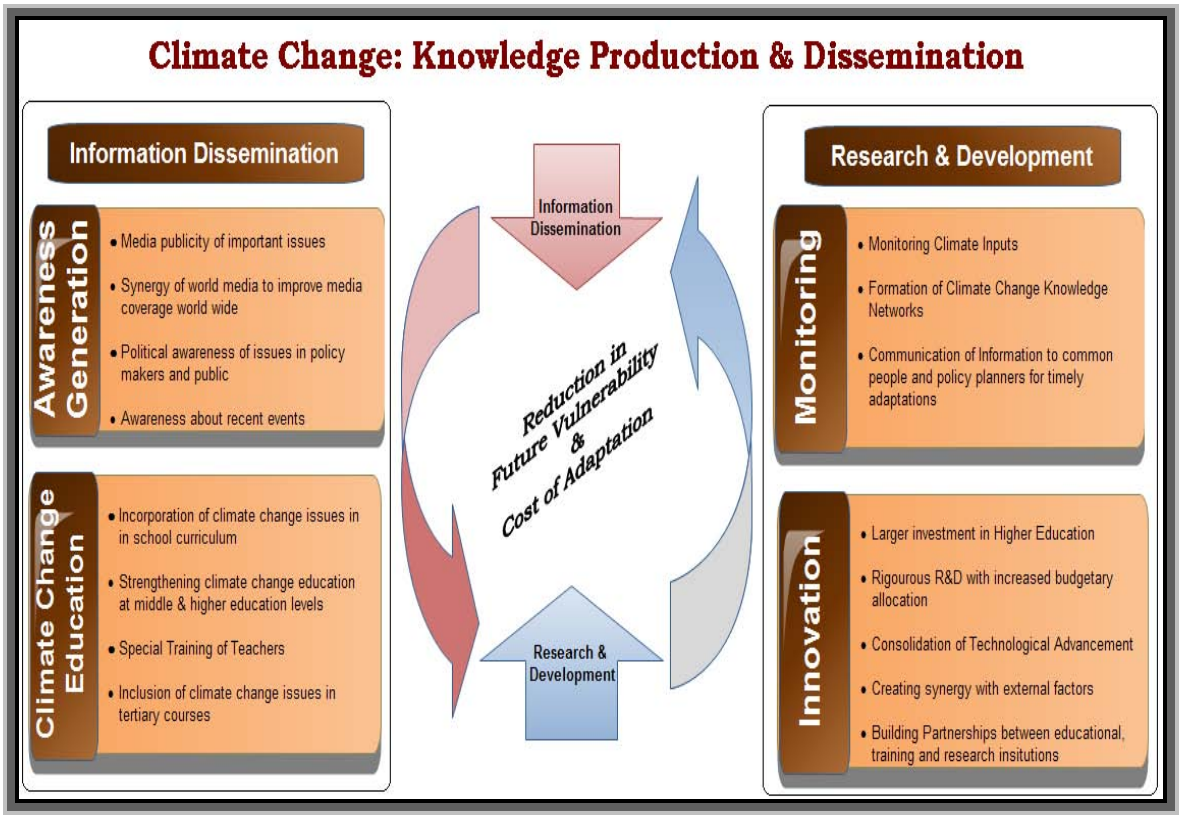
[3] UNFCCC (2008), Climate Change: Impact, Vulnerabilities and Adaptation in Developing Countries, www.unfccc.int.

given the dearth of available information and technological wherewithal to establish linkages.

For generating awareness among policy planners, general populace and the international community the policy framework needs to integrate within itself a knowledge production and dissemination framework. Production of knowledge in terms of constant monitoring of climatic factors and diffusion of these to the policy planning stage and broader populace has immense implication for reduction of vulnerability and future cost of adaptation. Particularly, micro-level impact assessments of climate change and its associated factors are a necessary way of ascertaining direction that the policy discourse should take and the need for course correction. Similarly, it is also pertinent to incentivize technological development to tackle emerging issues and facilitate assimilation of greener technology.

The traditional knowledge base and practices of communities needs to be consolidated and integrated into the knowledge-processing networks for informing policy decisions on already existing adaptation practices, their viability and replicability. Information on the traditional knowledge base can also assist in fostering assimiliation of modern innovations into traditional practices to engender climate resilient livelihood practices.

An Impact Driven Approach: In order to prioritise programmes/ schemes and assess their performance vis-à-vis adaptation targets, it is imperative to take into consideration intended outcomes of these against their impact on the local communities in building resiliesnce to climate change. The policy framework on adaptation therefore requires integration of policies that incentivize shift in the behaviour of individuals pertaining to securing livelihood, socio-cultural activities and conservation and sustainable use of natural resources. However, the impact of programme initiatives is also dependent on the overall regulatory framework pertaining to land-use, ground water, forestry resources and other natural resources on which livelihoods of people are dependent. Accordingly, it is pertinent to have a concrete policy on the access and use of common property resources like grazing lands, fringe areas of forest and ocean ecosystems, small rivers and streams to protect the interests of the poor and marginalized who depend on these resources for their livelihood.



It is noteworthy that the challenges posed by global warming and its associated climate change are new to the global developmental paradigm. For countries like India where a large section of the population are still in the clutches of poverty and low human development, climate change adds a entirely new dimension to the already existing gaps in development and thereby require a whole gamut of policy shifts and reprioritization to address the emerging challenges. In order to develop a better understanding of what these new challenges mean and response of the government to these challenges, a review of the National Action Plan on Climate Change (2008) has been undertaken. The review also discusses a set of limitations in the proposed framework on adaptation and the budgetary estimation on adaptation expenditure as put forward by NAPCC.

2.3 The Indian Response on Adaptation to Climate Change

The Government of India in its response on climate change put forth a National Action Plan on Climate Change (NAPCC) in 2008, which emphasised the need for dealing with the challenges of global climate change without compromising on sustaining its high economic growth path. The NAPCC, in this context, also reaffirmed the need for prioritizing poverty eradication and socio-economic development with due consideration to environment and ecological balance.

The NAPCC has identified eight different sectors, which are climate sensitive and indicated the nature of government interventions in these sectors, which it construes as adaptation. These sectors are a) Crop improvement, b) Drought proofing, c) Forestry, d) Water resources, e) Coastal regions, f) Health, g) Risk financing and h) Disaster management. The quantum of government expenditure on adaptation across all these sectors is more than 2.6 percent of GDP as of year 2006-07 as reported in the action plan.

However, apart from the existing schemes, the NAPCC has proposed a mission mode apporoach to deal with challenge of climate change. The stated objective of the approach is to promote understanding of the issues of climate change, adaptation and mitigation, energy efficiency and natural resource conservation through active government intervention, public-private partnerships and civil society action as suited to individual mission objectives.

A Mission Mode Approach on Adaptation as proposed in NAPCC

NAPCC has also laid down the blueprint of eight national missions to tackle challenges of climate change both for mitigation of greenhouse gas emissions and adaptation to address the vulnerabilities of climate change. These eight national missions include a) National Solar Mission, b) National Mission for Enhanced Energy Efficiency, c) National Mission on Sustainable Habitat, d) National Water Mission, e) National Mission for Sustaining the Himalayan Ecosystems, f) National Mission for a Green India, g) National Mission for Sustainable Agriculture, h) National Mission on Strategic Knowledge for Climate Change.

Of the eight missions, the first three pertain to developing alternative energy sources and improving energy efficiency to reduce emission of greenhouse gases into the atmosphere and thereby constitute initiatives for mitigation purposes. The remaining five have specific components of adaptation incorporated into their mission objectives. The eight national missions as per NAPCC constitute a multi pronged, long-term and integrated strategy for achieving key goals in the context of climate change. However, it also acknowledges that several programmes envisaged under the missions are already in operation and may need a directional shift. The following table discusses some of the key features of the five proposed missions, which are relevant to adaptation to climate change.

Table 2.3 Key Features of Mission Mode Approach Proposed in NAPCC

Sl. No.	Missions	Key Features of the Missions
1.	National Water Mission	▪ Integrated water resource management ensuring conservation, ▪ minimizing wastage and equitable distribution; ▪ evolve a regulatory mechanism; ▪ incentivise water-neutral and positive technology; ▪ optimize and expand irrigation potential;

		▪ conservation of wetland ecosystems.
2.	National Mission for Sustaining the Himalayan Ecosystems	▪ Evolve management measures that sustain and safeguard the Himalayan glacial system and mountain ecosystems; ▪ establish a monitoring and observational network; ▪ protection and enhancement of forests & ecosystems with the objective of bringing two-third area of these regions under forest cover.
3.	National Mission for a "Green India"	▪ Increase in forest cover to promote ecosystem services like carbon sinks, preservation of ecological balance and conservation of biodiversity; ▪ aims at afforestation of 6 million hectares of degraded forestland with the participation of Joint Forest Management Committees (JFMCs); ▪ effective implementation of Wildlife Conservation Act and National Biodiversity Conservation Act 2001.
4.	National Mission for Sustainable Agriculture	▪ Identification and development of new varieties of crops which are thermal resistant; ▪ evolve cropping patterns which are capable of withstanding extreme weather patterns; ▪ create a knowledge network integrating traditional knowledge and practices with modern technology; ▪ strengthen agriculture and weather insurance mechanism and credit support mechanism.
5.	National Mission on Strategic Knowledge for Climate Change	▪ Create collaborations with the global community in research and technology development; ▪ encourage research in socio-economic impacts of climate change; ▪ set up academic units in Universities and other academic and scientific research institutions linked through a network to promote climate change related research activities; ▪ create a Climate Science Research Fund for providing funds for research.

Source of basic information: NAPCC (2008), Ministry of Environment & Forests, GoI.

2.4 A Critical Assessment of the Response on Adaptation

The Action Plan outlines the range of vulnerability to climate change and the necessary policy actions that are already in place apart from those that are on the anvil. A predominant feature of the disclosures made in the policy document revolve around the necessity of interventions in the area of management and conservation of natural resources, upscaling of ecosystem services and details the necessity of reforms and innovative management practices in the domain of human interface with natural resources and ecosystems. For example, the Action Plan essentially lays considerable emphasis on reduction in vulnerability in the agricultural sector through development

of climate-resistant crops, betterment of irrigation, better pest management, strengthening extension services and capacity building. It also stresses on wasteland development, development of watershed and conservation of wetlands, forests and biodiversity. The existing intervention areas listed; focus on related issues like health improvement and disease control, protection of coastal areas, disaster mitigation and risk management. In addition to the sectoral intervention, the Action Plan lays emphasis on expansion of existing knowledge base and its dissemination through larger investments in research and innovation, monitoring and impact assessments.

Although, the policy measures prescribed by the government spell out the ongoing and upcoming thrust areas for intervention, it stops short of distinguishing the linkages that ought to be present in each of the sectoral measures. For example, there is a distinct case for hyphenating of interventions in sectors like agricultural sustainability, drought proofing and management of water resources because agicultural sustainability is strongly dependent on the other two sectors. In this case, while shortage of water or long dry spells leading to crop loss is a specific sectoral issue and requires augmentation of irrigation measures; measures in general relating to drought proofing and management of water resources have multi-sectoral implications like betterment of drinking water supply leading to health improvements, prevention of desertification and wetland conservation in the context of forestry and biodiversity management. The Action Plan although have clustered each of the areas under a different mission or sectoral intervention in any given ministry, it does not explore the linkages between these sectors and possibilities of convergence. Three specific illustrations highlight this point:

a) In the agricultural sector while preservation of soil moisture through micro-irrigation facilities has been expounded on, the policy document totally ignores measures related to soil fertility management crucial for sustainability of agriculture. Even though the government devotes a substantial amount of resources for subsidy to chemical fertilizers and pesticides, these measures by themselves may not be sufficient to maintain soil fertility as excessive use of these inputs can actually lead to mal-adaptation with serious consequences like decline in soil quality, contamination of groundwater and other natural water bodies, health hazards among other ill effects.

b) In the management of coastal resources, the existing interventions largely depend on zoning regulations and protection of coastal infrastructure, but NAPCC does not highlight issues pertaining to conservation of marine ecosystems and its linkages with sustainability of livelihood for coastal fishing communities. Moreover, India also has several small island territories like Andaman and Nicobar Islands and Lakshadweep where around half a million people dependent on marine resources live. The adaptation framework put forward does not distinguish between necessities in the coastal mainland and necessities for these island territories, which are much more vulnerable and disaster-prone.

c) In the area of disaster management, the mainstay of the Indian response is still on relief and rehabilitation despite government enacting the National Disaster Management Act, 2005, and National Disaster Management Programme, which should have shifted the emphasis to disaster mitigation. The government in its response on coastal management in NAPCC has highlighted creation of infrastructure like cyclone shelters and other protective measures but these measures have largely been entrusted to state/district level planning authorities with no concomitant fund transfers. As per the National Disater Management Act 2005, local planning authorities are instructed to create and prioritise a shelf of projects that require disaster mitigation component to be financed from their annual plan outlay. However, with a dearth of allocation from the Central government for directly financing disaster mitigation projects at the local level and lack of clear policy guidelines, little progress has been made on this front.

The Action Plan has largely overlooked three crucial aspects of development viz. food security, educational infrastructure and housing for the poor. It only makes a cursory reference to infrastructure on education and housing aspects in the section on "Disaster Management Response to Extreme Climate Events". The section notes the necessity and cost-effectiveness of incorporating appropriate features in the initial design and construction of infrastructure projects and the necessity of insuring the existing infrastructure created under *Sarva Shiksha Abhiyan* (SSA), *Jawaharlal Nehru National Urban Renewal Mission* (JNNURM) and *Indira Awas Yojana* (IAY).

Development of housing has immense implications for improvement in the living conditions of the poor and the vulnerable, thereby also for improved health outcomes, which enable the poor to withstand climate related risks better. Likewise, educational infrastructure need to be bolstered against natural disasters as such events can potentially impair abilities of disaster struck areas to attain educational outcomes even after these areas have attained normalcy. On the other hand, this infrastructure can also support extension of relief and rehabilitation in disaster-struck areas. In the present framework, although the government has acknowledged the need for intervention, the programmes/ schemes (in both SSA and IAY) have uniform unit cost across the country except for hilly areas. It thus gives the state or local planning authorities little advantage to incorporate region specific components in infrastructural projects.

2.5 Limitations in the Government Estimation of Spending on Adaptation

The government estimation of expenditure on adaptation in India is composed of a collection programmes/ schemes across the sectors of poverty alleviation, crop improvement, drought proofing and flood control, health improvement and prevention of diseases, risk financing, disaster management and forest conservation. Of these sectors, all except poverty alleviation pertain to interventions in specific vulnerable sectors or areas of concern. NAPCC, in its discussion on the existing measures on adaptation has not elucidated on the interventions on poverty alleviation, which it construes as adaptation, or its linkages with the other sectors. Moreover, the

discussion on mission mode approach in NAPCC focuses on improvement in energy efficiency, ecosystem services and creation of knowledge networks and does not indicate how these measures will complement the existing interventions on improvement in human conditions. Poverty alleviation being a multi-dimensional issue and a large section of poor being dependent on natural resources for basic sustenance, a discussion in this regard should have been forthcoming.

