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Climate Finance at the Sub-National Level – The Case of Odisha

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Responsibility for the content of this report rests with the authors alone and any errors remain the responsibility of the authors.

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List of Acronyms

AABY	Aam Admi Bima Yojana
ACA	Additional Central Assistance
ASHA	Accredited Social Health Activist
AWW	Anganwadi Worker
AYUSH	Ayurveda, Yoga & Naturopathy, Unani, Siddha and Homeopathy
BCC	Behaviour Change Communication
BPL	Below Poverty Line
BRGF	Backward Region Grant Fund
BSUP	Basic Services to Urban Poor
CAMPA	Compensatory Afforestation Fund Management and Planning Authority
CCAPS	Climate Change and African Political Stability
CCS	Carbon Capture and Sequestration
CDM	Clean Development Mechanism
CDP	City Development Plan
CenPEEP	Center for Power Efficiency and Environment Protection
CESU	Central Electricity Supply Utility of Odisha
CFRI	Central Fuel Research Institute
CMRI	Central Mining Research Institute
CNG	Compressed Natural Gas
CPP	Captive Power Producer
CPRI	Central Power Research Institute
CSP	Centrally Sponsored Plan
CSR	Corporate Social Responsibility
DFID	Department for International Development
DISCOM	Distribution Companies
DPR	Detailed Project Report

DSM	Demand Side Management
EAP	Externally Aided Project
ECBC	Energy Conservation Building Code
EOCs	Emergency Operation Centres
ESCO	Energy Service Company
ETS	Emissions Trading Scheme
FC-XIII	Thirteenth Finance Commission
FY	Financial Year
GHG	Greenhouse Gas
GIM	Green India Mission
GoO	Government of Odisha
GRIDCO	Grid Corporation of Orissa Limited
HDI	Human Development Index
HW	Health Worker
IAY	Indira Awas Yojana
ICZMP	Integrated Coastal Zone Management Programme
IDSP	Integrated Disease Surveillance Project
IEC	Information, Education and Communication
IHSDP	Integrated Housing and Slum Development Programme
IMD	Indian Meteorological Department
IMR	Infant Mortality Rate
IPCC	Intergovernmental Panel on Climate Change
IPHS	Indian Public Health System
IPP	Independent Power Producer
ITC	Indian Tobacco Company
IWDP	Integrated Watershed Development Programme
JBIC	Japan Bank for International Cooperation
JFM	Joint Forest Management
JFMC	Joint Forest Management Committees

JNNURM	Jawaharlal Nehru National Urban Renewal Mission
KVIC	Khadi and Village Industries Commission
MDF	Moderately Dense Forest
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MO	Medical Officer
NABARD	National Bank for Agriculture and Rural Development
NADRS	National Animal Disease Reporting System
NCEF	National Clean Energy Fund
NCRMP	National Cyclone Risk Mitigation Project
NIPI	Norway-India Partnership Initiative
NMSKCC	National Mission on Strategic Knowledge for Climate Change
NPCDCS	National Programme for Prevention and Control of Cancer, Diabetes, Cardiovascular Diseases and Stroke
NRHM	National Rural Health Mission
NRLM	National Rural Livelihood Mission
NSC	National Steering Committee
NTFP	Non-timber forest products
NTPC	National Thermal Power Corporation
NVBDCP	National Vector Borne Disease Control Programme
O & M	Operations and Maintenance
OCCAP	Orissa Climate Change Action Plan
OHSP	Orissa Health Sector Plan
OIIAWMIP	Orissa Integrated Irrigated Agriculture Water Management Investment Program
OPTCL	Odisha Power Transmission Corporation Ltd.
OREDA	Odisha Renewable Energy Development Agency
OSDMA	Odisha State Disaster Management Authority
OWDM	Orissa Watershed Development Mission
OWSSB	Odisha Water Supply and Sewerage Board

PAT	Perform, Achieve and Trade
PHEO	Public Health Engineering Organisation
PRI	Panchayati Raj Institution
R & D	Research and Development
R-APDRP	Restructured -Accelerated Power Development & Reforms Programme
REDD	Reduced Emissions from Deforestation and Degradation
RGSY	Rashtriya Gram Swaraj Yojana
RPO	Renewable Purchase Obligation
RUJJA	Rastriya Urja Jan-Jagriti Abhiyan
RVEP	Rural Village Electrification Programme
SAPCC	State Action Plan on Climate Change
SC	Scheduled Caste
SCA	Special Central Assistance
SDA	State Designated Agency
SEAC	State Level Expert Appraisal Committee
SECF	State Energy Conservation Fund
SEIAA	State Environment Impact Assessment Authority
SGDP	State Gross Domestic Product
SGSY	Swarnjayanti Gram Swarozgar Yojana
SHG	Self-help Group
SIRD	State Institute for Rural Development
ST	Scheduled Tribe
SWM	Solid Waste Management
TCS	Tata Consultancy Services
TFR	Total Fertility Rate
TRIPTI	Targeted Rural Initiative for Poverty Termination and Infrastructure
U5MR	Under-Five Mortality Rate

UIDSSMT	Urban Infrastructure Development Scheme for Small and Medium Towns
UIG	Urban Infrastructure Governance
ULB	Urban Local Body
USAID	United States Agency for International Development
VAT	Value Added Tax
VDF	Very Dense Forests
WISE	World Institute of Sustainable Energy

Executive Summary

Background and Rationale

In parallel to the national efforts to address climate change, all Indian States have embarked on a process to individually develop action plans aligned with the National Action Plan on Climate Change (NAPCC) to plan for low carbon and climate resilient development in their respective States. This has assumed the shape of formulation of the State Action Plans on Climate Change (SAPCC).

Till date 25 States have prepared documents on SAPCC and the National Steering Committee on SAPCCs (NSC-SAPCC) in the Ministry of Environment and Forests has recommended the SAPCC of five States for funding. For the 13 States that have come up with detailed cost estimates (duration differs for different States– ranging from short term 2010-2015/ 2012-2017 to long term (up to 2030), the combined resource requirement stands at a whopping Rs. 3,85,586.60 Crores*. There are several other States that have come up with a SAPCC or a draft version, but fail to provide detailed cost estimates.

While it is difficult to ascertain the accuracy of these estimates given that they involve future costs, it is clear that the requirements are enormous and that funding is going to be a major stumbling block in realizing sub-national climate change goals. It is extremely important for States to identify various funding sources and start developing strategies to target them based on their State-specific needs at a very early stage. Different sources fund different kinds of activities. While the private sector might be interested in proven technologies and business models, international funds might be available for preparatory and capacity development activities. Central Government funds might be available in certain sectors, but States might need to align their actions more closely with the corresponding national mission catering to that sector. Therefore, the need for financial planning cannot be stressed enough.

Aims of the Study

The purpose of this Study is to develop financing strategies that would assist the Central and State Governments in implementing the State Action Plans on Climate Change (SAPCC) in an effective and efficient manner. There are broadly three different sources of climate finance available to States: public (domestic), private and international public

* This figure has been collated from cost estimates provided in the SAPCC documents of the respective States.

finance. Apart from raising additional funds for climate change, there also needs to be synergies among the various sources and better targeting of both existing and additional funds. Transparency regarding the flow and use of funds will increase coordination and cooperation among different funding sources, as well as better leveraging of scarce financial resources to achieve climate change goals. This report aims to help States and promote their efforts with regards to some of these issues.

Phase I^ of this Study did a comparative analysis of the SAPCCs of six Indian States against a set of criteria and made some recommendations about improving the content of the Plans, their alignment with the national missions in order to increase their chances of funding. The report also made some general recommendations that would be useful for the States while targeting various funding sources. This report takes the Plans as written, conducts an in-depth analysis of the proposed climate actions, and also analyses some of the general recommendations from Phase I in greater detail in order to develop strategies to fund the SAPCCs. Using Odisha (erstwhile Orissa) as a case study, this report develops some approaches and frameworks that could potentially be applicable to all States in order to analyse their proposed climate change activities and budgets. Although the immediate results and findings are relevant to Odisha, some of the broader strategies and in particular, the approach and analytical frameworks used to arrive at these findings would be applicable to and potentially useful for all Indian States.

Structure of the Report

The findings of the Study are presented in five parts. Chapter 1 on introduction provides the project description and goals, outlines the context and provides the rationale for selecting Odisha. Chapter 2 provides the methodology for the Study. Chapter 3 forms the core of the report. It provides a detailed analysis of the climate relevance of Odisha's current public expenditure, comparison of Odisha's proposed climate budget vis-a-vis current expenditure, and develops some recommendations for funding of proposed climate actions. It also identifies and provides a preliminary analysis of fiscal instruments that the State could use to transition to a low carbon economy and also to raise funds for implementing some of the proposed climate actions. Chapter 4 provides an in-depth analysis of each of the adaptation relevant sectors and develops some sector-specific recommendations Chapter 5 presents the conclusions of the Study.

^ Developing Financing Strategies for Implementing the State Action Plans on Climate Change available at http://cdf.ifmr.ac.in/wp-content/uploads/2013/03/SAPCC-Phase-I-Report-Final_CDF_IFMR.pdf

Principal Findings and Recommendations

A. Adaptation

Analysis of Current Expenditure and Proposed Strategies

1. The total public expenditure made by all adaptation relevant Departments (Agriculture, Water Resources, Forest and Environment, Health and Family Welfare, Fisheries and Animal Resources Development, Revenue and Disaster Management, Housing and Urban Development, Rural Development, and Panchayati Raj) in the State of Odisha for FY 2011 – 12 was Rs. 13956.08 Crores. Out of this, 57.04% went towards funding activities that are *General Development (GD)* in nature, 39.34% towards activities that are *Capacity Development (CD)* in nature, 1.71% towards *Climate-Oriented (CO)* activities, and 1.91% towards funding activities that are *Ambiguous Development (AD)* in nature.

2. Different Departments have given varying importance to *CD* and *CO* activities within their respective Department expenditure. Water Resources, Rural Development and Panchayati Raj are Departments that have made significant spending on *CD* activities – about 75.6%, 76% and 74%, respectively of their individual Department expenditure. The Agriculture Department has spent 40% of its total expenditure on *CD* activities, which is comparable to the overall State figure. There are only a few Departments that have made *CO* expenditure. They are Forest and Environment (20.33%), Water Resources (4.16%) and Agriculture (0.02%).

3. In contrast to the existing expenditure in the corresponding nodal Departments, there is a significant shift towards *CD* and *CO* categories in the proposed budget for the adaptation relevant sectors. The analysis reveals that *CD* and *CO* categories account for about 55% and 24% respectively of the Odisha Climate Change Action Plan (OCCAP) budget. The *GD* category forms the remaining 21% of the proposed budget.

4. Most sectors are heavy on *CD* in terms of their proposed strategies and budgets. There are a few sectors, like agriculture, water, and forestry that have proposed strategies that are *GD* in nature. Coasts and disasters and forestry are the two sectors that have devoted a significant portion of their proposed budget to *CO* strategies, whereas sectors such as agriculture, urban planning, water resources, and fisheries do not have any proposed strategies that are *CO* in nature.

5. Currently, the *Capacity Development* and *Climate-Oriented* categories are funded more from Plan sources. The share of Plan spending on *CD* ranges from 77% in the case of Coasts and Disasters, to 97% for the Urban Development Department. The dominance of the State Plan component is observed from the expenditure pattern in these Departments. The analysis also shows that the State Plan component almost entirely (99.98%) funds the Forest and Environment Department's *CO* expenditure, and about 83% of the Water Resources Department's *CO* expenditure. The Agriculture Department's spending in this category is dominated by Centrally Sponsored Plan component, at 95%.

6. Externally Aided Projects (EAPs) flowing through the State budget account for about 2.77% of the total expenditure by all adaptation relevant Departments. Out of the total EAP expenditure of about Rs. 386 Crores, almost half (48%) goes towards funding *CD*, about 28% towards *GD*, and 24% towards *CO* activities.

7. The expenditure in different Departments for FY 2011-12 was also analysed by categorizing them into important functional areas in order to understand the current orientation of public spending. While the functional classifications used for different Departments are not strictly comparable, it is interesting to note that the share of expenditure on R&D is low across all Departments.

Recommendations

1. Funding sources and their contribution should vary according to the climate relevance and functional orientation of the proposed strategies.

   (i) Most of the proposed strategies in the OCCAP fall under *Capacity Development*. In line with existing expenditure, these should be funded using a combination of Central and State funds. Since these strategies do not have a *Climate-Oriented* motive, yet provide climate resilience, States will benefit from them even in the absence of climate change.

   (ii) Proposed R&D strategies, such as collection of data, climate modelling based on agro-climatic zones, and other climate related research, almost entirely over lap with the National Mission on Strategic Knowledge for Climate Change. Odisha could potentially access funds available under this Mission in order to implement these strategies. In contrast, Odisha might be more amenable to spending its own resources on *CD* strategies that are more tangible in nature, such as infrastructure, and sustainable products and practices.

(iii) Coasts & Disasters and Forestry are the two sectors that have devoted significant portion of their proposed budget to *CO* strategies. Since the State and local Governments may not benefit much from these activities in the absence of climate change, the capacity and willingness for State funding decreases, with an increasing need for funding from Central Government and international sources.

(iv) There are a few sectors, like Agriculture, Water, and Forestry that have proposed strategies that are *General Development* in nature. Most of these are continuation or expansion of on-going programmes. This forms around 21% of the proposed climate budget for the State. Since the State and local Governments will benefit from these programmes even in the absence of climate change, a substantial share of funding these strategies should come from these sub-national governments.

(v) The objectives of many of the current EAPs overlap with the proposed climate strategies. This makes a strong case for Odisha to seek additional funds from international donors and either extend the on-going projects or expand their scope.

2. It is recommended that the "additionality" component be maintained for activities funded from international climate funds. Activities funded out of the State budgets should be excluded and the remaining should be funded through international climate funds.

3. Greater priority should be given to existing/on-going schemes that have a high potential for delivering on adaptation goals.

4. In order to understand the effectiveness of climate finance it becomes crucial to trace the path of fund flow from the source to its ultimate beneficiary. Once the flow of funds and its impacts are mapped, the accountability and traceability of funds are enhanced, which would facilitate timely intervention by any regulatory authority.

5. The scope for private sector investment in adaptation should be explored. Based on current initiatives and investments, these seem to be some of the potential areas: a) conceptualizing technologies that facilitate resilience building against climate change; b) adoption of sustainable practices by the private sector, especially by agri-business, food and beverage companies; c) private equity funds and contributions from large corporations through their CSR programmes to finance certain adaptation strategies.

   Another area where the private sector has been operational for quite some time now is agriculture insurance. However, the role of private sector within crop/weather

insurance remains restricted as the issue of commercial viability continues to exist. Here are some steps that the State and private insurance companies can take to make agriculture insurance more lucrative for the private sector:

(i) A comprehensive premium based on crop type, rainfall requirement, landholding size and other factors would be more scientific and economical, and also reduce the scope of moral hazards and negligence on the part of farmers.

(ii) Information relating to schemes, their design, usage, and claim procedure needs to be communicated to farmers in simple terminologies in vernacular language.

(iii) Public private partnerships are required where the Government initially supports the private insurer with subsidies and risk sharing for the first few years and share infrastructure costs to ease the expense of setting up weather monitoring stations. Once this infrastructure has penetrated through most villages, it becomes easier for private insurers to implement the schemes.

(iv) A more bottom-up approach to insurance that caters to specific crops and regions at a micro level will ensure satisfaction to the farmers, thereby increasing the uptake of the scheme. It also builds trust in the private company's schemes that results in an increase in market penetration and share for the company.

(v) Government subsidies in insurance should be well targeted and custom-made as opposed to a "one size fits all" approach.

B. Mitigation

Analysis of Current Expenditure and Proposed Strategies

1. Public expenditure analysis for FY 2011-12 suggests that the Departments of Industry, Commerce and Transport, and Steels and Mining did not have any schemes with a low carbon emissions component. Energy was the only sector that had budgetary expenditure on low carbon activities and this was routed through the Department of Energy and Department of Science and Technology.
2. The highest spending of Rs. 881.83 Crores was on transmission and distribution infrastructure. Budgetary expenditure on energy efficiency and renewable energy are estimated to be at Rs. 9.89 Crores and Rs. 3.18 Crores respectively.
3. The proposed low carbon strategies for the energy sector in the OCCAP follow a similar pattern, wherein a major portion (83%) of the proposed budget for the sector is directed towards interventions that aim at reducing T&D losses.

4. A large number of the proposed interventions in the energy sector are at the *Concepts and Plans* stage and *Capacity Building* stage (across *Concepts and Plans, Infrastructure, Operations & Management*). However, a disproportionate share (83%) of the proposed budget for the sector has been allocated to reducing T&D losses.

Recommendations

These recommendations are specific to the energy sector. However, the approach and assessment frameworks used for the analysis could be used for other mitigation-relevant sectors as well.

1. International funding will mostly be restricted for technologies that are ready for commercial deployment in the State of Odisha. This would mean that funding for assessments and feasibility related strategies should be mobilised mostly from State finances or through Central assistance. For example, the National Clean Energy Fund (NCEF) created by the Government of India provides funding for research and innovative projects in clean energy technologies.
2. Reducing T&D losses
   (i) Transitional support should be provided to the Distribution Companies (DISCOMs) in order to clear their past liabilities. Fiscal incentives may be provided to AB cables and HVDS manufacturers in order to reduce the cost of procurement of these technologies for strengthening the T&D infrastructure.
   (ii) Demand Side Management (DSM) measures can be taken up by the private DISCOMs under regulatory oversight. Funding support to create a revolving fund for DSM as well as capacity building of State Electricity Regulatory Commission and DISCOMs is recommended. In order to kick start DSM, there needs to be budgeting of expenditure by DISCOM in the Annual Revenue Requirement which entails an upward revision of tariff. The revolving fund will help ease that burden and the year- end savings can help recuperate the fund.
3. Promoting clean coal technologies
   (i) Appropriate public financing instruments are required to support the full-scale commercialization of these technologies. The financing mechanisms devised by the State should be appropriate to the maturity of the technology.
   (ii) End-of-pipe technologies such as NOx reduction equipment can be promoted through market based instruments, such as the Emissions Trading Scheme (ETS) that is currently being piloted in Gujarat and Tamil Nadu.

(iii) Coal-washing interventions can be supported through public finance mechanisms such as technology grants, loan guarantees, subsidies, and tax credits.

4. Promoting energy efficiency in energy consuming sectors

(i) Interventions in the OCCAP focus mainly on reducing regulatory uncertainty which affect investment in energy efficiency projects. However, in order to reduce the risk perceptions associated with energy efficiency projects, appropriate financing incentives need to be devised by the State. Some examples include facilitating loans at cheaper rates and setting up of funds that provide equity gap or last mile equity in energy efficiency projects. The scope of the State Energy Conservation Fund (SECF) may also be enhanced for purposes, such as developing and financing innovative business models in order to sustain the fund.

(ii) Grant funding should be used only for activities such as market creation/project development, capacity building, awareness etc.

(iii) Public intervention through guarantee programmes, such as the Partial Risk Guarantee Fund set up by the BEE, may also be required to ensure access to debt financing.

(vi) The State should participate in various national level programmes in order to enhance energy conservation awareness in the State.

(v) Energy Efficiency Services Limited (EESL) set up by Ministry of Power, Government of India, as the implementing arm for energy efficiency can be used to support implementation of energy efficiency.

5. Promoting renewable energy

(i) For setting up demonstration renewable energy power plants, technology incubators can be constituted, whereas for large-scale investments in the renewable energy sector, the role of venture capital finance and private equity is prominent in India. These funds can also be constituted by pooling Government and private capital. The Akshaya Shakti Nidhi Trust that is planned in Karnataka to finance renewable energy projects is a good example.

C. Fiscal Instruments for Low Carbon Growth

1. It is important to raise revenues to meet targets for the mitigation strategies through appropriate use of fiscal instruments. Some of the fiscal instruments and incentives that have been proposed for the State of Odisha include financial transaction tax

(FTT), primary carbon tax, feebates, standards and ratings, differential taxation, renewable energy subsidy and tax credits, carbon sequestration credits, accelerated capital cost allowance, climate change levy, feed-in-tariff, carbon tax, and renewable energy surcharge/VAT.

2. Fiscal instruments should be divided into revenue instruments and subsidy instruments. The net effect of these should be revenue neutralizing while enabling GHG emission reduction.

3. Funds generated through the use of fiscal instruments should be earmarked for activities that can improve the productive base of the economy.

4. Some specific recommendations for proposed mitigation strategies include using feebates for generation of cleaner energy through clean coal approaches; differential taxation for promoting demand side management and encouraging effective flyash utilization; capital subsidies or grants, operating subsidies, tax credits, feed-in-tariffs, renewable energy surcharge/VAT, and accelerated capital consumption allowance for promotion of renewable energy; carbon credits through CDM and mandatory use of biofuels in transport for developing biofuels; carbon sequestration credits, mandatory efforts by carbon emitting firms reforestation/afforestation activities, protection of existing forests, increasing planting on non-forest land, and expanding and maintaining green zones in major mining clusters; differential fuel taxation for promoting alternate fuel; and feebates for promoting recovery, recycle and reuse of waste material like flyash, dolochar, slag etc.

D. Institutional Mechanisms for Effective Implementation of the OCCAP

While it might be too early to recommend something that might work for Odisha, a few salient points emerged from the analysis and interviews with different State Government officials and experts.

1. Existing institutions will continue to play a crucial role in the implementation of the State's climate agenda. The analysis of proposed strategies in different sectors in the OCCAP highlights the considerable overlap between existing/on-going programmes and the proposed strategies. Since climate change action (especially adaptation) is not just additional to development but often is development, there is a strong case for maintaining the existing institutional set up for flow of funds and implementation of climate actions.