Poverty alleviation constitutes more than 70 percent of the entire expenditure on adaptation as estimated by the government and its importance for securing development, and as a corollary for adaptation, cannot be underrated. For understanding its linkages with adaptation however, caution needs to be exercised. Government interventions in essential sectors like rural infrastructure (PMGSY), housing in urban areas (ISSHU), providing urban amenities in rural areas (PURA), development of small scale industries and its allied services or improvement in working conditions in unorganized sector which can be construed as poverty alleviation measures, have limited potential as adaptation measures. However, poverty alleviation measures pertaining to providing income security (NREGP), alternative livelihoods (SGSY or SJSRY) or ensuring food security are essential not just for ameliorating present vulnerabilities of the poorer population but also to provide a safeguard against any future climatic shocks that can cause loss of livelihood or food insecurity. Hence, to adopt a more direct approach in the case of poverty vis-a-vis adaptation, the present study makes a departure from the government stand in streamlining scheme selection in this sector by focusing on the more direct interventions.

In the case of adaptation intervention in agricultural sector, the government estimation has laid exclusive emphasis on crop improvement and research i.e., new varieties of climate resistant seeds, livestock and fisheries breeding projects, agricultural education and extension services. The necessity of these measures in the case for adaptation to climate change is beyond doubt, but while addressing issues of adaptation in agricultural sector it may be worthwhile to take a more holistic perspective in the nature of sustainability of the sector rather than just securing production or increasing yield. In such a context, there arises the need for inclusion of programmes/ schemes that focus on soil fertility management, pest management, watershed development, development of marketing for agricultural produce and storage facilities, agro-forestry and other services.

In the health sector, the government spends a significant amount of resources in creation of health infrastructure in the form of sub-centres (both rural and urban) to enhance coverage of basic health care services to backward areas. However, inclusion of such provisioning as adaptation may not be a worthwhile strategy, as such services ideally should form the core of development in health sector. On the other hand, to have a comprehensive view of health related vulnerabilities to climate change, augmentation of drinking water supply is crucial for health improvement as is provision of sanitation facilities. Without inclusion of the programmes or schemes addressing these aspects of health improvement, an estimation of adaptation expenditure in this sector may be incomplete.

In the forestry sector, the estimation of expenditure on adaptation places emphasis on schemes and programmes, which are related to aforestation, conservation and regeneration of forestlands, biosphere reserves, mangroves and wetlands and development of environmental information systems and research. However, for sustainability of ecosystems and biodiversity, equally important are protection of keystone wildlife species from extinction, habitat preservation and other related services, which need to be incorporated into any credible framework on adaptation in the forestry and biodiversity sector.

To sum up, estimation of government expenditure as advanced by NAPCC has several lacunae. It has given undue emphasis to certain sectors within poverty alleviation and health improvement while the scope of agriculture and forestry has been restrictive. This has led to an overestimation of expenditure on adaptation in India.

2.6 Concluding Remarks

In India, development priorities form the primary thrust of government expenditure policies both at the Centre and in the States. Given the large amount of developmental deficits that still exist in the country, the impact of these policies have been moderated by different factors, primary among these being faulty implementation, lack of convergence, subversion of regional priorities and needs, corruption and different politically determined factors. Doubts have also been cast about the feasibility of India achieving the UN mandated Millennium Development Goals (MDGs) within the stipulated period.

For developing countries like India, the challenge is to provide basic services and income opportunities to all its citizens and ensure a decent standard of living without embarking on a high-carbon intensive growth path. The challenge can also be seen as an opportunity to redefine the development and growth path through active policy formulation and institutional reforms.

The progress made on development so far has actually fallen short of desirable outcomes as the bulk of the population (mostly in the rural areas) still languishes under the yoke of poverty, largely dependent on agriculture, susceptible to climate conditions and other natural resources for livelihood and sustenance. The present and ongoing challenge that global warming and consequent climate change pose to the Indian developmental paradigm is immense in terms of the sheer numbers of vulnerable population who have so far failed to reap the benefits of developmental gains. There is also the possibility of the present developmental gains falling into jeopardy.

The Government of India implements a number of programmes/ schemes that address the vulnerabilities arising out of climate change as part of its strategic focus on sustainable development. As per Ministry of Environment and Forest (MoEF), six broad sectors have been identified as the focus of adaptation measures currently in progress. Out of all the sectors, the area of intervention which captures bulk of the programmes/schemes and investment is poverty alleviation and livelihood

preservation, constituting more than 70 percent of the total expenditure on adaptation related activities.

It may also be noted that most of these interventions address specific developmental needs related to climate related vulnerabilities, but it remains to be seen whether these interventions address the differential needs, both spatially and temporally, arising out of the present and future climate variations. In the next chapter, a detailed description of the major government programmes/ schemes on adaptation have been provided and outlays quanitified.

Chapter 3

An Assessment of Public Spending on Adaptation in India

In India, the challenges of climate change and its effects are predominantly met with a mix of old and relatively recent policies, programmes/ schemes. These are being implemented across numerous ministries and departments on many thematic domains. Question over the very nature of the scheme (adaptation/developmental) however remains a moot point for public and academic scrutiny. The schematic classification undertaken in Annexure II is a valuable fact sheet to analyze and assess the timeline, nature of the government control and supervision, targeted beneficiaries and lastly, the critical objectives of the programmes/ schemes addressing adaptation needs in India.

3.1 Budgetary Outlays on Adaptation in India

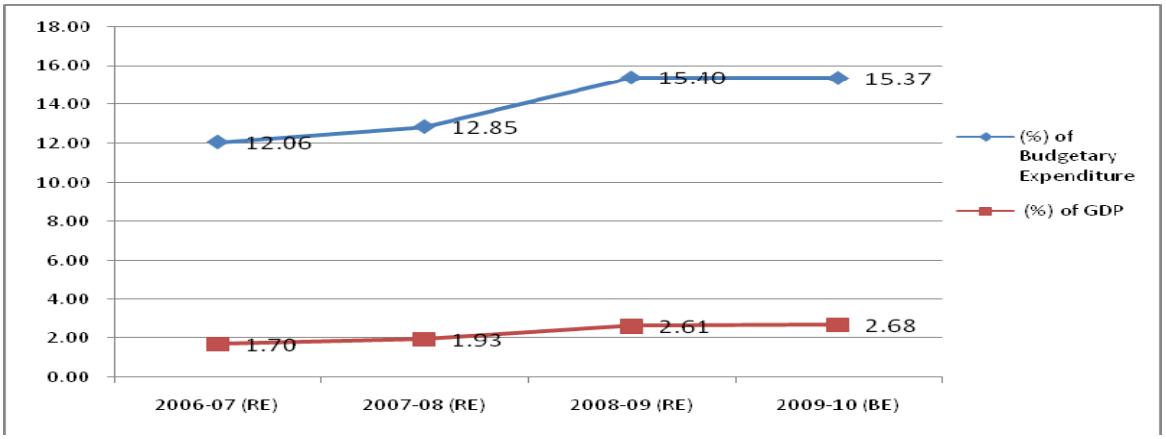
The study has identified several developmental programmes/ schemes operated by the government under various thematic heads, which serves the purpose of adaptation in India. Although, many of these programmes/ schemes were operational even before adaptation to climate change cropped up as a core issue of development, these serve as an important basis for effective adaptation strategies. Contrary to government claims of 2.6 per cent of GDP as of 2006-07, the study found expenditure on adaptation in India to be around 1.7 per cent of GDP as per 2006-07 (RE) (see Chart 1 below). However, expenditure on adaptation by the government has increased at a rapid pace from 2006-07 at an average annual growth rate of 32 per cent and is reported to be around 2.68 per cent of GDP for 2009-10 (BE).

The phenomenal growth in adaptation expenditure is largely driven by superlative growth in allocation in *poverty alleviation, livelihood and food security* and *land development and drought proofing*. In fact, the marked rise in overall allocation for adaptation in India in the financial year 2008-09 can be seen from Chart 1. Given that poverty alleviation, livelihood and food security continues to figure as major developmental issues and recognizing that there are glaring gaps in the outreach of this sector to potential beneficiaries; it inevitably forms the centerpiece for adaptation in India. Quite expectedly then expenditure on poverty alleviation, livelihood and food security forms the major portion of the purported expenditure on adaptation (see Table 1). The objective of such a strategy is that ensuring security of income, livelihood, food and nutrition would enable people to adapt to climatic shocks whenever such situations arise. Whether these programmes/schemes actually enable people to undertake changes in their pattern of livelihood and consumption is difficult to ascertain unless the implementation is carefully reviewed.

A case in point is the National Rural Employment Guarantee Programme (NREGP) implemented by the Government of India directly through the rural local bodies. The

NREGP seeks to provide guaranteed employment to rural unskilled workers at minimum wages and in turn create rural public assets and infrastructure like watersheds, check dams, land improvement and forestry. As a prerequisite, the NREGP guidelines require the local bodies to prepare a shelf of such projects according to the requirement of the area. But, many of these projects suffer from faulty design and lackadaisical implementation due to lack of technical knowhow and adequate human resources for monitoring. Moreover, NREGP does not provide for any kind of skill upgradation of its beneficiaries that would enable these people to adapt to climate shifts by adopting climate friendly livelihoods and practices. Given the limited ambit of the study, ascertaining such experiences and facts for each scheme would have been a time consuming and arduous procedure. The study limits itself to assessing the schemes/programmes for adaptation based on their stated objectives, targeted beneficiaries and intended outcomes.

Chart 1: Trendline of Adaptation Expenditure on Climate Change in India



Acceding that augmenting human capabilities can be an important policy direction for adaptation strategies for a developing country like India with large human development gaps, access to health care services particularly against vector-borne and communicable diseases is a major area of concern apart from poverty alleviation. From tables 1 and 2, the relative focus on this sector as a crucial adaptation sector is apparent, given that it constitutes only 1 per cent of the total budgetary expenditure and as a proportion of GDP has remained almost unchanged over the last four Union Budgets.

Table 1 shows that out of all the thematic areas identified, two sectors have shown significant improvement in terms of sectoral priority over the last four years. These are *Poverty Alleviation, Livelihood and Food Security* and *Land Development*, *Drought Proofing, Irrigation and Flood Control*. However, two sectors viz. *Disaster Management* and *Coastal, Marine and Ocean Management* have miniscule outlays as a proportion of the total budgetary allocation as also in terms of GDP.

Table 1: A Comparative Analysis of Adaptation Expenditure to Budgetary Expenditure & GDP (market prices)

	2006-07 (RE)		2007-08 (RE)		2008-09 (RE)		2009-10 (BE)	
Expenditure on Various Adaptation Sectors	(%) of Budgetary Expenditure	(%) of GDP	(%) of Budgetary Expenditure	(%) of GDP	(%) of Budgetary Expenditure	(%) of GDP	(%) of Budgetary Expenditure	(%) of GDP
Poverty Alleviation, Livelihood & Food Security	8.98	1.26	9.09	1.36	11.68	1.98	11.51	2.01
Health Improvement and the Prevention of Diseases	1.07	0.15	1.18	0.18	1.06	0.18	1.03	0.18
Risk Financing	0.17	0.02	0.27	0.04	0.20	0.03	0.18	0.03
Land Development, Drought Proofing, Irrigation and Flood Control	0.63	0.09	1.07	0.16	1.12	0.19	1.22	0.21
Agriculture & Allied Sectors	0.92	0.13	0.99	0.15	1.11	0.19	1.16	0.20
Forest, Biodiversity, and Wildlife Conservation	0.11	0.02	0.12	0.02	0.10	0.02	0.10	0.02
Water Resources	0.09	0.01	0.08	0.01	0.10	0.02	0.11	0.02
Disaster Management	0.07	0.01	0.02	0.00	0.02	0.00	0.05	0.01
Coastal, Marine and Ocean Management	0.01	0.002	0.014	0.002	0.014	0.002	0.017	0.003
Total	**12.06**	**1.70**	**12.85**	**1.93**	**15.40**	**2.61**	**15.37**	**2.68**

Source of Basic Data: Budget Documents (various years), Govt. of India; CSO estimates of Gross Domestic Product (GDP), www.mospi.nic.in.

The worrisome part of the allocation on adaptation is that out of 2.68 per cent of GDP (in 2009-10 B.E.), adaptation programmes focusing on human capabilities (i.e. *Poverty Alleviation, Livelihood & Food Security; Health Improvement and the Prevention of Diseases and Risk Financing*) constitutes around 2.22 per cent of GDP, while those addressing the human-nature interface (i.e. *natural resource management, common property resources*) constitutes a mere 0.46 per cent of GDP. This shows the lopsided focus of adaptation strategies in India whose mainstay is development rather than addressing critical adaptation areas pertaining to natural resource management. While improvement in human capabilities is important, adequate focus on interlinkages between improvement in ecosystem services and human dependence on these is also needed.

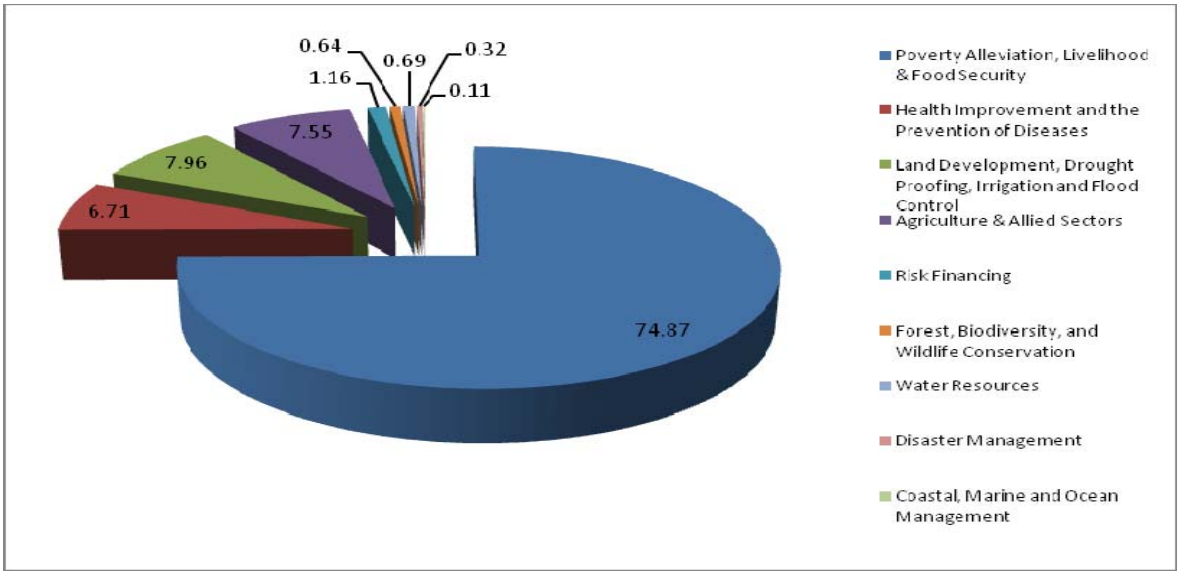
From Table 2, it is apparent that relative importance of certain sectors in the overall spending on adaptation has also declined over the last four years, except for an increase in the share of *Land Development, Drought Proofing, Irrigation and Flood Control*.

Table 2: Sectoral Composition as percentage of Adaptation Expenditure in the Union Budget

S.No.	Adaptation Sectors	2006-07 RE	2007-08 RE	2008-09 RE	2009-10 BE
1	Poverty Alleviation, Livelihood & Food Security	74.41	70.69	75.88	74.87
2	Health Improvement and the Prevention of Diseases	8.91	9.21	6.85	6.71
3	Land Development, Drought Proofing, Irrigation and Flood Control	5.22	8.36	7.25	7.96
4	Agriculture & Allied Sectors	7.64	7.74	7.20	7.55
5	Risk Financing	1.40	2.12	1.27	1.16
6	Forest, Biodiversity, and Wildlife Conservation	0.92	0.93	0.67	0.64
7	Water Resources	0.78	0.65	0.67	0.69
8	Disaster Management	0.61	0.18	0.12	0.32
9	Coastal, Marine and Ocean Management	0.12	0.11	0.09	0.11
	Total	100.00	100.00	100.00	100.00

Source of Basic Data: Budget Documents (various issues), Govt. of India.