The Panchayati Raj Department has a designated State Institute for Rural Development (SIRD), which provides capacity building and training for elected Panchayat representatives. The importance of such institutions cannot be undermined as they are directly involved in the developmental activities of the rural areas that are most vulnerable to climate change. Such institutions should be equipped with the relevant knowledge and expertise, and their scope should be expanded in order to enable them implement climate relevant schemes.

2. All Departments feel the need to strengthen their respective technical capacities in order to address climate change issues relevant to their sector. However, different Departments are at different stages in terms of actually executing this. The Department of Water Resources has recently created a new internal unit, the GIS and Climate Change Division. While this Division is yet to become fully active, its role is visualized as one of monitoring schemes of the Department that include a climate change dimension. Similarly, the Department of Housing and Urban Development has made it mandatory to involve an Environmental Engineer in the preparation of all Detailed Project Reports (DPRs) / City Development Plans (CDPs).

3. The role of the proposed Odisha Climate Change Agency is still nebulous. However, inputs from several Departments echo the view that a nodal body which spearheads research and capacity building activities, monitors and evaluates the progress of all sectors with regards to implementation of their proposed strategies, and also supports inter-Departmental coordination is considered necessary.

Conclusion

Although the immediate findings and recommendations from the Study pertain to Odisha, here are some key insights from the report that might be useful to a wide range of stakeholders, including other States and international donors:

1. Analysis of actual public expenditure and proposed budget by climate categories and functional areas help in understanding the nature of the proposed activities from multiple perspectives. This allows different funding sources to target specific areas / strategies based on their funding objectives and mandate.

2. About 2.5% of Odisha's GDP is already being spent on funding *Capacity Development* and *Climate-Oriented* activities that promote adaptation in various sectors. A substantial portion of this is being sourced from the State Plan, primarily the State's own resources. Therefore, the importance of State funds should not be undermined while funding the SAPCCs.

3. An analysis was done to identify overlap between proposed adaptation strategies and existing/on-going programmes. This is a useful exercise because of two reasons: a) given more details about the proposed strategies, this could help in identifying requirements that are "additional" in nature and therefore, help in better targeting of international climate funds; and b) overlapping areas should receive greater focus as they can help accelerate the pace of integrating climate change considerations into on-going programmes.

4. Classifying climate mitigation strategies along the following categories - *Concepts and Plans, Infrastructure, Operations and Management, Technology Transfer* and *Capacity Building* can facilitate in understanding the nature of strategies planned by the State, identifying knowledge and data gaps that need to be addressed for building appropriate mitigation interventions and help ascertain different sources of funds available based on the type of mitigation strategies.

5. Most international funds and private sources are focussed on financing large scale deployment of clean technologies. Therefore, concerted efforts from State and Central Governments towards financing and assistance in conducting assessments, feasibility studies and demonstration projects will be required. This assistance will further leverage private sector and international sources of funding for large scale investments in clean technology.

6. High risk perceptions associated with energy efficiency projects pose as a deterrent to its financing. Therefore, innovative public finance mechanisms will be needed in order to reduce these risk perceptions and the subsequent financing gaps that emerge.

7. Public finance instruments such as grants have the potential risk of restricting the energy efficiency market to the size of the grant/subsidy and therefore, it is advised that the tool be used with utmost caution. It is recommended for grants to be used as a financing instrument for activities such as market creation/project development, capacity building, awareness etc.

8. It is important to raise revenues to meet mitigation targets through appropriate use of fiscal instruments. There are several fiscal instruments and incentives that could be used at the State level, including feebates, carbon tax, differential taxation, carbon sequestration credits etc. However, a couple of points are important while using these instruments: a) fiscal instruments should be divided into revenue instruments and subsidy instruments. The net effect of these should be revenue neutralizing while

enabling GHG emission reduction; and b) funds generated through the use of fiscal instruments should be earmarked for activities that improve the productive base of the economy.

The cost of implementing the SAPCCs is enormous and there may not be enough funds to meet the requirements of all States. While States will compete against each other to get the most resources from various funding sources, Central Government and international sources, in particular should act in a concerted manner and follow a set of criteria and guidelines in financing various aspects of the Plans. In using scarce financial resources, some kind of balancing of priorities is needed – among States, among sectors, among functional areas (R&D, Infrastructure, Policy and Planning, Awareness and Capacity Building, Sustainable Practices etc.), between mitigation and adaptation etc. This report should also help funders in achieving that objective. Climate actions in the SAPCCs are now written as high level strategies. Once they are developed further into detailed projects and programmes, better and more effective targeting of funds should be possible.

Chapter 1 Introduction

1.1 Project Description and Goals

The purpose of this Study is to develop financing strategies that would assist the Central and State Governments in implementing the State Action Plans on Climate Change (SAPCC) in an effective and efficient manner. There are broadly three different sources of climate finance available to States: public (domestic), private and international public finance. Apart from raising additional funds for climate change, there also needs to be synergies among the various sources and better targeting of both existing and additional funds. Transparency regarding the flow and use of funds will increase coordination and cooperation among different funding sources, as well as better leveraging of scarce financial resources to achieve climate change goals. There are multiple State-level institutions that are responsible for planning, execution and delivery of climate change goals and actions at the sub-national level. These institutions often work independent of each other and have direct access to various funding sources. It is important to put in place appropriate institutional mechanisms to ensure both internal coordination, as well as coordination with non-State actors. This Study aims to help States and promote their efforts with regards to some of these issues.

Phase I[1] of this Study did a comparative analysis of the SAPCCs of six Indian States against a set of criteria and made some recommendations about improving the content of the Plans, their alignment with the national missions in order to increase their chances of funding. The report also made some general recommendations that would be useful for the States while targeting various funding sources. This report takes the Plans as written, conducts an in-depth analysis of the proposed climate actions, and also analyses some of the general recommendations from Phase I in greater detail in order to develop strategies to fund the SAPCCs. Using Odisha (erstwhile Orissa) as a case study, this report develops some approaches and frameworks that could potentially be applicable to all States in order to analyse their proposed climate change activities and budgets. Although the immediate results and findings are relevant to Odisha, some of the broader strategies and in particular, the approach and analytical frameworks used to arrive at these findings would be applicable to and potentially useful for all Indian States.

1 *Developing Financing Strategies for Implementing the State Action Plans on Climate Change* available at http://cdf.ifmr.ac.in/wp-content/uploads/2013/03/SAPCC-Phase-I-Report-Final_CDF_IFMR.pdf

Key tasks performed under the Study include:

- Identifying and measuring the climate relevance of Odisha's current public expenditure
- Comparing climate change adaptation strategies and corresponding budgets proposed in the Orissa Climate Change Action Plan (OCCAP) with the State's existing public expenditure and making appropriate recommendations regarding the nature of activities and potential sources of funds
- Analysing Odisha's mitigation strategies as proposed in the OCCAP using well-established matrices and making appropriate recommendations regarding the nature of activities and potential sources of funds
- Identification and preliminary analysis of innovative fiscal instruments to raise climate funds at the State-level
- Making recommendations on institutional mechanisms for effective implementation of Odisha's climate action plan.

The authors hope that this document will provide an analytical framework to explicitly draw crucial linkages between proposed climate change actions and budgets in climate sensitive sectors and existing expenditure in similar sectors and therefore, help understand the financing of SAPCCs from that perspective. The results and findings would help bring greater transparency in the flow and use of funds and result in enhanced cooperation and more effective targeting of funds from various sources. The authors also believe that some of the recommendations, if adopted, would lead to increased low-carbon production and additional funds to implement mitigation and adaptation actions in Odisha.

1.2 Context

The Government of India, in 2008, released the National Action Plan on Climate Change (NAPCC), which marks the country's initial attempt at preparing a deliberate and coordinated response to global warming. In addition, the Planning Commission constituted an Expert Group on "Low Carbon Strategies for Inclusive Growth" in the pursuit of proactive policies in India's 12th Five Year Plan (2012-2017), which focuses on low carbon inclusive growth. Most of the strategies recommended by the Expert Group have been included in the approach paper and the Draft 12th Five Year Plan Document developed by the Planning Commission. In parallel to national efforts, all Indian States have embarked on a process to individually develop action plans aligned with the NAPCC to plan for low carbon and climate resilient development in their respective States. This has assumed the shape of formulation of the State Action Plans on Climate Change.

Till date 25 States[2] have prepared documents on SAPCC and the National Steering Committee on SAPCCs (NSC-SAPCC) in the Ministry of Environment and Forests has recommended the SAPCC of five States for funding.[3] However, not all of them have provided cost estimates for implementing their proposed actions. For the 13 States that have come up with detailed cost estimates (duration differs for different States– ranging from short term 2010-2015/2012-2017 to long term (up to 2030), the combined resource requirement stands at a whopping Rs. 3,85,586.60 Crores.[4] There are several other States that have come up with a SAPCC or a draft version, but fail to provide detailed cost estimates. Assam's SAPCC, for example, proposes that the Government of Assam will need an additional allocation of at least 10% of its total plan size for the implementation of the SAPCC during the period 2012-2017. The Union government has sanctioned Rs. 2,160 Crores for Kerala's SAPCC, which the Kerala Government feels is insufficient.[5] While it is difficult to ascertain the accuracy of these estimates given that they involve future costs, it is clear that the requirements are enormous and that funding is going to be a major stumbling block in realizing sub-national climate change goals. It is extremely important for States to identify various funding sources and start developing strategies to target them based on their State-specific needs at a very early stage. Different sources fund different kinds of activities. While the private sector might be interested in proven technologies and business models, international funds might be available for preparatory and capacity development activities. Central Government funds might be available in certain sectors, but States might need to align their actions more closely with the corresponding national mission catering to that sector. Therefore, the need for financial planning cannot be stressed enough.

1.3 Why Odisha?

In Phase I of this project, six States (West Bengal, Sikkim, Haryana, Karnataka, Rajasthan, and Odisha) were selected based on their economic profile for a detailed comparative assessment of their SAPCCs. The goal for this second and final phase of the Study was to demonstrate an approach and some analytical frameworks that could be used to develop a financing roadmap for the SAPCCs by using one of those six States as a case study. Odisha

2 West Bengal, Odisha, Sikkim, Mizoram, Manipur, Meghalaya, Kerala, Andaman and Nicobar, Arunachal Pradesh, Assam, Tripura, Lakshadweep, Maharashtra, Andhra Pradesh, Uttrakhand, Jharkhand, Chhattisgarh, Punjab, Delhi, Karnataka, Madhya Pradesh, Himachal Pradesh, Haryana, Nagaland and Rajasthan

3 State Action Plans on Climate Change, Newsletter Issue II, 2012, July, Climate Change Adaptation in Rural Areas of India (CC-RAI), http://www.ccarai.org/files/cca_rai_newsletter_issue_ii__july_2012.pdf

4 This figure has been collated from cost estimates provided in the SAPCC documents of the respective States.

5 Revised State Action Pan on Climate Change Ready, 2012, September 7, The Times of India

was selected purely from the point of view of ease of data collection. A lot of the data on Odisha's public expenditure used for this Study was available in the public domain. Audited expenditure reports were also made available to the Study team by the Odisha Government upon request. However, as mentioned earlier, the approach and the analytical frameworks that have been used to develop financing strategies and some of the strategies themselves are applicable to and potentially useful for all States.