Chart 2: Sectoral Composition of Adaptation Expenditure (%) in FY 2009-10 BE



Source of Basic Data: Budget Documents (various years), Govt. of India

While poverty alleviation, improvement in human health and risk management are crucial for policy response to climate change and needs to be prioritized if India is to achieve the requisite Millenium Development Goals (MDGs), there is a clear duality in the policy statement on adaptation brought forth by the government in NAPCC. It is striking that the existing initiatives on adaptation listed in NAPCC cover only *crop improvement, drought proofing, forestry, water, coastal regions, health, risk financing* and *disaster management* and the resources devoted to adaptation constitute around 25 per cent of the total allocation and 0.67 per cent of GDP in 2009-10 while the rest is devoted to *poverty alleviation*. NAPCC also refrains from any clear delineation on the possible linkages between poverty alleviation measures being implemented and any of the other sectors mentioned.

In a nutshell, the assessment of budgetary allocation on adaptation in India brings into sharp focus the contradictions that still exist in the plane of policy statements and resource allocation by the government. It also casts light on the prudence of the estimation of government expenditure on adaptation and thereby, the selection of schemes and programmes as adaptation measures, which the study shows as overestimated. The following section gives a detailed account of programmes/schemes selected by the study as adaptation measures across nine broadly defined thematic sectors.

3.2 Schemes and Programmes on Adaptation in India

In the process of selection of schemes and programmes which cater to the necessities of adaptation in India, the study has categorized nine broad areas of adaptation viz. a) *Poverty alleviation, livelihood, food and nutritional security*, b) *Health improvement and disease control*, c) *Risk financing*, d) *Land development, drought proofing, irrigation and flood control*, e) *Agriculture and allied services*, f) *Forestry and biodiversity*, g) *Water resources*, h) *Coastal, marine and ocean management*, i) *Disaster management*. The rationale for scheme selection of each of these sectors has taken into account the existing vulnerabilities as well as vulnerabilities arising out of purported impacts of climate change, which has been explained as follows:

- For *poverty alleviation, livelihood, food and nutritional security*, schemes which primarily promote income security, alternate livelihood options, strengthen food security and improve nutritional status have been clubbed together as these not only bridge the developmental gaps that exist but also enhance adaptive capacity of individuals to cope with climatic shocks.

- In the case of *health improvement and disease control*, only those schemes were selected, which directly intervened in disease control particularly vector-borne diseases along with schemes that aim to strengthen availability of drinking water and sanitation facilities given their importance in promotion of healthy living conditions and controlling spread of diseases in a developing country like India. Provisioning of housing facilities, both in rural and urban areas, would have been a logical choice for this sector as improvement in living conditions leads to improvement in health outcomes. Given the heavily

centralized nature of allocation for these schemes, which do not distinguish between the differential needs of housing facilities across the diverse geographical and climatic regions of the country, the schemes although address a crucial aspect of development but do not cater to adaptation needs.

- In the case of *land development, drought proofing, irrigation and flood control* schemes pertaining to development of wastelands, watersheds, availability of water through irrigation and flood control measures have been included as these seek to conserve scarce natural resources and common property resources on which livelihoods of a large section of the rural population depend.

- For *agriculture and allied services*, the emphasis has been laid not just on crop improvement through development of climate resistant variety of seeds but also on preservation of soil fertility and pest control, storage of agricultural produce, extension services and education, among others.

- The *forestry and biodiversity* sector includes schemes pertaining to conservation and management of existing forests, afforestation programmes and biodiversity conservation including conservation of certain keystone wildlife species as these are crucial for viability of ecosystems. Additionally, schemes pertaining to conservation of rivers and wetlands, production and dissemination of knowledge and linkages with forestry and livelihood have been included.

- Conservation and sustainable use of *water resources* is crucial for the sustenance of humam life and livelihood and the schemes included in this thematic sector consist of initiatives for preventing pollution of water bodies, major and medium irrigation systems, effluent treatment plants, groundwater management and recharging, among others.

- The thematic sector on *coastal, marine and ocean management* has been broadened from just zoning regulations in coastal areas to include management of coastal and marine resources management, information and observation systems for ocean and related programmes. This has been done to imbue a holistic perspective about protection of coastal assets and conservation and management of living and non-living resources in coastal areas.

- *Disaster management* includes relief and rehabiltitation measures for victims of natural calamities, capacity creation for disaster mitigation, early warning systems, weather forecasts, among others.

3.2.1 Land Development, Drought Proofing, Irrigation and Flood Control

In the last couple of decades, Government has implemented many significant programmes for the development of agricultural and non-agricultural lands whose

implications are of significant value to agriculture sustainability and land productivity and in the larger context of food security.

Three crucial departments, Department of Land Resources (DoLR), Department of Agriculture & Cooperation (DoA&C), and Ministry of Water Resources (MoWR) have been engaged to implement various schemes and programme for the holistic development of land, drought proofing, irrigation and flood control at the central level. There were three standalone Centrally Sponsored Schemes (CSS) such as DPAP, DDP, IWDP implemented since 70s & 80s as drought proofing measures at the national level to tackle negative effects of rising desertification and controlling and combating the spread of wasteland, dry-land and rain-fed areas. In 1995, all three programmes were merged into a broader programme of Integrated Watershed Management Programme (IWMP) with larger mandate and broader guidelines involving crucial decentralised decision making by the rural local bodies. It is also mandated to use low cost technology for the soil and moisture conservation programme like terracing, bunding, trenching, construction of the sustainable watershed management structure, and planting and sowing of multi-purpose trees, shrubs, grasses, legumes, and pasture for land development. Besides, the merged programme also encourages natural regeneration of vegetation and agro-forestry & horticulture, etc. More importantly, the IWMP intends to further the livelihood and economic upliftment of the landless and others belonging to weaker sections of society with focus on women, SC & ST.

Besides DoLR, interventions related to dry-land, rain-fed farming systems & shifting cultivation have been covered through the DoA&C. Various CSS such as Dry land Farming Systems, Rainfed Area Development Programme, Watershed Development Programme for Shifting Cultivation address various crucial needs of the land development through rainwater harvesting, in-situ soil moisture conservation, balanced use of organics manures, etc.. Importance has been attached to promote and adopt alternate land use pattern and improved dryland farming technologies in a cost effective mode. For the protection and development of lands in hilly areas, the Department is implementing Watershed Development Programme against shifting cultivation through different soil and water conservation measures in order to reduce further land degradation process.

Irrigation and flood control are important components not only for sustainable land development processes but also for increasing agricultural productivity and national economic growth. While DoA&C implements the programme of micro irrigation and soil conservation in catchments of river valley projects in the flood prone areas, MoWR implement many flood control programmes as Central Sector Scheme.

For the small and medium irrigation facilities, MoWR is implementing Command Area Development (CAD) Programme and Accelerated Irrigation Benefit Programme (AIBP) to meet the gap between the potential created and its effective utilisation, and to complete ongoing major/medium projects and extension, renovation and modernization of projects in benefiting drought prone areas. Both CAD & AIBP programmes have been implemented since 1974-75 and 1996-97 respectively. It is

an irony that after such a long period of implementation of both the crucial programme for irrigation, huge agricultural lands are still beyond reach of sustainable irrigation leaving farming and agriculture to unpredictable Monsoon. The net irrigated area in India is just 58.54 million hectares out of the 141.32 million hectares of net shown area.

3.2.2 Health Improvement and Prevention of Diseases

The impacts of climate change within the health sector is acute with significantly large number of people suffering mortality and morbidity from heat waves, flood, storms and drought, increased infections like malaria, dengue, Japanese Encephalitis (JE) and water borne diseases such as diarrhoea. Such incidents have been rising in the tropical climatic region of India.

The Central Government's specific interventions in this sector, for adapting to climate change, are focused on surveillance and control of vector-borne diseases and immunisation. Among these, National Vector Borne Disease Control Programme is pursuing an integrated approach for the containment of many vector-borne diseases such as malaria, Lymphatic Filariasis, Kala-azar, Dengue and Chikungunya and Japanese Encephalitis in many high-risk areas. Besides, another Central Sector Scheme, National Integrated Disease Surveillance Programme is also intended to establish a decentralised state based system of surveillance of communicable and non-communicable diseases so that any outbreak can be detected early, in order to initiate rapid response to avert large number of morbidities and mortalities. Child protection against preventable diseases, being crucial to adapting to climate change, the Central government is implementing Routine Immunisation Programme (NRHM) to cover children under six for vaccine preventable diseases (VPD) such as Hepatitis B, Japanese Encephalitis (JE), Measles, BCGs, DPTs, etc.

For the purpose of health improvement, providing clean and safe drinking water and hygenic sanitation facilities are crucial adaptation interventions. There are four crucial centrally sponsored schemes (CSSs) being implemented both for the urban and rural areas. ARWSP a CSS that forms the mainstay of rural drinking water mission is running since 1973-74 and aims to provide "safe" drinking water to uncovered habitations, slipped back and quality affected habitations of biological and chemical contamination. The results are however, far from desired even after a prolonged period implementation of the scheme.

Likewise, the situation of urban drinking water supply has remained below expectation and is emerging as an area of serious concern in rapid climate change vulnerability. The Accelerated Urban Water Supply Programme (CSS), which is running since 1993-94, aims to provide safe and adequate water supply facilities to the entire population of towns having population less than 20,000. The programme also targets drought prone areas as well as areas having excess salinity, fluoride, iron and arsenic content in the water sources and high incidence of water borne diseases.

For universal and hygienic sanitation both for rural and urban India, Central Government has been implementing Central Rural Sanitation Programme (Total

Sanitation Campaign) for rural areas. For urban areas, the government implements Low Cost Sanitation Programme in order to eliminate open defecation practices, converting the existing dry latrines into low cost pour flush latrines, creating new latrines with cost effective and appropriate technologies, promoting ecological sanitation, eliminating manual scavenging, and lastly minimising risk of contamination of drinking water and food. Such schemes for drinking water and sanitation are crucial for the health improvement and can act as crucial mechanisms to tackle climate change implication on human health.

3.2.3 Poverty Alleviation, Livelihood & Food Security

Schemes and programmes for Poverty Alleviation, Livelihood and Food Security are considered crucial adaptation interventions given the figures for poverty in India. As per Planning Commission statistics, approximately 30% of population is Below Poverty Line (BPL) while National Sample Survey (NSS) data on percentage of rural households living below the national average of Monthly Per capita Expenditure (MPCE) is a staggering 50% (with 17% for urban areas). Therefore, the magnitude and focus of India's adaptation schemes and programmes are likely to be crucial on these sectors.

Food subsidy is considered the mainstay for ensuring comprehensive food security in the country. The existing central food subsidy with its two programme wings, Targeted Public Distribution System (TPDS) and Antodaya Anna Yojana is being implemented by the Department of Food & Public Distribution and with SC & ST under BPL families and poorest of poor families under BPL categories identified as targeted beneficiaries. Both the schemes provide foodgrains at a highly subsidized rate (covering 50% of the economic costs) to the consumers. The Central government through Food Corporation of India (FCI) has assumed the responsibility for procurement, storage, transportation and bulk allocation of foodgrains to the states, which in turn distributes the foodgrains to the targeted families. Under Antodaya Anna Yojana (AAY), foodgrains are provided at a Rs 2 per kg for wheat and Rs 3 per kg for rice. The flagship programmes for ensuring food and nutritional security for children and women are Mid Day Meal (MDM) Scheme and Integrated Childs Development Services (ICDS). In MDM, there is a crucial component of providing hot cooked meals to school children both at primary and secondary levels; while in ICDS, nutritional components like Supplementary Nutrition Programme (SNP) for children up to 6 years of age and dry rations to pregnant and lactating mothers are envisaged.

Besides food security, the Department of Rural Development is implementing three important rural livelihood and employment generation programmes for poverty eradication and creation of sustainable rural assets with a focus on BPL and marginal APL families especially women, SC & STs. Swarnajayanti Gram Swarojgar Yojana (SGSY) focuses on gainful sustainable self-employment for the rural poor through self-help group. Government of India also enacted the National Rural Employment Guarantee Act (NREGA) in 2005 under which NREGP is being implemented in rural districts of the country with key environment related components like water conservation and harvesting and drought proofing (including afforestation, tree plantation, renovation of irrigation canals and traditional water bodies, land

development and other flood control works). Apart from providing income security to the rural population, sixty percent of NREGP works are geared for the water conservation and harvesting activities due to which it therefore emerging as a potential adaptation programme for water conservation and land improvement in the country.

The government since 1996-97 is also implementing a Central Sector scheme, Village Grain Banks to ensure civil supplies in food scarce villages in drought prone areas, hot and cold desert areas, tribal areas and inaccessible hilly areas. The target beneficiaries are BPL and AAY families and the scheme is being run by Gram Panchayats, SHGs or NGOs.

In the urban set up, Swarna Jayanti Shahari Rozgar Yojana (SJSRY) is the only programme that aims at gainful employment for the urban poor, unemployed and underemployed through setting up self-employment ventures and provision of wage-employment through creation of suitable community structures. It also makes provisions for capacity building and training of beneficiaries, potential beneficiaries and other persons associated with the Yojana through upgradation and acquisition of vocational and entrepreneurial skills. The Jawaharlal Nehru National Urban Renewal Mission (JNNRUM) and Sub Mission on Basic Services to Urban Poor (SM-BSUP) focus on integrated development of basic services for the urban poor including improved housing, water supply, sanitation and ensuring delivery through convergence of other already existing universal services of the government for education, health, affordable housing and social security.

There are schemes for women and two important sub-plans for SCs and STs for ensuring poverty alleviation, livelihood and food security for many disadvantaged groups. The *Swadhar* and *Swayamsidha Yojana* need particular mention with regards to upliftment of women. In *Swadhar*, the government provides support for food and shelter, counseling, medical facilities and vocational training to women particularly widows, victims of trafficking, victims of natural calamities, women with special needs and destitute women. *Swayamsidha* on the other hand is for holistic empowerment of women through formation of SHGs, awareness generation and economic empowerment through convergence of various schemes concerning women. In the Scheduled Caste Sub-Plan & Tribal Sub Plan (SCSP & TSP), greater thrust has been given to those development programmes related to occupational pattern and the need for increasing productivity and income.

3.2.4 Agriculture and Allied Services

In India, agriculture and its allied sectors are particularly vulnerable to the vagaries of climate change considering that the country is predominantly an agriculture driven economy in terms of rural employment (comprising 52% of workforce), livelihood sustainability, and contribution to country's GDP growth (at present 18.5% of GDP).

The Ministry of Agriculture through its departments of Agriculture and Cooperation; Agricultural Research and Education; and Animal Husbandry, Dairying and Fisheries, runs programmes/ schemes missions for enhancement of agricultural productivity. It

has, in recent years, formulated a comprehensive National Agricultural Policy and National Farmers Policy to spur a growth rate in excess of 4 percent per annum in the agriculture sector through efficient use of resources and conservation of soil, water and bio-diversity. The policy framework maintains that the growth should be sustainable technologically, environmentally and economically.

The ministry also formulated the National Seeds Policy to create an appropriate environment for the seed industry to utilize available and prospective opportunities while safeguarding the interests of farmers and conserving agro-biodiversity. It underscored improving the infrastructure for production of quality seed and community involvement in the efforts through the "Seed Village Programme".

More importantly, the ministry is promoting the Integrated Nutrient Management (INM) programme that envisages soil testing as well as balanced use of chemical fertilizers, bio-fertilizers and organic manures. The National Project on Organic Farming, which is being implemented since 10th Five Year Plan period, promotes development of organic agriculture in the country by augmenting production of organic sources of nutrients like bio-fertilizers, organic manures and compost. The project also assists organic farmers and other farmers, extension staff and organization through capacity building for production and promotion of organic farming. Another Central Sector scheme, National Project on Promotion of Balanced Use of Fertilizers, which started in 1991-92 aims to strengthen and modernize oil testing services so that fertilizer inputs are used judiciously on the basis of the soil test recommendations. It also promotes recycling of organic waste from urban and rural areas by converting it into compost fertilizers.

In order to achieve the targets of crop production, the ministry is also promoting Integrated Pest Management to ensure availability of safe and quality pesticides for sustaining crop production, streamlining quarantine measures for accelerating introduction of new high-yielding crop varieties; eliminating the chances of entry of exotic pests; and promoting human resource development including empowerment of women in plant protection skills.

As Agriculture is a State subject, the primary responsibility for boosting agricultural production, enhancing productivity and exploring the vast untapped potential of the sector rests with the State Governments. However, in order to supplement the efforts of the State Governments, a number of Centrally Sponsored and Central Sector Schemes are being implemented.

Since 2007-08, DoAC has started two important programmes/missions National Food Security Mission (NFSM) and Rastriya Krishi Vikas Yojana (RKVY) particularly focusing on the development of the agriculture sectors particularly in the state and district level. NFSM as 100% CSS envisages increased production and productivity of wheat, rice and pulses on a sustainable basis to ensure food security of the country in the 11th Five Year Plan period. The NFSM (mission mode) targets those districts that have lower productivity than the State average productivity by restoring soil fertility and productivity at the individual farm level through promotion and extension of improved technologies i.e., seeds, integrated nutrient management (including micronutrients),

soil amendments and resource conservation technologies along with capacity building of farmers.

Rastriya Krishi Vikas Yojana (RKVY) on the other hand is a 100 % Central Assistance to State Plan Scheme to incentivize the states to increase public investment in agriculture and allied sectors by ensuring the preparation of agriculture plans for districts and states based on prevalent agro-climatic conditions, availability of technology and natural resources. Under RKVY the states are given flexibility to make choices as per the requirements in planning and expenditure.

The Grameen Bhandaran Yojana, a capital investment subsidy scheme for construction / renovation of rural godowns was introduced in 2001-2002 to bolster agri-marketing and storage in the post-harvest phase. The main objectives of the scheme include creation of scientific storage capacity with allied facilities in rural areas to meet the requirement of farmers for storing farm produce, to prevent distress sales of produce, promote pledge financing and marketing credit and to introduce a national system of warehouse receipts for agricultural commodities stored in such godowns. The project for construction of rural godowns can be taken up by individuals, farmers, groups of farmers/growers, partnership/ proprietary firms, non-government organizations (NGOs), Self Help Groups (SHGs), companies, corporations, co-operatives, local bodies other than Municipal Corporations, federations, Agricultural Produce Marketing Committees, Marketing Boards and Agro Processing Corporations. Assistance for renovation of rural godowns are however restricted to godowns constructed by cooperatives only according to the scheme guidelines.

Other sensitive areas from the perspective of climate change includes cattle development, veterinary services and animal health and development of fisheries both inland and marines. The Central government has made provisions for the National Project for Cattle and Buffalo Breeding Programme and Central Cattle Development Organizations, which includes seven Central Cattle Breeding Farms, Central Frozen Semen Production and Training Institute, and Central Herd Registration Organization located at various places in the country. Besides, the Union Budget also has a provision for livestock health, which includes the scheme of Assistance to States for Control of Animal Disease, National Project on Rinderpest Eradication, and Directorate of Animal Health, which includes Animal Quarantine Certification, Central Disease Diagnostic Laboratories, National Institute of Veterinary, Biological Products Quality Control Centre, Livestock Insurance and Control and Containment of Avian Influenza.

Similarly given the long coastline and numerous rivers across the country, the development of fisheries resources are crucial for many livelihood and conservation of water marine resources. In this respect, the Union Budget has made various provisions for different components of Development of Marine Fisheries, Infrastructure & Post Harvest operations. Furthermore, there are provisions that have been made for Development of Inland Aquaculture and Fisheries, National Programme for Fishermen, Fisheries Training and Extension and Strengthening of Database and Information Networking.

The study has identified the ministry's efforts for diversification of agriculture through the National Horticulture Mission and other technology missions for the Cotton, Jute, Oil seeds, Oil palms, Pulses and Maize development. These schemes are meant to increase productivity and quality keeping in view the livelihood and quality of life of the farming community.

The study also acknowledges the relevance of many R&D programmes for effectiveness and sustainability of the adaptation efforts. For sustainable agriculture, DoAC & DARE have provisions for development of crop science, extension & training, agricultural engineering besides schemes for crucial forecasting of agricultural outputs using Space Agro-Meteorology and land-based observation and forecasting and remote sensing application in crop husbandry.

3.2.5 Risk Management and Price Support

Taking into consideration the diverse agro-climatic region of India, crop insurance is one of the instruments for protecting farmers from crop production related risks caused by adverse weather conditions. Among notable schemes or programmes in this regard since 1999-2000, National Agricultural Insurance Scheme (NAIS) which provide insurance coverage and financial support to farmers in the event of failure of any notified crop due to natural calamities, pests or diseases. The scheme also encourages farmers to adopt progressive farming practices, high value inputs and higher technology in agriculture, and to help stabilize farm incomes, particularly in disaster years.

Likewise, the Weather Based Crop Insurance scheme is being implemented on a pilot basis, since Union Budget 2007-08 made an outlay for the scheme to safeguard farmers against the likelihood of financial loss on account of anticipated crop loss resulting from incidence of adverse conditions of adverse weather conditions like rainfall, temperature, frost, humidity etc.

Agricultural risk management is also complemented by price support mechanisms that the Central government devised through National Agricultural Cooperative and Marketing Federation of India Ltd (NAFED). NAFED offers a Price Support Scheme (PSS) to provide remunerative prices to growers of agricultural commodities on the recommendation of the Commission for Agricultural Costs and Prices (CACP) for each crop session, i.e. Rabi & Kharif. It also makes market interventions through Market Intervention Scheme (MIS) for procurement of horticultural and other agricultural commodities generally perishable in nature and not covered under PSS.

The government is also providing insurance cover in the health sector. The community-based Universal Health Insurance Scheme was announced in Union Budget 2003-04. The scheme offers health protection and easy access to good health services to the disadvantaged sections. Under this scheme, a premium of Re 1 per day for an individual, Rs 1.50 per day for a family of five (including the first 3 children) and Rs 2 per day for a family of seven (including the first 3 children and dependent parents) will be entitled to reimbursement of medical expenses of upto Rs 30,000 towards

hospitalisation, a cover for death due to accident upto Rs 25,000 and compensation due to loss of earning at the rate of Rs 50 per day up to a maximum of 15 days after a waiting period of 3 days. The government also contribute Rs 100 as annual premium for BPL families and is planning to launch health insurance under Urban Health Mission to address health needs of the urban population with a focus on slum (listed and unlisted) dwellers and other disadvantaged sections.

3.2.6 Water Resources

Water resources are another sector very sensitive to climate change. Any change in the rise of surface and air temperature causes variations in the climatic cycle that would alter the pattern of rainfall, affect surface water availability and subsequently, availability and utilization of ground water. Due to rapid process of industrialization and unplanned urbanization, there is unsustainable level of pollution of rivers bodies and lakes in India. The government has initiated seven crucial programmes for the conservation, restoration, reutilization of water bodies that are being implemented across different ministries primarily Ministry of Water Resources (MoWR), Department of Biotechnology (DoB), Ministry of Earth Sciences (MoES) and Ministry of Environment and Forest (MoEF). MoWR has focused on the management and regulation of the ground water resources. The Ministry's Ground Water Management and Regulation scheme is carrying out ground water management studies, ground water exploration aided by drilling to delineate ground water worthy areas, to periodically assess country's ground water resources and revise/update the methodology, establishing/updating of data storage and information system and to carry out geophysical studies through surface and sub-surface methods. Likewise, for effective quality solution for ensuring safe drinking water, DoB has taken up a very important Central sector scheme, Water Technology Initiative, for providing low-cost solutions for domestic use of technologies for safe drinking water. Nano materials and filtration technologies are being used for eradicating biological and chemical contamination of water. The initiative also includes the pilot testing of a credible number of products and referencing of selected technologies to the social contexts of the application regions. MoES on the other hand has initiated Desalinisation Projects in many coastal and island areas to arrest the rapid salination of the drinking water resources of the country.

Besides the problems of drinking water and ground water, the pollution of surface water has wider ramifications with respect to climate change. MoEF is entrusted with two important programmes CSSs, National River Conservation Plan and National Lake Conservation Plan, under the broad programme intervention of Prevention and Control of Pollution. Efforts have been undertaken to intercept and divert wastewater from falling in rivers, treatment of wastewater from recovery of resources such as bio-energy, and other sanitary measures such as low cost sanitation, biological conservation, etc. Under the National Lake Conservation Plan, the objective is to restore and conserve urban and semi-urban lakes degraded due to wastewater discharge, as well as other unique freshwater ecosystems through an integrated approach. MoEF is also implementing a programme for promoting the use of Common

Effluent Treatment Plants (CETPs) in compatible small-scale industries to prevent pollution in such clusters across the country.

3.2.7 Coastal, Marine and Ocean Management

India has 7,500 km of coastline that not only connects nine states but also harbors a sizeable stretch of cultivable land. According to NAPCC, the rise in the sea level is 1.06-1.75 mm per year and if this rate continues, it would threaten many coastal states, endangering the existing ecology and biodiversity. Large tracts of low-lying areas, mangroves and islands would be submerged and become prone to natural calamities. However, such a crucial area has not been prioritized in the policy and programme level. The National Coastal Management Programme is the only CSS being implemented by MoEF (since 1991) for protection and conservation of the coastal environment, which forms the livelihood security of communities along the coastal stretches. It also outlines measures to arrest degradation of the coastal environment due to pollution from land- based activities.

In addition, MoES is implementing several research and development based CSSs to evolve scientific data monitoring changes in ocean and marine areas in terms of effects, impacts and their management in the context of climate change. The Integrated Coastal and Marine Area Management (ICMAM) programme aims to develop Geographic Information System (GIS) information for critical habitats in coastal and marine areas with regard to building of infrastructure, assessment of resources available and possible impacts. The programme has two components, (i) Capacity building and (ii) Development of Infrastructure for R&D, survey and training. The important features of Ocean Observation & Information Service are development of an observation network and coupled ocean atmospheric models.

The Indian National Centre for Ocean Information Services programme on the other hand generates and disseminates user-oriented ocean data/data products in the form of sea surface temperature maps, potential fishing zone maps, ocean state forecast, wind vector maps and mixed layer depth maps. The programme, under MoES, helps in understanding of prior data about cyclones and rise in sea levels. Likewise, the Ocean Data Buoy Programme is designed for strengthening the data buoy network in the Indian Ocean to acquire real-time data on surface meteorological and upper ocean parameters for various operational purposes viz., weather forecast, improve monsoon prediction capability, coastal and offshore developmental activities.

3.2.8 Forests, Biodiversity and Wildlife Conservation

Forests, biodiversity and wildlife conservation in India are crucial areas in the context of climate change. Although the recorded forest cover is 67.71 million hectares (around 20.60% of the total geographical area), the country's per-capita availability of forests is abysmally low in comparison (0.06ha) and even below the world per-capita average (0.08ha). Forests and Wildlife is on the Concurrent List and both the Centre and the states have equal jurisdiction over the subject. MoEF is the nodal ministry at the Centre looking after the domain of forests, wildlife and biodiversity conservation by implementing many important CSSs for protection, conservation and regeneration of

forest resources. Under “Forest Conservation, Development and Regeneration: Strengthening of Forest Divisions” plan scheme, the ministry monitors and evaluates all forest development projects and schemes with emphasis on conservation of forests and to undertake physical inspection of sites in cases of diversion of forest land involving more than 100 ha. Another CSS “Integrated Forest Protection Scheme” includes the features of forest fire control management through the cooperation of state forest department and Joint Forest Management Committees; strengthening of infrastructure for forest protection of forest wealth, conservation of biodiversity and environmental protection. It also plans to carry out a detailed survey of forest areas and demarcation of boundaries to notify forest areas.

MoEF has taken a number of initiatives for promotion of afforestation and eco-developmental activities. Under the National Afforestation and Eco-development Board, it promotes afforestation, ecological restoration and eco-developmental activities in the country with special attention to regeneration of degraded forest areas and land adjoining forest areas, national parks, sanctuaries and other protected areas as well as ecologically fragile areas like the Western Himalayas, the Aravallis and Western Ghats. The National Afforestation Programme (NAP) is an initiative that aims at garnering people's participation in planning and regeneration efforts to ensure sustainability and equitable distribution of forest products from regenerated lands; to promote partnership concepts in management and administration of forests and common property resources. The scheme emphasizes the operationalization of Joint Forest Management Committees (JFMCs) and accepts their stakeholders in the protection and management of forests and forest resources. The new scheme proposed under the 11th Plan has recently also accepted the participation of local communities in the creation and management of social forestry through *Panchayat Van Yojana*.

In response to the continued threat to the country’s fauna, the ministry is implementing wildlife protection and conservation programmes like Project Tiger (initiated in 1973) that focuses on tiger conservation in specially constituted tiger reserves. The project objectives include creation of basic infrastructure for management, habitat development, augmenting water resources, compensatory ameliorative measures for habitat restoration, eco-development, and village relocation, use of technology for monitoring and evaluation of tiger reserves and monitoring of the habitat status. In 1992, the government launched Project Elephant to assist states having free-ranging populations of wild elephants to ensure long-term survival of identified viable populations of pachyderms in their natural habitats. Besides these two projects, MoEF is implementing the CSS, “Assistance for Development of National Parks & Sanctuaries”, to assist states and union territories in development of national parks and sanctuaries and to facilitate expansion of protected areas through creation of infrastructure, financial assistance for eco-development training, capacity building and research, relocation of villages falling within the protected areas, and settlement of rights for better enforcement of the Wildlife (Protection) Act, 1972.

The ministry is also involved in some other important initiatives such as Biosphere Conservation Programme, Mangroves Eco-systems and Wetlands Conservation Programme and Biodiversity Conservation Programme. The main objectives of the Biosphere Conservation Programme is to conserve plant and animal diversity within the natural ecosystem through enhanced protection and management interventions; to ensure sustainable use of natural resources through most appropriate technologies for improvement of socio-economic conditions and local communities, and to facilitate multi-faceted research, monitoring, education and training in Biosphere reserve and potential sites. Under the Mangroves Eco-systems and Wetlands Conservation Programme, it intends surveys, demarcation, afforestation and restoration of mangroves as also to provide alternative livelihoods, protection measures, education and awareness. The objectives of the Biodiversity Conservation Programme are support to the National Biodiversity Authority, facilitating the establishment of State Biodiversity Boards and setting up a database on biodiversity position and protection in the country. It also facilitates training programmes and capacity building for implementation of the Biodiversity Act, 2002.