Chapter 2 Methodology

A combination of methods have been used for different key tasks (outlined in section 1.1) performed as part of this Study.

2.1 Climate Coding of Odisha's Public Expenditure

The process of coding and tracking of climate change funds happen for a number of purposes. There are indeed quite a few methodologies that exist for coding and tracking of both adaptation and mitigation funds. Given the short duration of the Study and its overall purpose, the idea was not to trial and develop a new system, but to adopt and / or modify an existing one that suits the objectives of the Study. Since the approach and thought process that went into the selection and adoption of a methodology were different for adaptation and mitigation related expenditures, they are given below separately.

2.1.1 Adaptation

The Study team's efforts were driven primarily with the objective of finding a coding and tracking system that is able to capture the breadth and complexity of existing and proposed adaptation activities in various climate sensitive sectors, and consequently provide some insights into targeting of funds and funding sources for the proposed adaptation activities in the OCCAP. Binary classification systems (i.e. a single code for adaptation or not) are inadequate for this purpose since they fail to capture the complexity of the adaptation-development continuum.[6] Percentile coding, also known as proportional coding seemed to be more appropriate for the purposes of this Study. Three such approaches were studied in detail – Climate Public Expenditure and Institutional Reviews (CPEIR)[7] developed by the Overseas Development Institute, World Bank's internal tracking of financial climate change co-benefits in Bank lending[8] and the Climate Change and African Political Stability Programme (CCAPS).[9] Jones et al (2012) provides a useful summary of all three approaches.

The CCAPS methodology was adopted for this Study. Although the methodology has been designed primarily for coding international aid, it was found suitable for this Study because of two main reasons:

6 See McGray et al., 2007

7 http://www.aideffectiveness.org/images/stories/cpeir%20methodology%20paper.pdf

8 See World Bank 2012 b

9 Peratsakis et al., 2012

1. It makes use of activity level information for coding a project. This is relevant for Odisha (and in fact, other Indian States as well) since a lot of the schemes/ programmes/missions implemented in the State are very large, both in terms of scope and budget, and it is important that one analyses the various components and sub-components of such a scheme/programme/mission to understand multiple objectives, and therefore their climate relevance. This detailed methodology allows the quantification and climate coding of both explicitly adaptation-relevant schemes, as well as those that have adaptation components but are not primarily climate-focused.
2. It puts all activities on four separate categories (*Ambiguous Development, General Development, Capacity Development* and *Climate-Oriented Developmen*t) along a climate spectrum. In the context of this Study, it is important to analyse activities and expenditure using such a spectrum because the challenge for Odisha or any other sub-national government is to be able to integrate climate change work and expenditure into traditional development schemes and programmes. In addition, it facilitates certain kinds of analysis while comparing proposed adaptation actions and corresponding budgets to existing activities and expenditure.

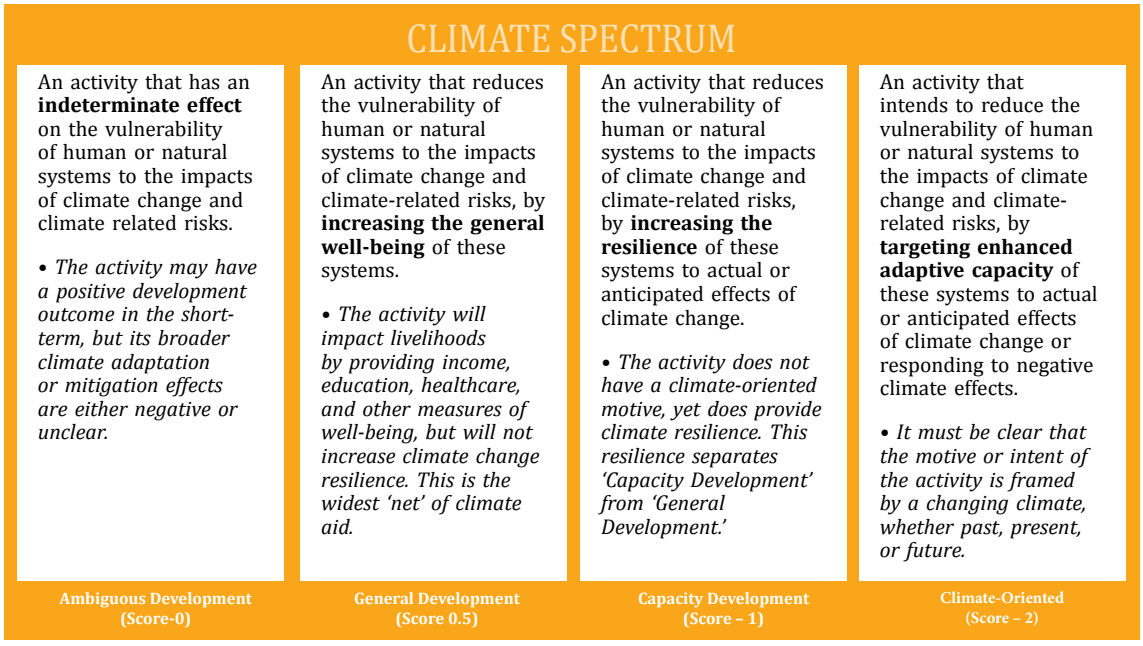
A brief summary of the CCAPS methodology[10] and a step by step methodology adopted for this Study is provided below.

Overview of CCAPS Climate Coding Method

Activities are culled out from project documents. Each activity is then given a code for climate relevance using a continuous spectrum. There are four categories along the spectrum as shown in Figure 2.1 below. These four categories are: *Ambiguous Development* (*AD* - least benefit to adaptation, including maladaptation); *General Development* (*GD* - activities that increase the general well-being of human and natural systems, but will not directly increase climate change resilience); *Capacity Development* (*CD* - activities that increase the resilience of human and natural systems to actual or anticipated effects of climate change, but are not carried out with that purpose in mind); and *Climate-Oriented Development* (*CO* - activities that target enhanced adaptive capacity of human and natural systems and are clearly designed to explicitly address climate issues).

10 For details of the methodology see Peratsakis et al., 2012

FIGURE 2.1: CLIMATE SPECTRUM



Source: Peratsakis et al. (2012)

Values of 0 to 2 are assigned along the spectrum (0 for *AD*; 0.5 for *GD*; 1 for *CD*; and 2 for *CO*), although end users can realign weights according to their own value judgments. A climate score for the entire project is then calculated using a weighted average and a simple equation.[11]

Data and Step by Step Methodology for Odisha

Data: Public expenditure by all Departments involved in the delivery of programmes in adaptation relevant sectors has been mapped and climate coded using the above methodology. The sectors chosen for this Study were the ones where climate change adaptation strategies have been proposed in the Orissa Climate Change Action Plan (OCCAP).[12] These sectors are: Agriculture, Coasts and Disasters, Fisheries and Animal Resources, Forestry, Health, Water Resources, and Urban Planning. Although some sectoral schemes and programmes flow through multiple Departments, there is a nodal Department for each of these sectors that is responsible for setting the mission and key activities for the sector and also has the lead organizational responsibility for overall management of the sector. The concerned nodal Departments for Odisha's

11 The final score (FS) for each project is calculated using a weighted average of the overall project score (OS) and the activity score (AS) average ($\sum AS/n_{Activities}$) as in the equation: $FS=0.7*OS + 0.3*(\sum AS/n_{Activities})$. See Peratsakis et al., 2012 for details.

12 See Orissa SAPCC for details

adaptation relevant sectors are: Agriculture Department for the agriculture sector, Revenue and Disaster Management Department for the Coasts and Disasters sector, Fisheries and Animal Resources Development Department for the fisheries and animal resources sector, Forests and Environment Department for the forestry sector, Health and Family Welfare Department for the health sector, Water Resources Department for the water resources sector, and Housing and Urban Development Department for the urban planning sector. In addition, there are a couple of Departments that implement schemes and programmes that cut across different adaptation relevant sectors. These are the Rural Development Department and the Panchayati Raj Department. These nine Departments together are referred to as adaptation relevant Departments. Except for the Revenue and Disaster Management Department, total budgetary expenditure made by all other Departments has been mapped. For the Revenue and Disaster Management Department, only expenditure related to the coasts and disasters sector has been considered for analysis. Audited expenditure data for FY 2011-12 for all Departments was provided by the Deputy Accountant General's (DAG) Office, Government of Odisha. Although expenditure data for the same Departments was also available through Outcome Budgets, the DAG dataset was preferred and used for a couple of reasons: first, it is actual audited expenditure; and second, it provided more granular information in a format that is consistent and comparable across all sectors. While Outcome Budgets provided expenditure data at the scheme level, the DAG dataset provided expenditure information by major head, sub-major head, minor head and sub-head for each Department. The sub-head level data was used for the purposes of climate coding, whereas analysis has been done at higher levels. The sub-head level data typically is a combination of activities and schemes. These schemes are very granular in nature with a single objective or target. The activities, on the other hand, are part of larger schemes with multiple objectives and thrust areas. Although Outcome Budgets have not been used directly for climate coding, they were used to cross check and validate data and also to match large schemes with their corresponding activities provided in the DAG dataset.

Step by Step Coding Method: This has been adopted largely from the CCAPS methodology with a few minor changes to accommodate local context.

Step 1: Activity Coding

Schemes and activities from the DAG dataset were coded using the AidData platform, which provides a methodology for coding development projects to the activity level (consisting

of more than 700 codes).[13] New codes were created in the AidData platform in order to accommodate context-specific activities, which are not currently included in the platform.

Step 2: Pre-assigned Scores

Each code was then automatically placed under one of the categories in the climate spectrum. Each possible activity has a pre-assigned score and this list of pre-assigned scores was provided to the Study team by CCAPS.

Step 3: Manual Coding

Pre-assigned scores were manually adjusted to reflect local context. Based on interactions with Odisha Government officials and scheme details, researchers adjusted a pre-assigned score higher or lower on the spectrum.

Step 4: Weighting Schemes

As mentioned earlier, the schemes provided in the DAG dataset are already very granular in nature and correspond to activities on the AidData platform. These schemes directly receive a climate score in Step 3. For activities that are part of a larger scheme, the final climate score for the scheme is a weighted average of all the activity scores. The expenditure under each activity has been used as the weights. In absence of activity level expenditure data, the CCAPS method for weighted average has been used.

This methodology has also been used to code key adaptation priorities in the OCCAP in order to compare them with existing schemes and expenditure to draw inferences on the nature of proposed strategies and glean insights for funding the same. Given that the proposed key priorities are more in the form of high level strategies, specific activities could not be culled out. Brief description provided under each strategy has been used to assign them a category on the climate spectrum. Only the additional budget quoted for each proposed strategy has been considered for this analysis. It is assumed that the State has already secured funding for the existing budget.