3.2.9 Disaster Management

Disaster management is a critical component of adaptation to climate change, more so in India, which in recent times has faced several severe natural calamities such as cyclones, storms floods and droughts. However, the management and mitigation of disasters has not been given due weightage in government policies and programmes. The National Disaster Management Programme is the core intervention on disaster mitigation in India. It provides grants-in-aid to various institutes/universities for bringing out literature and organizing various programmes on tackling natural and man-made disasters. It covers assistance for capacity building activities such as human resource development, research and consultancy services, studies, documentation and interaction with regional and international agencies in the field of disaster management. The government has established the Multi-Hazard Early Warning Support System to develop disaster specific adaptable management frameworks by integrating local scale lead-time impact assessment based on early warning, hazard mapping and risk management decision support systems with customized emergency preparedness mechanisms and critical and fail-safe communication. Likewise, the objectives of Tsunami and Storm Surge Warning System programme are to establish an early warning system for oceanogenic disasters such as tsunami and storm surges. The project strengthens the seismic observation station, observation network and installation of real time tide gauge monitoring stations, 24-hour monitoring of the systems for generation of timely warning. Considering that India is highly prone to unpredictable weather, the National Centre for Medium Range Weather Forecasting is developing a global circulation model for preparing weather forecasts in advance.

Two schemes are being implemented for mitigating various health disasters through the Department of Health Research (DoHR). The new scheme, Matter Relating to Epidemics, Natural Calamities and Development of Tools to Prevent Outbreaks seeks to establish a revolving fund to facilitate rapid mobilization of disaster response to the

outbreak of infectious diseases and natural or man-made disasters. Health Sector Disaster Preparedness & Management, including Emergency Medical Relief programme aims to investigate any suspected cases/outbreak among human populations and to create the infrastructure to manage any outbreak. The programme helps in coordinating health relief activities and provides physical and logistic support to the states to counter the effects of disasters on the health sector.

3.3 Concluding Remarks

The overall spending on adaptation shows an increasing trend over the last four years but caution needs to be exercised taking into account methodological issues involved in identifying and assessing programmes/schemes implemented by the government. The caveats are, firstly, the budgetary figures obtained are revised estimates of the government based on the fund releases for the first three quarters of the fiscal and, therefore, may vary marginally from the actual fund utilization for the different programmes/schemes. Even to look at quantity of expenditure may not be sufficient as the quality of expenditure for different interventions usually varies greatly across different states depending on absorptive capacity of each. Secondly, as illustrated in the case of NREGP, many government interventions identified as adaptation measure in the study may by design or through implementation, serve only the developmental purpose without addressing differential needs arising out of climate variability.

Nonetheless, the utility of the study does not singularly revolve around a gross estimation of spending on adaptation. It also provides an approximation of the direction of the present policy regime both in the case of developmental programmes and in the case of adaptation to climate change. As per the benchmark adopted for framework development and analysis, which seeks to identify and segregate programmes/schemes that directly affect and augment human capabilities and those that intend to influence usage of natural resources (thereby trying to inculcate behavioral changes in individual production and consumption decisions), a sharp focus of the government over the former approach rather than the latter is observed. For the second approach, it may be noted that budgetary allocations by themselves may not provide much impact; rather it should be coupled with institutional reforms that redefine property relations and provide direct incentives for conservation of resources. Apart from these, the study has also identified and quantified a number of programmes implemented by the government that promote innovation, research and development. Potentially, these can contribute to policy appraisals and revision through monitoring of climate inputs and reduce future vulnerabilities through development of climate friendly technologies. Details of all the schemes/programmes have been provided in the annexure in the following sections.

Summary of Key Findings

- In the recent past, the National Action Plan on Climate Change (NAPCC) had reported that the Union Government's expenditure on adaptation to climate change in 2006-07 was more than 2.6 percent of GDP. With very little information in the public domain on how this figure was arrived at; the estimation of Union Government's expenditure on programmes / schemes directly addressing adaptation in India done in the CBGA – Oxfam India study, pegs the figure at 1.7 percent of GDP for 2006-07.

- For the four years examined by the study, Union Government's expenditure on adaptation to climate change shows an increase from 1.7 percent of GDP in 2006-07 to 2.7 percent of GDP in 2009-10.

- However, this rise in the expenditure has been largely due to increase in expenditure on some specific programmes relating mainly to poverty alleviation, such as, the National Rural Employment Guarantee Scheme (NREGS) in which Union Government's budget allocation has more than doubled during 2006-07 to 2009-10. Likewise, there has been a significant increase in the Union Budget allocations for programmes / schemes relating to watershed development, e.g. the Integrated Watershed Management Programme (IWMP).

- The study classifies Union Government's expenditure on adaptation to climate change into two broad areas: the first is expenditure towards enhancing human capabilities (programmes / schemes relating to poverty alleviation, health improvement and disease control, and risk management), while the second category is expenditure towards conservation and management of natural resource and human dependence on these (programmes / schemes relating to agriculture and allied services, land development, drought proofing and flood control, water resources, forestry and biodiversity conservation, coastal, and marine resources management, and disaster management).

- The study finds that, in 2009-10 (Budget Estimates), expenditure towards enhancing human capabilities constitutes more than 80 percent of Union Government's total expenditure on adaptation to climate change (i.e. around 2.2 percent of GDP out of the total of 2.7 percent of GDP). The existing budgetary allocation for improvement in ecosystem services (in the context of adaptation) is a meagre 0.5 percent of GDP in 2009-10 (Budget Estimates).

- Moreover, the study points out that, the policy framework on adaptation put forth in National Action Plan on Climate Change (NAPCC) has a number of glaring lacunae. For instance, while the budgetary provisions by Union Government, which can be considered relevant for adaptation, have paid a lot more attention to poverty alleviation (than other sectors within the adaptation

framework), the policy statements on adaptation and the national missions have been silent on how poverty alleviation can be integrated into the overall adaptation framework and linked with other relevant sectors.

- The national missions, proposed in NAPCC, focusing on adaptation are directed mainly towards improvement in sustainability of ecosystem services. The NAPCC has not clarified whether the missions will subsume existing interventions or there will be additional measures supported by additional budgetary provisions.

- Sectors that are crucial to any adaptation intervention such as food security, rural and urban housing for the poor, and health and education infrastructure have received inadequate attention in the policy response on adaptation. These critical sectors need to be integrated into the country's adaptation policy framework.

- Moreover, region-specific vulnerabilities across the country call for region-wise stylized intervention requirements, which can hardly be met under the prevailing system of centrally sponsored programmes / schemes that entail rigid guidelines and uniform unit costs.

- There is a need for greater transparency in the process of formulation of public policies towards adaptation to climate change and the Union Government should include civil society organisations in these processes.

- A comprehensive policy framework on adaptation to climate change, based on the assessment of differential vulnerabilities across the sectors, needs to be formulated with clearly establishing the linkages between the interventions for enhancing human capabilities and those for improving the sustainability of ecosystem services in the country.

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Annexures

Annexure IA: Expenditure from Union Budget on *Adaptation to Climate Change* (Figures in Rs. Crore)

	Sectors of Adaptation @	2006-07 RE			2007-08 RE			2008-09 RE			2009-10 BE		
		Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total	Plan	Non-Plan	Total
1	Poverty Alleviation, Livelihood & Food Security	28010.9	24203.9	52214.8	32912.7	31545.6	64458.3	61625.8	43627.2	105253.0	65015.7	52489.7	117505.4
2	Health Improvement and the Prevention of Diseases	6217.0	33.1	6250.1	8360.7	39.4	8400.2	9453.2	54.6	9507.8	10467.1	59.1	10526.2
3	Land Development, Drought Proofing, Irrigation and Flood Control	3659.2	3.4	3662.6	7616.9	3.4	7620.3	10052.8	3.0	10055.8	12485.6	3.0	12488.6
4	Agriculture & Allied Sectors	4591.3	766.7	5358.0	6351.5	705.8	7057.2	9062.9	931.5	9994.4	10645.3	1211.4	11856.7
5	Risk Financing	697.8	285.0	982.8	1151.0	784.3	1935.2	1370.2	388.0	1758.2	1801.4	12.5	1813.9
6	Forest, Biodiversity, and Wildlife Conservation	602.1	43.7	645.7	800.4	44.9	845.4	877.6	48.6	926.4	951.6	57.3	999.0
7	Water Resources	457.9	88.9	546.8	499.5	97.6	597.1	623.8	304.2	928.0	924.5	153.4	1078.0
8	Disaster Management	164.5	260.5	424.9	97.3	66.8	164.1	82.6	83.7	166.4	149.0	351.9	500.9
9	Coastal, Marine and Ocean Management	52.2	29.9	82.1	58.3	43.0	101.3	88.4	37.9	126.3	133.5	38.3	171.8
	Total Expenditure on Adaptation	44452.8	25715.0	70167.8	57848.2	33330.8	91179.1	93237.2	45478.7	138716.1	102573.7	54376.6	156940.3
	As % of Total Union Budget	**25.7**	**6.3**	**12.1**	**27.9**	**6.6**	**12.9**	**33.0**	**7.4**	**15.4**	**31.6**	**7.8**	**15.4**
	Total Expenditure of the Government	172729.6	408907.5	581637.0	207524.0	501849.2	709373.3	282956.5	617996.9	900953.4	325149.0	695688.7	1020837.7
	GDP (at current prices)			4129173			4723400			5321753*			5856569**
	As % of GDP			**1.70**			**1.93**			**2.61**			**2.68**

Notes: @ Refer to Annexure II and Annexure III for the detailed list of Union Govt. Programmes / Schemes on Adaptation to Climate Change

**GDP for 2009-2010 BE has been projected at Rs.5856569 crore; *the Revised Estimates (RE) of 2008-2009 GDP is Rs.5321753 crore;; R.E. refers to Revised Estimates in Budget; T.E. refers to Total Expenditure; T.B.E refers to Total Budgetary Expenditure of Union Government; A.E. refers to Adaptation Expenditure.

Source: Compiled by the authors from Budget Documents (various years), Govt. of India.

Annexure I B: Share of *Adaptation Expenditure* in Total Expenditure of Ministries / Departments at the Union Level

		2006-07 (RE)			2007-08 (RE)			2008-09 (RE)		
Sl. No	**Ministries / Departments**	**T.E. of Min./Dept** (in Rs. crore)	**A.E. of the Min./Dept.** (in Rs. crore)	**A.E. as % of T.E.**	**T.E. of Min./Dept** (in Rs. crore)	**A.E. of the Min./Dept.** (in Rs. crore)	**A.E. as % of T.E.**	**T.E. of Min./Dept** (in Rs. crore)	**A.E. of the Min./Dept.** (in Rs. crore)	**A.E. as % of T.E.**
1	(D) Rural Development	24297.7	15581.8	64.0	28523.5	19840.0	70.0	56883.5	38863.2	68.0
2	(D) Drinking Water & Supply	5301.6	4770.0	90.0	7461.8	6704.0	90.0	8502.3	7750.0	91.0
3	(D)Land Resources	1421.7	1083.0	76.0	1403.9	1053.6	75.0	1804.7	1440.5	80.0
4	(D) Agriculture & Cooperation	5281.1	2464.1	47.0	4813.5	4613.5	96.0	10327.5	6607.6	64.0
5	(D) Animal Husbandry, Dairying & Fisheries	914.9	361.5	40.0	868.4	294.2	34.0	1015.5	370.8	37.0
6	(D) Health Research	0.0	0.0	0.0	0.0	0.0	0.0	567.0	0.0	0.0
7	(D) Health & Family Welfare	11366.0	701.3	6.0	14500.0	767.4	5.0	17307.0	1803.1	10.0
8	(M) Water Resources	811.5	187.5	23.0	821.7	351.1	43.0	886.2	183.6	21.0
9	(D) Biotechnology	510.0	0.0	0.0	703.0	0.6	0.1	901.5	5.0	0.6
10	(M) Earth Sciences	590.0	165.3	28.0	655.0	146.5	22.0	820.0	122.2	15.0
11	(M) Environment & Forest	1406.2	814.0	58.0	1591.0	941.9	59.0	1722.0	993.8	58.0
12	(D) Food & Public Distribution	24570.0	24203.9	99.0	32060.0	31561.3	98.0	44590.0	43642.5	98.0
13	(M) Housing & Poverty Alleviation	419.9	280.0	67.0	509.8	384.0	75.0	676.9	555.2	82.0
14	(D) School Education and Literacy	17133.0	4813.2	28.0	23191.4	6004.0	26.0	26026.6	7200.0	28.0
15	(M) Women & Child Development	4898.4	3918.7	80.0	5853.0	4812.8	82.0	6919.0	5723.8	83.0
16	(M) Social Justice & Empowerment	1742.8	440.1	25.0	2260.0	487.0	22.0	2475.0	577.7	23.0
17	(M) Tribal Affairs	1663.1	816.7	49.0	1731.1	816.7	47.0	1984.2	860.5	43.0

18	(M) Home Affairs: Other Expenditure of Ministry of Home Affairs	1432.0	266.2	19.0	1245.5	71.6	6.0	1454.4	92.2	6.0
19	(D) Urban Development	2310.6	50.0	2.0	3489.0	32.5	1.0	5165.9	0.0	0.0
20	(M) Finance: Transfer to State & UTs	66153.2	2372.0	4.0	73048.2	6602.0	9.0	90241.0	9506.5	11.0
21	(D) Financial Services*	5196.2	25.0	0.5	41769.0	20.0	0.1	30369.0	176.4	1.0

Notes: @ Refer to Annexure II and Annexure III for the detailed list of Union Govt. Programmes / Schemes on Adaptation to Climate Change

(D) refers to Department; (M) refers to Ministry; T.E. refers to Total Expenditure; and A.E. refers to Adaptation Expenditure.

Source: Compiled by the authors from Budget Documents (various years), Govt. of India.

Detailed List of Union Govt. Programmes / Schemes on Adaptation to Climate Change (Annexure II and Annexure III)

Annexure II: Union Govt. Programmes / Schemes on Adaptation to Climate Change

S. N	Name of Scheme/ Programme	Sanction Year	Nature of Scheme	Ministry/ Department	Target Beneficiaries	Adaptation Feature and Components of the Scheme
Land Development, Drought Proofing, Irrigation and Flood Control						
1	Integrated Wasteland Development Programme	1989-90	Centrally Sponsored Scheme	(D) Land Resources	Farmers in the wasteland areas	The programme includes in situ soil and moisture conservation measures like terracing, bundling, trenching, vegetative barriers and drainage line treatment; planting and sowing of multi-purpose trees, shrubs, grasses, legumes and pasture land development; encouraging natural regeneration; promotion of agro-forestry & horticulture; wood substitution and fuel wood conservation measures; awareness raising, training & extension; encouraging people's participation through community organization and capacity building; drainage line treatment by vegetative and engineering structures; development of small water harvesting structures; afforestation of degraded forest and non forest wasteland; development and conservation of common property resources.
2	Drought Prone Areas Programme	1973-74	Centrally Sponsored Scheme	(D) Land Resources	Farmers in drought prone areas	The programme has drought proofing features by taking up of soil land moisture conservation, water harvesting structures, afforestation and horticulture programmes on a comprehensive micro watershed basis. It has features to minimize the adverse effects of drought on the production of crops, livestock and productivity of land, water and human resources with drought proofing techniques. The programme also promote the overall economic development and improve the socio-economic conditions of vulnerable groups
3	Desert Development Programme	1977-78	Centrally Sponsored Scheme	(D) Land Resources	Farmers in desert prone areas	The programme intends to mitigate the adverse effects of drought as well as combat drought and desertification. It also encourages restoration of ecological balance by conserving, developing and harnessing land, water, livestock and human resources. It also promotes economic development of the village community.

4	Integrated Watershed Management Programme(IWDP, DPAP, DDP)	1995	Centrally Sponsored Scheme	(D) Land Resources	Landless farmers, weaker section of community and women	This programme integrates all inputs that's comes under above IWDP, DPAP, DDP with focus over decentralised decision making, involvement of PRIs, promotion of available low cost technology. It furthers the livelihood and economic upliftment of the landless persons and others belonging to weaker sections such as women
5	Financing Sustainability of Dry land Farming Systems	2007-08	Centrally Sponsored Scheme	(D) Agriculture and Cooperation	Farmers in the arid and semi arid region	Addresses issues like rainwater harvesting and its efficient utilisation; in situ soil moisture conservation; use of organics/organic manures; alternate land use; and adoption of improved dry land farming technologies.
6	Rain Fed Area Development Programme	2008-09	Centrally Sponsored Scheme	(D) Agriculture and Cooperation	Farmers of rain fed areas	Increases agricultural productivity in rain-fed areas, as well as strengthening livelihood supports in the rural areas with the particular aim to achieve comprehensive development in the rain-fed areas through conservation of rain water and optimisation of soil and water resources in a sustainable and cost-effective mode. It also talks about improved moisture management in the rain fed areas
7	Soil conservation in Catchment of River Valley projects in flood prone areas	2000	Centrally Sponsored Scheme	(D) Agriculture and Cooperation		----
8	Watershed Development Programme in shifting cultivation areas	1995	Central Assistance to State Plan as Additional Central Assistance	(D) Agriculture and Cooperation	Jhumia farmers	It is designed to protect and develop the hill slopes of jhum areas through different soil and water conservation measures to reduce further land degradation process. The scheme will be implemented on watershed basis with a cost norm of Rs 10,000/- per ha on net treatable area.
9	Command Area Development Programme	1974-75	Centrally Sponsored Scheme	Ministry of Water Resources		The nature of CAD is to bridge the gap between the irrigation potential created and that utilized through increase in irrigated areas and thereon to increase efficient utilization of irrigation water and improve the agricultural productivity in the irrigation commands.
10	Micro-Irrigation	2006	Centrally Sponsored Scheme	(D) Agriculture and Cooperation	Farmer Community	It increases the area under efficient methods of irrigation, such as drip and sprinkler irrigation as these methods have been recognised as the only alternatives for efficient use of surface as well as ground water resources.

11	Accelerated Irrigation Benefit Programme and other Water Resources Programme (AIBP)	1996-97	Central Assistance to State Plan as Additional Central Assistance	Ministry of Water Resources	Districts with less irrigated areas	Centre to give loan assistance to the states to help them complete ongoing major/ medium projects and extension, renovation and modernization projects in benefiting drought-prone areas; tribal areas; states with lower irrigation development as compared to national average; and districts identified under the PM's package for agrarian distress districts.
12	Flood Control: Emergent Flood Protection in Eastern and Western Sectors	----	Central Sector Scheme	Ministry of Water Resources	Eastern and Western Sectors	It enables the states to take up flood protection measures/works of an emergent nature along with the international rivers (eastern and western sectors).
13	Flood Control: Flood Forecasting	----	Central Sector Scheme	Ministry of Water Resources	----	Flood forecasting and warning system has been planned for the structural measures of flood management, as advance knowledge of incoming floods plays an important role in reducing flood damage as also better planning of rescue/relief operations. Flood forecast also helps in optimum regulation of (multipurpose) reservoirs with or without flood cushions in storage space.
14	Flood Control: River Management Activities and Work related to Border Rivers	----	Central Sector Scheme	Ministry of Water Resources	Border areas	It take up river management activities which includes hydrological observation, investigation and necessary flood control measures
Poverty Alleviation, Livelihood & Food Security						
1	Food Subsidy: Targeted Public Distribution System	1997	Non-Plan Expenditure. It comes under food subsidy	Department of Food and Public Distribution	The SC & ST under BPL families	It identifies rural poor families under BPL within the States and providing them food grains at a highly subsidized rate (covering 50% of the economic costs) to the consumers under the scheme to ensue food security and eradication of poverty. The Central government, through FCI, has assumed the responsibility for procurement, storage, transportation and bulk allocation of food grains to the State Governments.
2	Food Subsidy: Antodaya Anna Yojana	2000	Non-Plan Expenditure. It comes under food subsidy	Department of Food and Public Distribution	Poorest among BPL families	It identifies one crore poorest of the poor families from amongst the number of BPL families covered under TPDS within the States and providing them food grains at a highly subsidized rate of Rs.2/ per kg. for wheat and Rs. 3/ per kg for rice. Thus the entire food subsidy is being passed on to the consumers under the scheme to ensue food security and eradication of poverty

3	Civil Supplies: Village Grain Banks	1996-97	Central Sector Scheme (CS)	Department of Food and Public Distribution	For Below Poverty Line (BPL) and Antodaya Anna Yojana families but Village Panchayat/Gram Sabha, Self-Help Groups or NGOs run the grain bank	Establishing Village Grain Banks in food scarce area like the drought prone areas, the hot and cold desert areas, tribal areas and the inaccessible hilly areas for ensuring food security
4	Integrated Child Development Services	1975	Centrally Sponsored Scheme	(M) Women and Child Development	Children and Women	Seeks to provide an integrated package of health, nutrition and educational services to children up to six years of age, pregnant women and nursing mothers. The package includes supplementary nutrition, immunization, health check-up, referral services, nutrition and health education and non-formal preschool education.
5	Swadhar	2001	Centrally Sponsored Scheme	(M) Women and Child Development	Women	The objective of the scheme is to comprehensively rehabilitate widows, victims of trafficking, victims of natural calamities, mentally disordered and destitute women. The scheme provides for support like food and shelter, counselling, medical facilities and vocational training to women. The scheme also envisages setting up help-lines for women in distress.
6	Swayamsidha	2001	Centrally Sponsored Scheme	(M) Women and Child Development	Women	This is an integrated scheme of Ministry of Women & Child Development for holistic empowerment of women through formation of Self Help Groups (SHGs), awareness generation, economic empowerment and convergence of various schemes.
7	Swarnajayanti Gram Swarozgar Yojana (SGSY)	1999	Centrally Sponsored Scheme	(D) Rural Development	BPL and marginally APL family	To provide sustainable self-employment to the rural poor through SHGs
8	Sampoorna Gramin Rozgar Yojana (SGRY)	2001	Centrally Sponsored Scheme	(D) Rural Development	All rural poor (preference to women, SC/STs and parents of child labour	Creation of durable community, social and economic assets and infrastructural development in rural areas such as construction of village infrastructure and link roads, primary school building, dispensaries, veterinary hospitals, marketing infrastructure and Panchayat Ghars

9	National Employment Guarantee Schemes	2006	Centrally Sponsored Scheme	(D) Rural Development	All rural households	Water conservation and water harvesting, Drought Proofing (including afforestation and tree plantation, irrigation canals, renovation of traditional water bodies, land development, flood control works. It also focuses all weather access Rural connectivity and creating durable public assets
10	JNNRUM: Sub Mission on Basic Services to Urban Poor (SM-BSUP)	2005	Central Assistance to State and Uts Plan	(M) Finance	Urban poor	The submission under JNNRUM focused attention to integrated development of basic services to the Urban Poor in the cities covered under the Mission including security of tenure at affordable prices, improved housing, water supply, sanitation and ensuring delivery through convergence of other already existing universal services of the Government for education, health, affordable housing and social security. Effective linkages between asset creation and asset management so that the Basic Services to the Urban Poor created in the cities, are not only maintained efficiently but also become self-sustaining over time.
11	Swarna Jayanti Shahri Rojgar Yojana	1997	Centrally Sponsored Scheme	(M) Housing & Urban Poverty Alleviation	Urban poor	The Yojana intends to provide gainful employment to urban poor, unemployed and underemployed through setting up self employment ventures and provision of wage-employment also by empowering community through creation of suitable community structures. It also makes provisions for capability building, and training of beneficiaries, potential beneficiaries and other persons associated with the urban employment programme for up gradation and acquisition of vocational and entrepreneurial skills. It provides scope for Women's Group for to be engaged in micro-enterprises
12	Nutritional Support to Education (Mid Day Meal)	1995	Centrally Sponsored Scheme	(D) School Education and Literacy	Children in Primary & Secondary school	The scheme is intended to improve the nutritional status of children in the Government, Local Body and Government aided schools, and EGS and AIE centers, encouraging poor children, belonging to disadvantaged sections, to attend school more regularly and help them concentrate on classroom activities. It also provides nutritional support to children of primary stage in drought affected areas during summer vacation.
13	Special Assistance to Scheduled Castes Sub Plan	1998	Special Central Assistance	(M) Social Justice and Empowerment	Scheduled Caste Population	The SCCP intends to give a thrust to the development programmes for Scheduled Castes with reference to their occupational pattern and the need for increasing the productivity of and income from their limited resources. It will help in bringing about occupational diversification in the labour surplus economy. SCA provides a thrust to family oriented schemes of economic development of SCs below the poverty line.

14	Tribal Sub Plan	1974-75	Special Central Assistance	(M) Tribal Affairs	Scheduled Tribal population and areas	It is meant for filling up of the critical gaps in the family-based income generation activities of the tribal population and areas and also cover the employment-cum-income generation activities and the infrastructure so as to boost the demand based income-generation programmes in tribal areas and thus raise the economic and social status of Tribal. The programme "Development of Forest Villages" is also funded under this head.
15	Self Employment Scheme of Liberation and Rehabilitation of Scavengers	1992	Centrally Sponsored Scheme	(M) Social Justice and Empowerment	Scheduled Caste Population engaged with manual scavenging	The scheme aims at rehabilitation of remaining scavengers and their dependents in a time bound manner. Under the Scheme, loan, subsidy and training are provided to the beneficiaries for gainful self/wage employment.
16	Prime Minister's Employment Generation Programme	2008	Central Sector Scheme	(M) Micro, Small and Medium Enterprises	First generation entrepreneurs in rural and urban areas.	The main objective of this programme is to generate employment opportunities by assisting establishment of micro enterprises in rural as well as urban areas by the first generation entrepreneurs. The scheme is expected to increase the participation by and coverage of rural beneficiaries by KVIC and State Governments in a more focused manner through rationalized implementation, focused EDP training, monitoring and verification procedures to be piloted and coordinated by KVIC and District Industries Centres (DICs) of State Governments. The funds earmarked under the scheme would be utilized for providing subsidy to the beneficiaries through Banks and meeting cost of training as well as backward and forward linkages.
17	Rural Employment Generation Programme			(M) Micro, Small and Medium Enterprises		The programme is being implemented by the KVIC, capital subsidy in the form of margin money is provided for setting up labour-intensive projects in rural areas as well as in small towns with population upto 20,000. The objective of this programme is to provide employment to the people in rural areas and small towns, thereby reducing the migration from the rural to urban areas.
18	Prime Minister's Rozgar Yojana	1993	Central Sector Scheme	(M) Micro, Small and Medium Enterprises	Educated and Unemployed Youth	The objective of the scheme is making available institutional finance to the educated unemployed youth for setting up self-employment ventures for all economically viable activities and creation of new job opportunities.
Health Improvement and the Prevention of Diseases						
1	National Vector Borne Disease Control Programme (NRHM)	2005	Central Sector Scheme	(D) Health & Family Welfare	high risk areas are generally rural, tribal and urban slums inhabited by the poor, marginalised and vulnerable sections	The programme undertake an integrated approach for the containment of vector borne diseases such as Malaria, Lymphatic Filariasis, Kala-Azar, Dengue/Chickungunya, and Japanese Encephalites (JE). The main components are training of health personnel and health volunteers to tackle the victor borne diseases through Annual Blood Examination Rate (ABER), Annual Parasite Incidence(API); Monitoring of vector populations in vulnerable areas; strengthening of sero-surveillance activities at regular intervals; Augmentation of IEC with the objective of behaviour change communication

2	National Integrated Disease Surveillance Programme (NRHM)	2005	Central Sector Scheme	(D) Health & Family Welfare	Surveillance of both State and District level	To establish a decentralised state based system of surveillance of communicable and non-communicable diseases so that any outbreak can be detected early in order to initiate rapid response to avert large number of morbidities and mortalities
3	Routine Immunisation (NRHM)	First introduced in 1985 under UIP; in 1997 are part of RCH and since 2005 it is part of NRHM	Central Sector Scheme	(D) Health & Family Welfare	Children below 6 years of age	Routine Immunisation of the children against 6 vaccines preventable diseases (VPD) and reduction in morbidity and mortality rate. The vaccines cover under this programme are Hepatitis B and Japanese Encephalites (JE), Measeals, BCGs, DPTs, etc
4	Central Rural Sanitation Programme: Total Sanitation Campaign	1999	Centrally Sponsored Scheme	(D) Drinking Water and Sanitation	Universal coverage, however focus over Below Poverty Line (BPL), Women and Children	Elimination of the open defecation from the rural areas resulting better and healthy quality of life, creating hygiene education and awareness, encouraging cost effective and appropriate technologies in sanitation, minimising risk of contamination of drinking water and food, converting dry latrines to pour flush latrines and eliminating manual scavenging practices wherever exists in rural areas
5	Accelerated Rural Water Supply Programme	1973-74	Centrally Sponsored Scheme	(D) Drinking Water and Sanitation	Ensuring full coverage in rural habitations with special emphasis on disadvantaged sections including SC/ST	It intends to provide 'safe' drinking water to uncovered habitations, slipped back habitations and quality affected habitations of biological and chemical contamination
6	Low Cost Sanitation Programmes	1980-81	Centrally Sponsored Scheme	(M) Housing & Urban Poverty Alleviation	All small and medium towns	It converts the existing dry latrines into low cost pour flush latrines and to construct new ones where none exist; to eliminate the open defecating practices in the urban areas and manual scavenging.