2.1.2 Mitigation

Approach for Low Carbon Finance Reporting

Defining low carbon investment

According to a recent IMF Working Paper, green investment is defined as "the investment necessary to reduce greenhouse gas and air pollutant emissions, without significantly

13 http://www.aiddata.org/content/index/user-guide/coding-scheme

reducing the production and consumption of non-energy goods" (Eyraud, Wane, & Zhang, 2011). It includes both public and private investment.

The structure of green investment can be summarized along three categories, *supply factor, demand factor and mixed factor*. Supply factors include low-emission energy supply sources such as large hydro, nuclear energy, renewable sources of electricity, research and development (R&D) in clean energy, and carbon capture and sequestration (CCS) technologies; demand factors include energy efficiency in energy consuming sectors viz. households, services, industry, agriculture, transport; and mixed factors[14] include energy efficiency in the electricity sector (generation, transmission, distribution) (Eyraud, Wane, & Zhang, 2011).

Measuring low carbon investment

This study broadly uses the above mentioned definition, with some exceptions, in order to track low carbon Investment for the State of Odisha. Controversial categories such as nuclear power and large scale hydro-power have not been included (Inderst, Kaminker, & Stewart, 2012). Additionally, day to day expenditure such as salaries and overheads for staff in dedicated Departments has also been excluded while ascertaining the level of low carbon investment in the State (Public Interest Research Centre, 2011).

Low carbon investment tracking for the State of Odisha has been done from two broad sources:

Public sector finance - This involves tracking of low carbon expenditure that is routed through the State budgetary process. The OCCAP has identified four key mitigation specific sectors- energy, transport, industries and mining. The nodal departments that are directly responsible for the planning and implementation of schemes and programmes in the sector are: Energy Department and Department of Science and Technology for the energy sector, Department of Commerce and Transport for the transport sector, Department of Industries for the industry sector and Department of Steel and Mines for the mining sector. Scheme-wise mapping of low carbon initiatives for the above mentioned Departments has been done and. the data is drawn from the Detailed Demand for Grants documents for these Departments.

Private sector finance - Data has been drawn from Bloomberg New Energy Finance (BNEF) in order to track deal flows in renewable energy by sources and asset classes.

14 Mixed factors mean that since electricity sector both demands and produces energy, energy efficiency efforts in this area affect both energy demand and supply

2.2 Fiscal Instruments for Low Carbon Growth

Odisha contributes substantially to India's overall Greenhouse Gas (GHG) emissions. The GHG emissions from industry and energy sectors in the State have been estimated at about six per cent of the country's total emissions, as per a report of the Odisha State Pollution Control Board.[15] A major contributor to the GHG emissions of Odisha is the energy sector, which accounts for over 50 per cent of the State's emissions. The GHGs are negative externalities imposing an external cost on the entire society and not just on the individuals who consume a certain product. The negative externalities arise in case where the social marginal costs of production are higher than the private marginal costs of production. Though India does not have an obligation to reduce the emissions of GHGs, it is important for sensitive States like Odisha to take a sustainable growth path. The emission of GHGs is a negative externality and left to free market forces, are unlikely to be reduced on their own. This is because producers of externalities do not have any incentive to take into account their action on others, and in a competitive economy, the optimum output is set at a point where the marginal private cost equals marginal benefit resulting in social inefficiency (private optimal level of output is higher than social optimal level of output). Hence, government intervention is needed to internalize the externalities in production and consumption decisions of firms/individuals so that social optimal levels of output are at the point where marginal social benefits equal marginal social costs.

The Government can achieve this in a number of ways: First, it can choose command and control regulation through setting standards (ambient, technology), banning the most polluting output, levying heavy penalties for pollution or closing the polluting firm. The main advantages of using these instruments are that they are simple; there is greater certainty in emission reduction achievement and monitoring of emission reductions. The key limitations are that there are high information costs, does not encourage innovation to reduce emissions, and only the pollution is controlled and not the residual damage. Secondly, governments may resort to the use of market based instruments, which work either by using existing markets or creating new markets.

Pigou (1920)[16] suggests that a way to deal with this problem is to impose a per unit tax/charge on output of the firm generating the negative externality. This tax/charge referred to as Pigouvian fee is levied equal to that of the external cost in order to

15 Orissa Climate Change Action Plan 2010-2015

16 1920, Pigou, A.C., The Economics of Welfare, Macmillan (London)

internalise the externality. That is the final price of the product is the social cost and not the private cost alone. Imposition of such a tax/charge will raise the output price and reduce the demand and thereby help in internalizing the environmental costs to some extent in the decisions of producers and consumers of the product. If the tax is levied on controlling carbon emissions, it is referred to as "carbon tax." If the regulator can succeed in levying optimal taxes/charges, less polluting alternatives are encouraged, can raise significant revenues, which can subsequently be used to fund or subsidize green technologies. Taxes/charges are often referred to as "pricing instruments."

However, there are several problems in deciding the optimal tax/charge due to uncertainty of the marginal costs and marginal benefits (which are not known to the regulator). In such a case, optimal tax rates can only be achieved by repeated trials resulting in longer lead times. Tax is often viewed as a blunt instrument as it does not guarantee the emission reductions. Sometimes very high taxes are required to be able to change the behaviour or influence the outcome. Taxes are appropriate when less polluting substitutes or alternatives are readily available and when modest change in price can have significant impact on markets. It is also administratively quite cumbersome to administer taxes and has low political acceptability.

Similar to taxes, the regulator can give subsidies for firms to innovate or reduce their emissions. Subsidies are meant to provide incentives for production and purchase of goods, which are less harmful to environment. In the long-run however, subsidies can increase industry emissions as it encourages entry of firms. The subsidies can be given as direct subsidies or indirect subsidies in the form of tax allowances or holidays, differential excise taxes/value added tax (VAT). The two categories of economic instruments taxes and subsidies, which give either incentives or disincentives to firms, are referred to as fiscal instruments.

While taxes/charges work by increasing the price of the polluting product, in the third category of instrument called tradable permits or cap-and-trade, regulator imposes a cap on the aggregate carbon emissions. Each firm can then be given a quota based on either grandfathering or auctioning of permits. A firm, which can abate at a low cost, can trade the permits with a firm with high abatement cost. In the process, the total level of emissions will be at the desired level. This instrument involves creation of new markets for carbon permits. The tradable permits are appropriate for reducing carbon emissions as they have global impact. A

wide range of options are available to firms to achieve environmental improvement at a range of costs for the firms to be able to choose the best option for their situation. These instruments also bring more certainty on the amount of carbon emission reductions. However, the marketable permits require complex monitoring of data and might encourage anticompetitive behaviour by firms. This option works for bigger firms but not for smaller firms.

The choice of instrument depends on the following: 1) whether the instrument is efficient at a point of time (static efficiency), 2) over a period of time (dynamic efficiency), 3) whether the goal is fulfilled, 4) the administrative burden of the instrument, 5) whether the instrument creates any barriers to entry, 6) whether the polluter would pay for the clean-up and 7) the political feasibility of the instrument. The main advantages of market-based instruments over the command-and-control instruments are that they provide static and dynamic efficiency and give more flexibility for firms to innovate. The administrative costs are relatively low in comparison to the command and control regulation. One key thing to note is that in the presence of already existing taxes, further tax to reduce carbon emissions might impose additional burden on the economy. On the other hand, the revenues raised from carbon tax could be earmarked for reducing GHG emissions, and can be redistributed to households and firms who suffer disproportionately from taxes (through tax credits, reduction in personal income tax etc), subsidize green innovative activities carried out by firms.

A particular policy instrument may not be effective in reducing the carbon emissions. The policy maker needs to resort to a combination of instruments to be effective in controlling carbon emissions. One can use combinations of indirect taxes and subsidies along with other complementary informative measures. On these grounds some authors suggest the use of multi-part instruments, i.e. the combinations of indirect taxes with other fiscal instruments (subsidies), which could better target emissions or other externalities than a single tax instrument. They can be complemented with other informational measures like labelling schemes, information campaigns so as to reduce the search costs for the consumers, etc. Products that are energy efficient look costlier upfront as the consumers do not take into account the long-run energy saving costs while buying the product, but the consumers can be given the benefit of direct subsidies, tax credits or allowances so as to encourage the use of energy efficient products. Such direct subsidies have been given in a number of countries.

While direct subsidies are very attractive, it would impose huge costs on the government. These resources have to be raised from somewhere and if direct taxes are levied, it can hurt the consumer welfare. There is a need for innovative financing for climate change.

Some of the innovative ways through which GHG emissions are curbed and revenues are generated for financing climate change (based on different country experiences) are the following:

1. **Carbon tax/levy:** A carbon tax is a direct levy on carbon emissions. The tax can be directly levied on the amount of carbon emitted or levied against fuels like coal or petrol/diesel at the point of purchase based on the carbon content of the fuel or carbon efficiency of the fuel. The carbon taxes or levies would provide the easiest way of generating revenues for the government. The governments can design the carbon taxes to be revenue neutral, in the sense that the revenues raised through carbon taxes may be used to displace other forms of taxes, or used to provide direct subsidies. Carbon tax, an indirect tax instrument, has been widely applied in countries like Australia, Denmark, Finland, France, Germany, Netherlands, Norway, Sweden, United Kingdom, some provinces in USA and Canada.
2. **Emissions trading:** The regulator imposes a cap on the aggregate carbon emissions. Each firm can then be given a quota based on either grandfathering or auctioning of permits. A firm, which can abate at a low cost, can trade the permits with a firm with high abatement cost. In the process, the total level of emissions will be at the desired level. Some examples of carbon emission trading are the New South Wales (NSW) Greenhouse Gas Abatement scheme, which requires electricity generators and larger consumers to purchase NSW Greenhouse Abatement certificates; New Zealand Emissions Trading Scheme, Japanese emissions trading scheme and European Union emissions trading scheme. The European Union Emissions trading scheme is in fact the first emissions trading program aimed to reduce GHG emissions.
3. **Redirecting fossil fuel subsidies**: Fuel consumption or production subsidies, by lowering the price that the end-use consumer faces, increase the demand for the energy product, thereby increasing the social costs of using the fossil fuel. However, there are subsidies that help reduce emissions like renewable energy and energy-efficient technologies. By redirecting the fossil fuel subsidies to subsidies on clean energy will lower the GHG emissions. A study by OECD[17] showed that GHG emissions

17 OECD. *Joint report by IEA, OPEC, OECD and World Bank on fossil-fuel and other energy subsidies: An update of the G20 Pittsburgh and Toronto Commitments*. Retrieved from http://www.oecd.org/site/tadffss/49006998.pdf

can be reduced by 6% if all the subsidies in the world are removed. Many nations have increased the subsidies for renewables, or energy-efficient technologies.

4. **Levying financial transaction taxes:** A financial transaction tax (FTT) involves levying a very small tax (say in the range 0.05 – 0.1%) on all financial market transactions, involving stocks, bonds, foreign exchange and derivatives (futures and options). However, other ordinary financial transactions like money withdrawals from ATMs or payments through cheques are not taxed. The financial transaction tax has good potential to generate revenues while shielding the public from tax burden. The burden of tax is shifted to the financial sector, as financial sector is a reflection of the economy that had benefitted from increased economic activity and indirectly contributing to the build-up of GHGs. A 2010 report by WWF[18] mentions that such domestic FTT already exists in some countries like USA, Austria, Greece, Luxembourg, Poland, Portugal, Spain, Switzerland, China, Singapore, Brazil and India, though not specifically earmarked for the purpose of global public good. These taxes should be especially earmarked for addressing climate change.

5. **Differential VAT rates:** The Value Added Tax on environment friendly products could be subject to lower tax rates and dirty products could be levied higher taxes. The differential VAT structures would stimulate higher demand for green products. For such differential VAT structures to be levied there should be clear information on "clean products" and "dirty products" (e.g. eco-labelling). Some countries have used differential VAT rates. A 2008 report by European Commission[19] mentions that Czech Republic, Portugal and UK have such differential VAT rates for renewable and energy efficient materials. Czech Republic applied reduced VAT rates to renewable energy equipment, biofuels and recycled paper during 1993-2004. Portugal taxed equipment necessary for the production and use of renewable resources at a rate of 12% instead of 21% VAT. In UK a reduced VAT rate is applied to the professional installation of specific energy-saving materials. However, the effectiveness of the differential VAT rates is not verified empirically.

6. **Energy efficiency excise tax:** Differential excise taxes are levied depending on the energy efficiency. Such differential excise taxes exist in several countries. For example, as per the European Council Energy taxation directive 2003/96/EC, higher excise

18 *Financial Transaction Taxes for climate change and development.* Retrieved from http://awsassets.panda.org/downloads/wwf_position_paper__ftt_final_nov_2010.pdf

19 European Commission. *The use of differential VAT rates to promote changes in consumption and innovation.* Retrieved from http://ec.europa.eu/environment/enveco/taxation/pdf/vat_final.pdf

taxes are levied on low efficient fuels in order to integrate environmental concerns into the energy taxation area, so as to improve the functioning of the internal market.

7. **Rebates/Tax credits:** Under this a rebate is provided to consumers or producers for buying or investing more in less polluting activities. One such example is the Production tax credit scheme: The production tax credit scheme provides investors in renewable sources of energy with a tax credit per kWh of energy produced. This has been first implemented in the US in 1992 and it has been very successful. Recently, France and UK have also initiated such a tax credit scheme. Such rebates are also passed on to consumers. For example, Netherlands gives rebate immediately after the purchase and Spain, Hungary, Denmark pays directly at the check-out. In Italy the consumers receive a tax credit for the purchase of energy efficient refrigerators and freezers (delivered in case of replacement of the old appliance) (Kosonen & Nicodème, 2009)

8. **Feebates:** Feebates are essentially a combination of two instruments: A fee on inefficient technology (emission intensity above the pivot) and a rebate on efficient technologies (emission intensity below the pivot). It has been widely applied for vehicles in different countries and is useful to reduce emissions. For example, the Bonus-Malus program in France paid the buyers of cars (in 2009) emitting a maximum of 160 grams of carbon dioxide per km (209 grams per mile) a bonus ranging from $255-6,365 depending on emissions levels. In 2010, the maximum limit was reduced to 125 grams per km, and bonuses were also reduced.[20] Similarly, Canada under the eco Auto scheme offers rebates to cars which give a fuel economy of 6.5L/100 km or better and new light trucks giving a mileage of 8.3 L/100km. The rebate is between C$1,000 to C$2,000 to people who buy or enter a long-term lease (12 months or more) for a fuel-efficient vehicle. For flex-fuel vehicles, the mileage economy should be at least 13 L/100 km.[21]

9. **Financial incentives**: Delinking carbon is expensive and risky. Hence, it is important to de-risk the investment in renewable or energy efficient sources. This is possible through providing loan guarantees, providing accelerated depreciation; providing interest free loans to encourage private players to take up these risky projects. Such kind of financial incentives exist in several countries. For example in Poland, the

20 *France's Bonus-Malus program*. Retrieved March 2013, from Global Fuel Economy Initiative Website: http://www.unep.org/transport/gfei/autotool/approaches/economic_instruments/fee_bate.asp#france

21 *Feebates*. Retrieved March 2013, from Global Fuel Economy Initiative: http://www.unep.org/transport/gfei/autotool/approaches/economic_instruments/fee_bate.asp#canada

Polish National Fund for Environmental Protection and Water Management draws resources from environmental fees, penalties and sale of GHG emissions. However, this revenue is used for giving preferential loans, subsides, blending loans and grants, prizes, depreciation, capital investments.[22]

10. **Feed-in-grants/tariff:** These are specially designed tariffs to subsidize the sale of electricity produced from renewable sources like solar, wind turbines, hydro, anaerobic digesters etc. The producers of the electricity are guaranteed index linked tariff (set) for the agreed set period for each unit they produce and send back to the grid. The tariffs are usually set above the market price by the government. The premium is paid by the users of the electricity through a per-unit charge added to the electricity bill. Such feed-in-tariffs (FIT) exist in several countries including India. The State of Gujarat, for example, had announced a FIT of Rs. 15 per unit for the first 12 years and Rs. 5 per unit for the next 12 years for grid connected solar power. The feed-in-tariff regulation exists in around 40 countries of the world at present such as Australia, Czech Republic, Denmark, Estonia, Finland, Germany, Italy, the Netherlands, Slovakia, Slovenia, Spain, United Kingdom, in combination with other support instruments for promoting renewable electricity.
11. **Multilateral finances or bilateral aids:** As part of the global efforts to speed up initiatives to combat climate change, multilateral finances like Green Climate Fund or bilateral aids between countries are available. Green climate fund for instance, promises to invest $100 billion annually into climate-relevant investments starting in 2020. Australia has committed to $100 million multilateral climate change finance budget for mitigation and adaptation measures to support developing countries.

The feasibility of some of the above instruments have been analysed for the State of Odisha using relevant information, such as GHG emissions of the State by sectors, revenue generation from various sources, existing taxes/charges etc. Appropriate recommendations regarding the nature of instruments most suitable for the State have been made based on this analysis.

2.3 Other Key Tasks Performed

A combination of desk research and expert interviews have been used for all other key tasks performed in the Study. An alphabetical listing of experts is provided in Annex 1.

22 *About: National Fund of Environmental Protection and Water Management (NFEP&WM)*. Retrieved March 2013, from http://www.nfosigw.gov.pl/en/executive-brief/

Chapter 3 Results and Findings

This chapter provides the main findings and recommendations with regards to financing the Odisha Climate Change Action Plan. It is divided into four sections. Section 3.1 provides summary recommendations for financing the adaptation strategies proposed in the OCCAP. More detailed sector-specific findings and recommendations are presented in Chapter 4. Section 3.2 provides recommendations for financing mitigation strategies proposed for the energy sector in the OCCAP. Although the findings and recommendations are specific to the energy sector, a similar approach and assessment frameworks could be used for other mitigation-relevant sectors as well. Section 3.3 presents an analysis of some of the potential fiscal instruments that the State could use in order to transition to a low carbon economy. The final section 3.4 is a note on institutional mechanisms for effective implementation of the OCCAP.

3.1 Adaptation

3.1.1 Public Expenditure Analysis

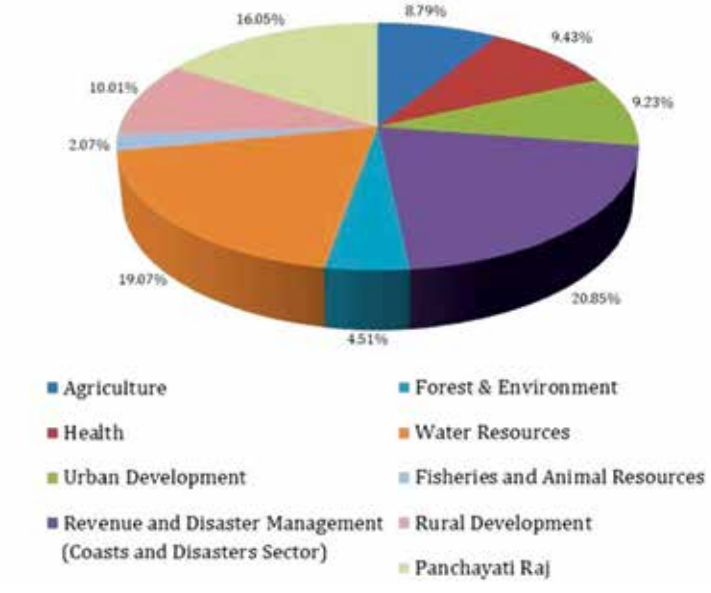
Findings

Public expenditure by all Departments involved in the delivery of programmes in adaptation relevant sectors was mapped and climate coded. The sectors chosen for this Study were the ones where climate change adaptation strategies have been proposed in the OCCAP. These sectors are: Agriculture, Coasts and Disasters, Fisheries and Animal Resources, Forestry, Health, Water Resources, and Urban Planning. Although some sectoral schemes and programmes flow through multiple Departments, there is a nodal Department for each of these sectors that is responsible for setting the mission and key activities for the sector and also has the lead organizational responsibility for overall management of the sector. The concerned nodal Departments for Odisha's adaptation relevant sectors are: Agriculture Department for the agriculture sector, Revenue and Disaster Management Department for the Coasts and Disasters sector, Fisheries and Animal Resources Development Department for the fisheries and animal resources sector, Forest and Environment Department for the forestry sector, Health and Family Welfare Department for the health sector, Water Resources Department for the water resources sector, and Housing and Urban Development Department for the urban planning sector. In addition, there are a couple of Departments that implement schemes and programmes

that cut across different adaptation relevant sectors. These are the Rural Development Department and the Panchayati Raj Department. These nine Departments together are referred to as adaptation relevant Departments. Except for the Revenue and Disaster Management Department, total budgetary expenditure made by all other Departments has been mapped. For the Revenue and Disaster Management Department, only expenditure related to the Coasts and Disasters sector has been considered for analysis.

Figure 3.1.1 shows the relative share of each of these Departments in the total expenditure for all adaptation relevant Departments. Revenue and Disaster Management Department had the highest spending of about Rs. 2,900 Crores for the Coasts and Disasters sector. This constitutes about 21% of the total spending by adaptation relevant Departments. This is followed by Water Resources, with close to Rs. 2,660 Crores, which is about 19% of the total spending. The expenditure by the Panchayati Raj Department, at close to Rs. 2,240 Crores, accounts for 16% of the total expenditure. Forest and Environment, being a key adaptation Department, receives a comparatively smaller budget of about Rs. 630 Crores. The Department of Fisheries and Animal Resources Development has an even smaller spending, accounting for about 2% of the total expenditure. Other Departments like Agriculture, Urban Development, Health and Rural Development, each have comparable expenditures, at around 9 to 10% of the total.