7	Urban Water Supply & Sewage: Accelerated Urban Water Supply Programme	1993-94	Centrally Sponsored Scheme	(M) Urban Development	The most vulnerable sections of the population such as women, children and other deprived sections	Provide safe and adequate water supply facilities to the entire population of the towns having population less than 20,000 (as per 1991 Census) in the country; within a fixed time frame; to improve the environment and the quality of life and better socio-economic conditions. It also targets drought prone areas as well as excess salinity, fluoride, iron and arsenic content in the water sources, and high incidence of water borne diseases
					Risk Financing	
1	National Agriculture Insurance Scheme (NAIS)	1999-2000 Rabi session	Central Sector Scheme	(D) Agriculture & Cooperation	Farmers community	It Provides insurance coverage and financial support to the farmers in the event of failure of any of the notified crops as a result of natural calamities, pest and diseases; to encourage the farmers to adapt progressive farming practices, high value in-puts and higher technology in agriculture and to help stabilise farm incomes particularly in disaster years
2	Weather based Crop Insurance	2004 Kharif session	Central Sector Scheme	(D) Agriculture & Cooperation	Pilot Project on two/three states	It provides insurance protection to the farmers against adverse incidence of weather parameters like un-seasonal rainfall, frost, heat (temperature) etc.
3	Grant to NAFED for MIS/PSS	2007-08	Non-Plan Grants	(D) Agriculture & Cooperation	All farmers	It acts as the Minimum Support Schemes (MSS) and Market Intervention Scheme (MIS) for the agricultural commodities, both in terms of perishable and non-perishable nature, so that farmers does not make distress sale and markets gets stabilised
4	Health Insurance (Urban Health Mission)	2007-08		(D) Health & Family Welfare	All listed and unlisted slum population	To address their health concerns and increase their quality of life

5	Community-based Universal Health Insurance Scheme	2003-04	Non-Plan Grants (Subsidies to Public Sector General Insurance Companies)	Ministries of Finance/Payment to Financial Institutions	Disadvantaged Sections	It offers health protection and easy access to good health services to the disadvantaged sections. Under this scheme, a premium of Re 1 per day for an individual, Rs 1.50 per day for a family of five (including the first 3 children) and Rs 2 per day for a family of seven (including the first 3 children and dependent parents) will entitle eligibility to get reimbursement of medical expenses up to Rs 30,000 towards hospitalisation, a cover for death due to accident up to Rs 25,000 and compensation due to loss of earning at the rate of Rs 50 per day up to a maximum of 15 days.
6	Credit Support Programme	---	Central Sector Scheme	(M) Micro, Small and Medium Enterprises	Women, Scheduled Castes, Scheduled Tribes and Minorities	The programme provides contributionto the Credit Guarantee Fund Trust for Micro and Small enterprises (CGTMSE) for providing guarantee cover to Commercial Banks for extending loans to Small/Tiny Units without any collateral. Under this head, Government will provide assistance to SIDBI to create Portfolio Risk Fund for credit operations for micro enterprises. Under this scheme, assistance will also be given for empowerment of women owned Enterprises and Scheduled Caste/Scheduled Tribes and Minorities.
Agriculture and Allied Activities						
1	National Project on Promotion of Balanced Use of Fertilisers	---	Central Sector Scheme	(D) Agriculture & Cooperation	All categories of Farmers	Financial support to the production units of bio-fertilisers, compost and vermin compost
2	National Project on Organic Farming	2004	Central Sector Scheme	(D) Agriculture & Cooperation	Farmers community in hilly, rain fed and North Eastern States in which there is low level of fertilisers consumption	The main intervention are (i) setting up of organic inputs units such as fruits/vegetable waste compost units; bio-fertiliser production units and vermiculture hatcheries; (ii) various field demonstrations on organic inputs including vermi-compost/city compost; use of enriched biogas slurry; and setting up of model organic farm(iii) training and capacity programme for certification and inspection agencies/service providers, organic inputs production and quality control, fields functionaries/extension officers and farmers training. It also involves for market development and promotion of the organic farming.

3	Plant Protection: Integrated Pest Management Programme	1991	Central Sector Scheme	(D) Agriculture & Cooperation	All categories of Farmers	Maximum crop production with minimum input costs; minimise environmental pollution in soil, water and air due to pesticides; minimise occupational health hazards due to chemical pesticides; preserve ecosystem and maintain ecological equilibrium and no or less use of chemical pesticides for minimum pesticide residues.
4	Plant Protection: Strengthening and modernisation of Plant Quarantine Facilities in India	1991	Central Sector Scheme	(D) Agriculture & Cooperation	----	Inspection of imported and exported agricultural commodities for preventing the introduction of exotic pests and diseases inimical to Indian fauna and flora; detection of exotic pests and diseases already introduced for containing/controlling them by adopting domestic quarantine regulations; undertaking post entry quarantine inspection in respect of identified planting materials and pest risk analysis
5	Plant Protection: Monitoring of Pesticide residue at National Level	1991	Central Sector Scheme	(D) Agriculture & Cooperation	----	To synthesise data and information being generated by various agencies to create a national repository to enable policy initiative for focused IPM, GAP, etc
6	National Food Security Mission	2007-08	Centrally Sponsored Scheme	(D) Agriculture & Cooperation	All categories of Farmers	The intervention relate to demonstration of improved production technology, distribution of quality seeds of high yielding varieties and hybrids, popularization of newly released varieties, support for macro nutrients, gypsum zero tillage, integrated pest management, integrated nutrient management
7	Agriculture Marketing: Grameen Bhandaran Yojana (Rural Godowns)	2002	Central Sector Scheme	(D) Agriculture & Cooperation	Framers community in Rural Area	Storage facilities in the doorsteps of farmers will help in reduction of post-harvest losses and prevention of distress sale of agricultural produce.
8	Rashtriya Krishi Vikas Yojana	2007	Central Assistance to State Plan as Additional Central Assistance	(D) Agriculture & Cooperation	Farmers community	The objectives is to incentivise the states so as to increase public investment in Agriculture and allied sectors and also in the preparation of agriculture plans for the districts and the states based on agro-climatic conditions, availability of technology and natural resources.

9	Macro Management of Agriculture (MMA)	2000-01	Centrally Sponsored Scheme	(D) Agriculture & Cooperation	Farmers community	MMA is formulated with the objective to ensure that central assistance is spent on focused and specific interventions for the development of agriculture in states. The scheme provides sufficient flexibility to the states to develop and pursue the programmes on the basis of their regional priorities. It is conglomeration of 17 schemes for the cooperative management of the agriculture, crop production programmes (for rice, wheat, coarse cereals, jute, sugarcane), watershed development programmes (NWDPRA, River Valley Projects [RVP]/Flood-Prone Rivers [FPR]), horticulture, fertilizer, mechanization and seeds production programmes.
	National Horticultural Mission	----	Centrally Sponsored Scheme	(D) Agriculture & Cooperation	----	To give impetus to the encouraging growth in cultivation of fruits, vegetables, flowers, spices, etc., a National Horticulture Mission has been launched to double production. The goal is to make available horticulture produce; improve economic conditions of the farmers by sustaining golden revolution and to increase exports.
	Control of Shifting Cultivation	----	Central Assistance to State Plan	(D) Agriculture & Cooperation	----	
10	Cattle Development	----	Centrally Sponsored Scheme	(D) Animal Husbandry, Dairying & Fisheries	----	It is a national project on cattle and buffalo breeding programme and includes central cattle development organisations consisting of seven central cattle breeding farms, central frozen semen production and training institute and central herd registration organisation located at different stations in the country.
11	Veterinary services and animal health	----	Centrally Sponsored Scheme	(D) Animal Husbandry, Dairying & Fisheries	----	
12	Marines Fisheries	----	Centrally Sponsored Scheme	(D) Animal Husbandry, Dairying & Fisheries	----	
13	Inland Fisheries	----	Centrally Sponsored Scheme	(D) Animal Husbandry, Dairying & Fisheries	----	

Water Resources						
1	Ground Water Management and Regulation	---	Central Sector Scheme	(M) Water Resources	----	Main objectives of the scheme are to carry out ground water management studies, ground water exploration aided by drilling to delineate ground water worthy areas, to periodically assess country's ground water resources and revise/update the methodology, establishing/updating of data storage and information system and to carry out geophysical studies through surface and sub-surface methods.
2	Water Technology Initiative	---	Central Sector Scheme	(D) Biotechnology	----	The focus of the program is in design and development of low cost solutions for domestic use of technologies for safe drinking water. Ensuring quality is the main consideration of safe drinking water research. Nano materials and filtration technologies are being used for eradicating biological and chemical contamination of the water. The initiative also include the pilot testing of a credible number of products and referencing of selected technologies to the social contexts of the application regions.
3	Desalination Project	---	Central Sector Scheme	(M) Earth Sciences	----	The project intends to establish such desalination plants along the coast and island territories of India to alleviate drinking water problem of coastal region.
4	Promotion of Common Effluent Treatment Plants	----	Centrally Sponsored Scheme	(M) Environment & Forest	----	The programme intends to treat the effluent emanating from the clusters of compatible small scale industries through construction and operation of the CETPs in many polluted clusters across country
5	Artificial Recharge of Ground Water through Dug wells	2008	Other Payments to Financial institutions	(M) Finance	Farmers Community	The objective of the Scheme is to recharge the existing dug wells using rainfall run-off from the agricultural fields to facilitate improvement in ground water situation in the affected areas which in turn will improve the over all irrigated agricultural productivity and help in improving the quality of ground water especially in the fluoride affected areas.
6	Prevention and Control of Pollution: National River Conservation Plan	1995	Centrally Sponsored Scheme	(M) Environment & Forest	All polluted river bodies	Under the National River Conservation Plan, efforts have been undertaken to intercept and divert waste water from falling in rivers, treatment of waste water from recovery of resources such as bio-energy, and other sanitary measures such as low cost sanitation, biological conservation, etc.
7	Prevention and Control of pollution: National Lake conservation Plan	2001	Centrally Sponsored Scheme	(M) Environment & Forest	All polluted lakes	The objective of the scheme is to restore and conserve the urban and semi-urban lakes of the country degraded due to wastewater discharge into the lake and other unique freshwater ecosystems through an integrated ecosystem approach.

Coastal, Marine and Ocean Management						
1	National Coastal Management Programme	1991	Central Sector Scheme	(M) Environment & Forest	Local communities in the coastal area	The National coastal Management Programme intends to carry out the protection and conservation of the coastal environment, protection of local communities and livelihood security along the coastal stretches, promotion of sustainable development along the coastal stretches and finally measures to control deterioration of coastal environment due to pollution arising from the land based activities
2	Integrated Coastal & Marine Area Management *(ICMAM)*	----	Central Sector Scheme	(M) Earth Sciences	----	The programme intends to develop GIS based information system for critical habitats in the coastal and marine areas in India with regard to building of the infrastructure, assessment of the resources available and possible impacts. The programme also has two components, namely (i) Capacity building and ii) Development of Infrastructure for R&D, Survey and Training.
3	Marine Non-living Resources Programme	----	----	(M) Earth Sciences	----	
4	Oceanographic Survey (ORV and FORV) and Marine Living Resources (MLR)	1984	----	(M) Earth Sciences	----	The programme is meant to make oceanographic survey and conducts research on both non-living and living resources in vast ocean areas particularly in Exclusive Economic Zone (EEZ) including Central Indian Ocean Basin and Southern Ocean.
5	Coastal Ocean Monitoring & Prediction System	----	Central Sector Scheme	(M) Earth Sciences	----	---
6	Ocean Observation & Information services	----	Central Sector Scheme	(M) Earth Sciences	----	It has some important features namely observation network and development of coupled ocean atmospheric models. The data arises from this programme from the sea around India are being used for various operational and research purposes including forecasting of cyclones and understanding the climate variability. Various basic issues on the ocean dynamic, climate variability, ocean state forecast, sea level variations, ocean flux studies etc, are met through this programme.

7	Ocean Data Buoy Programme	----	Central Sector Scheme	(M) Earth Sciences	----	The programme is designed for strengthening the Date buoy network in the Indian Ocean to acquire real-time data on surface meteorological and upper ocean parameters for various operational purposes viz., weather forecast, improve monsoon prediction capability, coastal and offshore developmental activities.
8	Indian National Centre for Ocean Information Services	----	Central Sector Scheme	(M) Earth Sciences	----	The programme is to generate and disseminate user-oriented ocean data/data products in the form of sea surface temperature maps, potential fishing zone maps, ocean state forecast, wind vector maps, mixed layer depth maps, etc. This programme helps in understanding prior data about the cyclone and sea level rise in India.
Forest, Biodiversity, and Wildlife Conservation						
1	Forest Conservation, Development and Regeneration : Regeneration-Strengthening of Forest Divisions	----	Central Sector Scheme	(M) Environment & Forest	----	The plan scheme monitor and evaluate, among other , all forest development projects and scheme with specific emphasis on conservation of forests and to undertake physical inspection of site in cases of diversion of forestland involving more than 100ha, etc.
2	Integrated Forest Protection Scheme	1997	Centrally Sponsored Scheme (CSS)	(M) Environment & Forest	Forest and its inhabitants	The scheme includes the features of forest fire control management through the cooperation of state forest department and Joint Forest Management Committees; strengthening of infrastructure for forest protection of forest wealth, conservation of biodiversity and environmental protection; it also intends to carry out detailed forest survey of forest areas and demarcation of the forest boundaries and notify the forest areas
3	Project Tiger	1973	Centrally Sponsored Scheme (CSS)	(M) Environment & Forest	Conservation of Tiger and also fucus over the welfare of the ST and local inhabitant of the conserve area	The scheme includes the features of strengthening of the protections, creating basic infrastructure for management, habitat development, augmenting water resources, compensatory ameliorative measures for habitat restoration, eco-development, village relocation, use of technology for monitoring and evaluation of tiger reserves, monitoring of the habitat status, etc.
4	Project Elephant	1992	Centrally Sponsored Scheme	(M) Environment & Forest	Conservation of Elephant	To assist States having free ranging populations of wild elephants to ensure long term survival of identified viable populations of elephants in their natural habitats

5	Welfare of Animals	---	Central Sector Scheme	(M) Environment & Forest	Distressed Animal	Important activities under the scheme are construction of shelter houses, animal birth control, immunisation, ambulance services and also provide help for the animal welfare in the case of famine, drought, earthquake and other natural disasters
6	Assistance for Development of National Parks & Sanctuaries	----	Centrally Sponsored Scheme	(M) Environment & Forest	Forest and National Parks and Sanctuaries	The main objectives of the scheme is to assist States/UTs in development of National Parks & Sanctuaries and to facilitate and encourage expansion of the protected areas network through creation of infrastructure, financial assistance for eco-development training, capacity building and research, and relocation of villages falling within the protected areas and settlement of rights for better enforcement of wildlife (protection) Act, 1972
7	Integrated Development of Wildlife Habitats	----	Centrally Sponsored Scheme	(M) Environment & Forest	Protection of wildlife-critically endangered species and habitats and also Community in the protected areas	The primary objectives of the scheme are to provide financial and technical assistance to State/UT Governments for the conservation and management of National Parks and Sanctuaries. It also has components like assistance to conservation reserves and community reserves, protection of wildlife outside protected areas and recovery programme for saving critically endangered species and habitats
8	National Afforestation and Eco-development Board	1992	Central Sector Scheme	(M) Environment & Forest	Degraded forest and ecologically fragile areas	It promotes afforestation, tree falling, ecological restoration and eco-developmental activities in the country with special attention to the regeneration of degraded forest areas and land adjoining forest areas, national parks, sanctuaries and other protected areas as well as the ecologically fragile areas like the Western Himalayas, Aravallies, Western Ghats etc.
9	National Afforestation Programme	1972	Centrally Sponsored Scheme	(M) Environment & Forest	Protection of forest through people's participation	Regeneration and eco-development of degraded forests and adjoining areas on a watershed basis by securing people's participation in planning and regeneration efforts to ensure sustainability and equitable distribution of forest products from the regenerated lands and to promote the partnership concepts in the management and administration of forests and common property resources. The scheme particularly emphasizes the operationalization of the Joint Forest Management Committees (JFMCs)
10	Wildlife Preservation: Biodiversity Conservation and Rural Livelihood Improvement Project (EAP)	2008	External Aided Project (EAP)	(M) Environment & Forest	People's participation in biodiversity protection	Biodiversity conservation and rural Livelihood improvement through testing and establishing decentralised participatory approaches across different important nationally landscapes under different management regime. This is being done through Externally Aided Projects under Global Environmental Facility (GEF)

11	Social Forestry with Communities (Panchayat Van Yojana)	New Scheme	Centrally Sponsored Scheme	(M) Environment & Forest	Local Panchayat	Afforestation on various categories of vacant public land involving PRIs
12	Biosphere Conservation Programme	1986	Centrally Sponsored Scheme	(M) Environment & Forest	Protection of natural ecosystem through people participation	The main objectives of the scheme is to conserve the plant and animal diversity within natural ecosystem through enhanced protection and management interventions; to ensure sustainable use of natural resources through most appropriate technologies for improvement of socio-economic conditions and local communities, and to facilitate multi-faceted research, monitoring, education and training in Biosphere reserve and potential sites
13	Mangroves Eco-systems and Wetlands Conservation Programme	1987	Centrally Sponsored Scheme	(M) Environment & Forest	Mangrove and wetland conservation	The program intends to make survey, demarcation, afforestation and restoration of the mangroves and also provide alternative and supplementary livelihoods, protection measures, education and awareness.
14	Natural Resources Management Programme		Centrally Sponsored Scheme	(M) Environment & Forest		It involves utilisation of remote sensing technology for accurate inventory of resources such as land , water, forest, minerals, ocean, etc. and to utilise this information for monitoring changes in the ecological system.
15	Biodiversity Conservation Programme	----	Centrally Sponsored Scheme	(M) Environment & Forest	Biodiversity conservation programme through institution building	The objectives of the programme is to support institutions including National Biodiversity authority for the conservation of Biodiversity and to support and facilitate in the establishment of State Biodiversity Boards and to set up date base for the biodiversity position and protection in India. It also facilitate training programmes & capacity building for implementation of the Biodiversity Act, 2002
Disaster Management						
1	National Disaster Management Programme		Central Sector Scheme	(M) Home Affairs		The programme is the core programme of disaster management in India. It provides grants-in aid to various to various institutes/universities for bringing out literatures/organising various programmes in tackling natural disasters and man made disasters. It also covers assistance to capacity building activities such as human resources development, research and consultancy services, studies, documentation and interaction with regional and international agencies in the field of disaster management. It also includes provision for ex-gratia assistance to victims of disaster, relief for earthquake victims.