FIGURE 3.1.1 : DEPARTMENT-WISE SHARE IN TOTAL PUBLIC EXPENDITURE BY ALL ADAPTATION RELEVANT DEPARTMENTS FOR 2011-12 (%)



Source: Audited Expenditure Statement, Govt. of Odisha (GoO)

A summary of the public expenditure analysis for these Departments is given in Table 3.1.1. As is evident from the table, Non-Plan spending forms a major share (approx. 58%) of the overall expenditure. The balance comes from Plan sources, a bulk of which is the State Plan. The State Plan component accounts for about 40% of the total expenditure. This is followed by smaller shares of Central Plan and Centrally Sponsored Plan components at close to 1.3% and 0.7%, respectively. Even within each of the Departments, Non-Plan spending forms the majority of the expenditure, Agriculture and Water Resources being the only exceptions. State Plan accounts for 81% of the total spending in Water Resources. In Agriculture, almost 76% of the total spending comes from Plan sources.

TABLE 3.1.1: DISTRIBUTION OF PUBLIC EXPENDITURE OF ADAPTATION RELEVANT DEPARTMENTS ACROSS BUDGET COMPONENTS – 2011-12

Department	Public Expenditure – by Budget Component (Rs. Crores)					
	Non-Plan	State Plan	Central Plan	Centrally Sponsored Plan	Total	Sector's Share of Total (%)
Agriculture	295.57	861.44	5.24	64.75	1226.99	8.79
Health	940.33	200.58	174.82	0.55	1316.29	9.43
Urban Development	960.75	322.46	1.64	2.68	1287.52	9.23
Revenue and Disaster Management	2893.49	15.50	0	0.78	2909.77	20.85
Forest & Environment	368.73	247.27	5.76	7.7	629.46	4.51
Water Resources	511.14	2150.04	0	0	2661.18	19.07
Fisheries*	36.32	12.68	0	10.31	59.32	0.43
Animal Resources*	175.41	45.96	0.05	7.66	229.08	1.64
Rural Development	705.96	690.25	0	0.20	1396.41	10.01
Panchayati Raj	1198.31	1035.56	5.43	0.75	2240.05	16.05
Total	8086.02	5581.74	192.94	95.39	13956.08	100
Contribution of Budget Component to Total (%)	**57.94**	**40.00**	**1.38**	**0.68**	**100**	

Source: Audited Expenditure Statement, GoO
**Expenditure by the Department of Fisheries and Animal Resources Development has been tracked separately for the Fisheries and Animal Resources sectors.*

Climate Coding of Public Expenditure

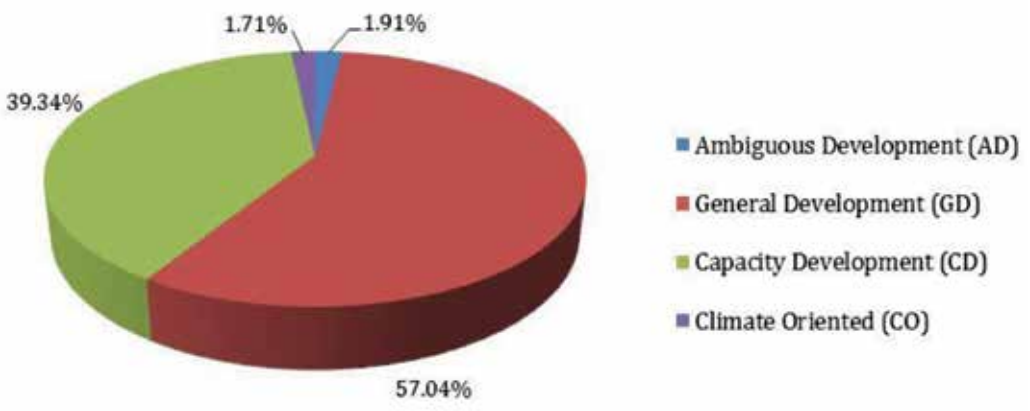
Public expenditure made by each of the adaptation relevant Departments was climate coded using the methodology mentioned earlier. The overall break-up of expenditure by climate categories is shown in Figure 3.1.2 below. Out of the total expenditure of Rs. 13956.08 Crores, 57.04% went towards funding activities that are *General Development* (*GD)* in nature. These typically consist of mainstream development activities in each of the sectors, for example, farm development, construction of dams, medical education and prevention and control of diseases, forest management activities etc. Most sectors have also undertaken *Capacity Development* (*CD*) programmes, some of which are in line with proposed adaptation strategies in the OCCAP. This constitutes 39.34% of the overall expenditure, and includes activities that promote resilience building among communities, training government officials and other stakeholders, protection of critically endangered species, income diversification etc. *Climate-Oriented* (*CO*) expenditure constitutes about 1.71% of the overall expenditure and 1.91% goes towards funding activities that are *Ambiguous Development* (*AD*) in nature. Programmes like reclamation of degraded areas, urban and rural plantations, enhancement of carbon sinks etc. constitute the former category while recurrent unspecified administrative expenditures form the latter.

Department-wise distribution of public expenditure over the climate spectrum is shown in Figure 3.1.3. It is interesting to note that *General Development* activities constitute the bulk of the expenditure in most of the Departments. *GD* spending ranges anywhere between 60% to 100% of the total expenditure in these Departments. However, Water Resources, Rural Development and Panchayati Raj Departments are exceptions, with about 75.6%, 76% and 74% of their respective total Department expenditure being *Capacity Development* in nature. Even Departments with high potential for delivering on adaptation, like Agriculture, Forest and Environment, have spent close to 60% of their total expenditure on *GD*, while expenditure on Fisheries, and Coasts and Disasters sectors are almost entirely in this climate category. Different Departments have given varying importance to *CD* activities. By definition, these activities reduce the vulnerability of human or natural systems to the impacts of climate change and climate-related risks, by increasing the resilience of these systems to actual or anticipated effects of climate change. As mentioned earlier, bulk of the spending in the Water Resources Department, Department of Rural Development and Panchayati Raj Department gets a *CD* score. The broad areas of spending in the Water Resources Department include irrigation projects, soil and water management projects, command area development projects and capital outlay on irrigation and flood control

projects. For the Rural Development Department, it includes activities like provision of sewerage and sanitation facilities, and access to pure drinking water. The expenditure by the Panchayati Raj Department in the *Capacity Development* category constitutes 74% of its total spending This includes expenditure on housing, infrastructure development in rural areas, and training and capacity building programmes for elected PRI representatives and field functionaries.

Agriculture is another Department that has made substantial expenditure (40%) towards *CD* activities, like promotion of bio-fertilizers, agriculture information services, post-harvest protection and technology, research on climate resistant crops etc.

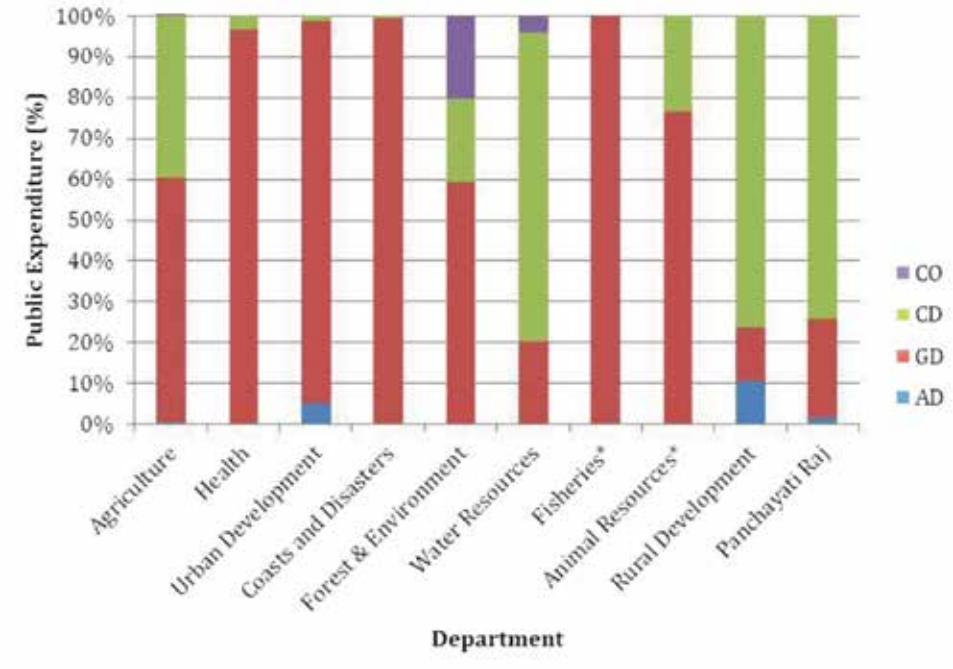
FIGURE 3.1.2: DISTRIBUTION OF TOTAL PUBLIC EXPENDITURE ACROSS THE CLIMATE SPECTRUM



Source: Audited Expenditure Statement, GoO and analysis by the Study team

There are only a few Departments that have made *Climate-Oriented* expenditure. They are Forest and Environment (20.33%), Water Resources (4.16%) and Agriculture (0.02%). While it is not expected that the State's current expenditure would have a significant component targeting enhanced adaptive capacity, it is worth noting that a few Departments have nil *CO* expenditure. Among these, Coasts and Disasters is one of the key adaptation-relevant sectors, which has proposed several initiatives in the OCCAP that are in the nature of *CD* (example: early warning systems, crop insurance, and construction of shelters). However, 99% of the current spending in this sector by the Revenue and Disaster Management Department is *GD* in nature. Similarly, the Agriculture Department which has great potential for organic farming, insurance against climate risks, etc., has about 40% expenditure in *CD* and a meagre 0.02% in *Climate-Oriented* development.

FIGURE 3.1.3: DISTRIBUTION OF PUBLIC EXPENDITURE ON THE CLIMATE SPECTRUM ACROSS DEPARTMENTS (%)



Source: Audited Expenditure Statement, GoO and analysis by the Study team
**Expenditure by the Department of Fisheries and Animal Resources Development has been tracked separately for the Fisheries and Animal Resources sectors.*

In case of the Forest and Environment Department, about 60% of the total expenditure is *GD* in nature, while the remaining 40% is divided equally between *CD* (conservation of wetlands and wildlife sanctuaries, integrated conservation programmes which include livelihood creation and forest research) and *CO* (afforestation and reclamation of degraded lands) activities.

Traditional infrastructure sectors like Health and Urban Development show a very high component of *GD*, with close to 97% and 94% of their total expenditure respectively in this category.

Climate Coding of Proposed Budget

The climate strategies proposed in the OCCAP for various sectors have been analysed by placing them on the climate spectrum. This is depicted in Figure 3.1.4. In contrast to the existing expenditure in the corresponding nodal Departments[23], there is a significant shift

23 Rural Development and Panchayati Raj are not included here as the OCCAP does not have separate proposed budgets for these Departments, although they are responsible for the implementation of schemes that cut across other adaptation relevant sectors.

towards *Capacity Development* and *Climate-Oriented* categories in the proposed budget. The analysis reveals that *CD* and *CO* categories account for about 55% and 24% of the OCCAP budget. The *General Development* category forms the remaining 21% of the proposed budget. There are a few sectors, like Agriculture, Water Resources and Forestry that have proposed strategies that are *GD* in nature. Coasts and Disasters and Forestry are the two sectors that have devoted a significant portion of their proposed budget to *CO* strategies, whereas sectors such as Agriculture, Urban Planning, Water Resources, and Fisheries do not have any proposed strategies that are *CO* in nature. In fact, Forestry is the only sector with an even distribution between *CD* and *CO* budgets. Strategies in the former category in this sector include, research and development on indigenous plant species, training and sensitizing forest management committees, improving tree planting programmes and integrating them with watersheds, whereas direct afforestation, reforestation activities, conservation of mangroves and degraded lands, etc. are some examples of the latter. Most sectors are heavy on *CD* in terms of their proposed strategies and budgets.