2	Multi-Hazard Early Warning Support System	----	Central Sector Scheme	(M) Earth Sciences	----	The objectives is to develop disaster specific adaptable management frameworks by integrating local scale lead time impact assessment based on early warning, hazard mapping and risk management decision support systems with customised emergency preparedness mechanisms and critical and fair-safe communication.
3	Tsunami and Storm Surge Warning System	----	Central Sector Scheme	(M) Earth Sciences	----	The objective of the project is to establish a warning system for the Oceanogenic disasters caused by tsunami and storm surges. The project strengthen the seismic observation station, Observation Network, Instillation of real time tide gauge monitoring stations, 24 hours monitoring of the systems for generation of timely warning.
4	National Centre for Medium Range Weather Forecasting	----	Central Sector Scheme	(M) Earth Sciences	----	The aim of the programme is to develop global circulation model for preparing weather forecasts in advance
5	Matter Relating to Epidemics, Natural Calamities and Development of Tools to Prevent Outbreaks (DoHR)	----	Central Sector Scheme	(D) Health Research	----	The scheme seeks to establish revolving fund to facilitate a rapid mobilisation of outbreak/disaster response to infectious diseases outbreak or a natural or man-made disaster.
6	Health Sector Disaster Preparedness & Management including Emergency Medical Relief (Disaster Management)	----	Central Sector Scheme	(D) Health & Family Welfare	----	The objective of the programme is to investigate any suspected cases/outbreak among human population and to create infrastructure to manage any outbreak among human. The programme helps in coordinating health relief activities and also provides physical and logistics support to the states to counter the effects of disasters on health sector. This is crucial programme during many natural disaster incidences.

Annexure III: Union Govt.'s Expenditure on *Research & Development, Education and support to Institutions* (Figures in Rs. Crore)

Sl. No	Name of Scheme / Programme	Ministry/ Department	2006-07 RE	2007-08 RE	2008-09 RE	2009-10 BE
1	Seeds (R&D):Plant Varieties Protection and Farmers Rights legislation; Development and Strengthening of the Seed Infrastructure facilities; Restructuring of the SFCI/NSC; and National Seeds Research Centre	(D) Agriculture & Cooperation	109.57	392.18	546.11	420
2	Intensive Cotton Development Programme/ Technology ision on Cotton	(D) Agriculture & Cooperation	62.83	70.78	59.31	59.92
3	Integrated Oilseeds, Oilpalm, Pulses and Maize Development	(D) Agriculture & Cooperation	302.35	315.75	7.42	10
4	Foodgrains Crops (R&D): Directorate of Millet Development & Directorate of Rice Development	(D) Agriculture & Cooperation	0.66	0.73	0.087	1.1
5	Other Programmes of Agricultural Economics and Statistics: Forecasting Agricultural Output using Space Agro-Meteorology and land based observation; Studies on inputs for Agricultural Economic Policy & Development; Forecasting & Remote Sensing Application in Crop Husbandry	(D) Agriculture & Cooperation	39.47	34.61	35.92	45.88
6	Extension and Training	(D) Agriculture & Cooperation	60.92	163.64	22.3	20.37
7	Agricultural Engineering	(D) Agriculture & Cooperation	16.39	17.74	26.95	26.95
8	Crop science	(D) Agriculture Research & Education	505.69	450.71	590.91	652.3
9	Horticulture	(D) Agriculture Research & Education	139.28	159.81	192.64	245.6
10	Agriculture Extension	(D) Agriculture Research & Education	263.99	291.5	286.2	283.43
11	Agriculture Education	(D) Agriculture Research & Education	431.34	347.65	380.77	430.17
12	National Agriculture Innovation Project	(D) Animal Husbandry, Dairying & Fisheries	10	80.7	253	252
13	Animal Husbandry	(D) Agriculture Research & Education	192.16	208.79	295.96	322.15

14	Fisheries	(D) Agriculture Research & Education	87.6	102.46	136.84	156
15	Other Animal Husbandry Programme: Assistance to States for Conduct of Livestocks Census; Feed and Fodder development; Conservation of Threatened Livestock Breeds	(D) Animal Husbandry, Dairying & Fisheries	276.68	113.34	181.31	142.36
16	Assistance to Fisheries Institutes	(D) Animal Husbandry, Dairying & Fisheries	57.81	58.14	68	73.27
17	Watershed Development Council	(D) Agriculture & Cooperation	1.23	1.38	0.6	0.74
18	National Rainfed Area Authority	(D) Agriculture & Cooperation	0	1.1	3.26	4
19	Soil and Water Conservation: Soil and Water Conservation Research Institute	(D) Agriculture Research & Education	15.95	16.21	22.62	27.67
20	Soil and Water Conservation: other Natural Resource Management Institute including Agro-forestry research	(D) Agriculture Research & Education	138.47	157.77	195.65	251.74
21	All India soil & land use survey and application of remote sensing technology	(D) Agriculture & Cooperation	12.28	12.13	14.83	16.31
22	National Wasteland Development Board	(D) Land Resources	3	0.9	2	2
23	Flood Control: Central Water Commission	(M) Water Resources	46.96	37.92	53	58.45
24	Central Ground Water Board	(M) Water Resources	120.3	59.7	82.8	94.99
25	Development of Water Resources Information System	(M) Water Resources	0	18.71	42.94	69
26	Research and Development Programme for Water sector	(M) Water Resources	7.5	33.26	59	51.5
27	Investigation of Water Resources Development Scheme	(M) Water Resources	0	26.97	35.55	40
28	Hydrology project	(M) Water Resources	0	13.6	25.51	38.1
29	Information, Education and Communication for water resources	(M) Water Resources	0	5.17	13	12

30	National River Conservation Directorate	(M) Environment & Forest	5	6	6.33	6.33
31	National Forestry Information System	(M) Environment & Forest	---	0	0.5	0.5
32	Wildlife Preservation: Wildlife Institute of India	(M) Environment & Forest	13.56	12.63	16.8	17.21
33	Wildlife Preservation: Central Zoo Authority	(M) Environment & Forest	17.63	17	14.5	14.5
34	Survey and Utilisation of Forest Resources: Forest Survey of India	(M) Environment & Forest	11.29	12.62	13.75	16.65
35	Survey: Botanical Survey of India	(M) Environment & Forest	23.83	24.07	29.06	31.32
36	Survey: Zoological Survey of India	(M) Environment & Forest	22.94	24.49	29.63	18.37
37	Environmental Education/Training/Extension: Environmental Education Training Scheme	(M) Environment & Forest	37.52	37.53	50.53	50.54
38	Environmental Information Systems	(M) Environment & Forest	4.68	5.05	6.06	6.76
39	Research and Ecological Regeneration: Eco-development Forces	(M) Environment & Forest	9.5	10.5	10.5	10.5
40	Environment Impact Assessment Programme	(M) Environment & Forest	2.74	3	3.57	3.6
41	Development and Promotion of Clean Technology	(M) Environment & Forest	1.5	3.5	3.05	3.05
42	Taxnomy Capacity Building programme	(M) Environment & Forest	2	2.5	2.75	2.75
43	Climate Change Project	(M) Environment & Forest	4.32	4.23	3.5	7.25
44	Centre for Climate Change	(M) Earth Sciences	---	0	5	25
45	Meteorology	(M) Earth Sciences	213.75	228.06	423.6	546.48

46	Indian Institute of Tropical Meteorology	(M) Earth Sciences	11.2	26	39.5	72
47	National Remote Sensing Centre	(D) Space	20	30	70.31	141.16
48	Disaster Management Support (DMS)	(D) Space	26.47	37.77	29.32	40
49	National Institute of Communicable Diseases, New Delhi	(D) Health and Family Welfare	21.1	21.05	27.31	27.5
50	Information, Education and Communication (NRHM)	(D) Health and Family Welfare	142.72	155.98	172.36	171.75
51	Public Health Education	(D) Health and Family Welfare	18.79	21.2	38.6	42.25
52	Human Resources for Health	(D) Health and Family Welfare	0	0	56	62
	Total		**3512.97**	**3876.53**	**4687.017**	**5125.47**
	GDP (Market Prices)		**4129174**	**4723400**	**5321753**	**5856569**
	As Percent of GDP		**0.09**	**0.08**	**0.09**	**0.09**

Source: Budget Documents (various years), Govt. of India.

Annexure IV: A Statistical Profile of Economic and Climate Sensitive Parameters in India

(1) Demographic Indicators	
Total Population in 2001	102 crores
Population Growth Rate in 2001	1.8%
Literacy Rate	64.8%
Sex Ratio (per 1000)	933
Density of population (per Sq. Km)	325
Average population density in coastal districts (per Sq. Km)	455
SC (%) to total population	16.2%
ST (%) to total population	8.2%
(2) Climatic Indicators	
Contribution of Green House Gases (GHGs) to atmosphere in 1994	
Carbon dioxide (CO_2)	65%
Methane (CH_4)	31%
Nitrous oxide (N_2O)	4%
Sectoral Contribution to Anthropogenic GHGs in 1994	
Energy	61%
Agriculture	28%
Industrial Process	8%
Waste	2%
Land Use, Land Use Change & Forestry (LULUCF)	1%
Production of Ozone Depleting Substances in India in 2004	55293 metric tones
India's contribution to Global Carbon Emission as per IPCC ranking	4th
India's per capita CO_2 emission in 2004 (approximately)	1.02 metric tones
World's per capita CO_2 emission in 2004 (approximately)	4.25 metric tones
Surface air temperature has increased over past century (as observed)	0.4^0 C
Warmest year on the record since 1901	2002, 2006, 2003, 2007
India gets an average annual rainfall	1197mm
Sea level rises (as estimated)	1.06-1.75mm per year
Coastal Line in India	7500 km
(3) Economic Indicators	
Gross Domestic Product (GDP) figure in current prices in 2008-09 (RE)	5426277 crores
Union Budget expenditure (Plan + Non-Plan) to GDP in 2008-09 (RE)	16.60%
Total Budgetary Expenditure of MOE&F to Union Budget in 2008-09 (RE)	0.19%
Central Govt. Spending on Agriculture & Allied Activities as % of GDP in 2008-09 (RE)	2.59%
Public Expenditure (Centre + State) on Food Security as % of GDP in 2008-09	1.12%
Public Expenditure (Centre + State) on Education as % of GDP in 2006-07 (BE)	3.24%
Public Expenditure (Centre + State) on Health & Family welfare as % of GDP in 2008-09 (RE)	1.02%
(4) Disaster Indicators (Heavy Rains, Flood, Cyclone)due to South West Monsoon in 2007	
No. of Houses are fully damaged	657262 units
Population affected due to disaster	5.93 crores
No. of Human lives lost	3339
No. of District affected	241
No. of villages affected	52494
No. of Cattle/ live-stock lost	103341
Crop area affected (in hectare)	6415288.49
Total value of houses are fully damaged	1729.42 crores
Total value of crop damage	3576.58 crores
Total value of public property damage	5472.13 crores
Total value of damage due to disaster due to heavy rains, flood and cyclone during South-West	10853.47 crores

Monsoon	
(5) Forestry and Biodiversity	
Recorded forest cover in March 2005	67.71 million hectares
Forest cover to total geographical area	20.60%
Per-capita Availability of Forests in India	0.06ha
Mangrove coverage to total geographical area on India	0.14%
Physiographic zone in India	14
No. of tribal districts in India	188
Forest cover in tribal districts	36.81%
India's major bio-geographic habitats	10
Total wildlife sanctuaries in India	502
Total National Parks in India	90
Mangroves areas identified for conservation in India	38
Coral reefs identified for conservation	4
(6) Land Use Pattern	
Soil erosion to total geographical area	45%
Net sown area in 2004-05	141.32 million hectares
Net Irrigated area in 2004-05	58.54 million hectares
Consumption of Chemical fertilizers (NPK) in 2006-07	220.45 lakhs tones
Consumption of Pesticides in 2006-07	37.95 thousand tones
Total foodgrains production in 2006-07	1756 kg/hectare
Fallow land in 2004-05	24.94 million hectares
Alkali area	3581 thousand hectares
Wasteland to total geographical area	20.17%
(7) Health Indicators	
Children received full vaccination in 2005-06	43.5%
Cases of malaria reported in India in 2008	1366517
Death cases reported due to malaria in 2008	878
No. of districts affected by Chickengunia in 2008	212
Death cases reported due to Chickengunia in 2008	662
No of affected cases of Dengue in 2008	12440
No of affected cases of Cholera in 2008	2680
No of affected cases of Diarrhea diseases in 2008	11231039
No of affected death of Diarrhea diseases in 2008	2841
Body Mass Index (BMI)of women below normal	35.6%
Body Mass Index (BMI)of men below normal	34.2%
Anemic children in India (6-69 months)	69.5%
Infant Mortality Rate in India (in 1000)	57
(8) Food Insecurity Indicators	
Annual Growth rate of Foodgrain Production (1989-2007)	1.18%
Rural Household reported food inadequacy	2.4%
Net Availability of Foodgrains (Gram Per Capita Per Day) in 2007	394.9 gram
Person Below Poverty Line in rural areas (Rs.12 per person per day)	28.3%
Population below $2 a day in 2008	80.6%
Proportion of rural population in India having MPCE below national average level of Rs. 580 in 2006-07	50.3%
Proportion of Urban population in India having MPCE below national average level of Rs. 990 in	17.4%

2006-07	
Out of every rupee that the average rural Indian spent on food in 2006-07	52 paisa
Out of every rupee that the average urban Indian spent on food in 2006-07	37 paisa
Proportion of children less than five years of age classified as undernourished in 2005-06	48%

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