The Coasts and Disasters sector, for example, has allocated 62.68% of its proposed budget to the *Capacity Development* category. Strategies include a) activities that facilitate adaptive responses, example, flood hazard mapping and flood forecasting models, risk assessments and monitoring sea level rise; and b) interventions that aim to accommodate sea level changes by making adjustments to human activities or infrastructure. These are construction of flood and multi-purpose cyclone shelters, disaster resilient infrastructure, flood hazard mapping and flood forecasting models, protection and rejuvenation of traditional water bodies and natural drainage channels, and ground water conservation/ replenishment. The remaining 37.32% of the proposed budget caters to strategies that are *Climate-Oriented* aiming to protect the coastline through mechanisms, such as construction of check dams, sustainable shelter belt plantation, mangrove generation etc.

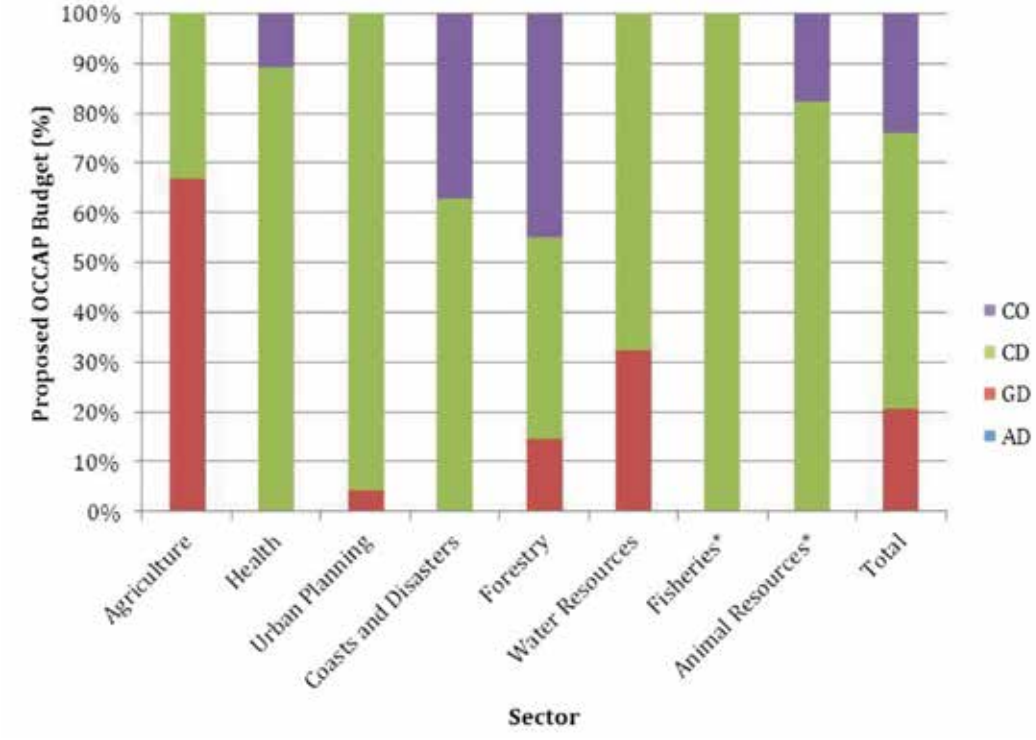
The Agriculture sector has proposed 55% of its budget towards *Capacity Development*, while there is no allocation towards *Climate-Oriented* initiatives. The *CD* initiatives include large scale policy and institutional strengthening, capacity building of extension personnel & farmers, research & development activities, etc. It is important to note that a disproportionate share (Rs. 1000 Crores) of the budget goes towards continuing the existing scheme on livelihood focussed people-centric watershed development in rain-fed regions that is currently being implemented by the Agriculture Department. This programme, when climate coded based on its stated objectives in the Orissa Watershed Development Mission's (OWMP) strategic document, indicated delivering both *GD* and *CD* outcomes. In absence of a clearly defined criterion to assign weightages to each category,

the proposed budget has been split in the ratio 2:1 (*CD:GD*) based on the number of outcomes in each category.

Fisheries and Animal Resources, despite the relatively low size of their current *CD* spending, have a significant share of budget allocation in this climate category. This includes coastal early warning systems, capacity building initiatives for livestock keepers and skill up-gradation for development of better adopted species.

Health and Urban Planning are the other sectors with a large allocation for *Capacity Development* strategies in the OCCAP. These include sensitisation of stakeholders, strengthening of health infrastructure to handle disease outbreaks, integrating climate change considerations in planning, and resource conservation. The Health sector has also proposed a few *Climate-Oriented* initiatives, like addressing climate-induced nutrition and food security concerns and dealing with physical and psychological impacts due to extreme weather conditions.

FIGURE 3.1.4: DISTRIBUTION OF PROPOSED BUDGET OVER THE CLIMATE SPECTRUM ACROSS SECTORS (%)



Source: OCCAP and analysis by the Study team
**Expenditure by the Department of Fisheries and Animal Resources Development has been tracked separately for the Fisheries and Animal Resources sectors.*

Apart from Agriculture, Water Resources is another sector that has a considerable *General Development* share in its budget. This is mainly on account of the strategy on construction of water harvesting structures. Although it has been highlighted as a climate adaptation strategy in the OCCAP, climate change literature identifies this as a *GD* activity and therefore, the total proposed budget for this strategy has been split equally between *GD* and *CD* for the purpose of climate coding. About 67.5% of the total budget for the sector goes towards *CD*. Strategies include improvement of drainage system, increasing water use efficiency and climate studies pertaining to water resources.

The analysis also looked at whether or not there is an overlap between proposed strategies in the OCCAP and existing/on-going schemes in the relevant nodal Departments. This was done by reviewing the stated objectives of both. Although there are sectoral differences, there are some proposed strategies in all sectors that seem to dovetail nicely with on-going schemes. It is, however, not clear from the OCCAP document whether the scope of these schemes will be expanded to fit the new strategies or they will be implemented as separate schemes. The presence of schemes that can be suitably moulded to integrate climate change considerations in different sectors should be fully exploited in terms of the climate change agenda and also rationalizing the cost of financing them. The National Vector Borne Disease Control Programme (NVBDCP), Integrated Disease Surveillance Project (IDSP), Nutrition Programmes and Integrated Child Development Services (ICDS) are important on-going schemes in the health sector that overlap with proposed actions in the OCCAP. Similarly, various initiatives under the Jawaharlal Nehru National Urban Renewal Mission (JNNURM) have the potential to absorb the proposed OCCAP strategies for the Urban Planning sector. In the Water Resources sector, strategies relating to the construction of water harvesting structures and drainage control overlap entirely with two of the existing schemes – in-stream storage structure and Rural Infrastructure Development Fund respectively. Both these schemes are funded entirely from the State's own resources.

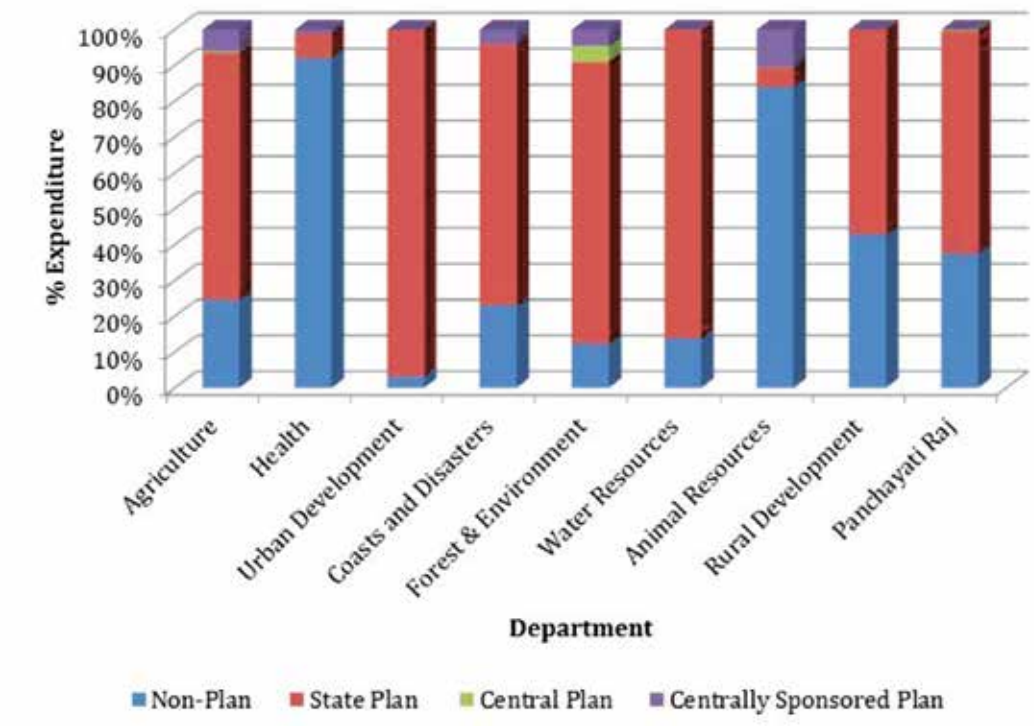
It is interesting to note that a large number of the proposed strategies across different sectors that do not overlap with existing/on-going schemes are in the nature of research and development, and training and education. Some of these relate to climate change impact studies at a micro level, strengthening of institutional mechanisms for more effective delivery of climate actions, capacity building and technical support of government officials as well as communities. This is an attempt to address one of the critical gaps

pointed out by experts[24] regarding the lack of scientific studies and technical capacity at the State level. More analysis on these lines is presented in a subsequent section on functional classification of existing expenditure and proposed budget.

Funding Sources for Capacity Development and Climate-Oriented Spending in the Budget

Currently, the *Capacity Development* and *Climate-Oriented* categories are funded more by Plan sources. The distribution of expenditure in the *CD* category across budget components is shown in Figure 3.1.5. The share of Plan spending on this category ranges from 57% in the case of Rural Development, to 97% for the Urban Development Department. The dominance of the State Plan component is also observed from the expenditure pattern in these Departments. Health and Animal Resources are exceptions in this regard, where 92% and 84% of their expenditure, respectively, are funded from the Non-Plan component.

FIGURE 3.1.5: DISTRIBUTION OF CAPACITY DEVELOPMENT EXPENDITURE ACROSS BUDGET COMPONENTS (%)

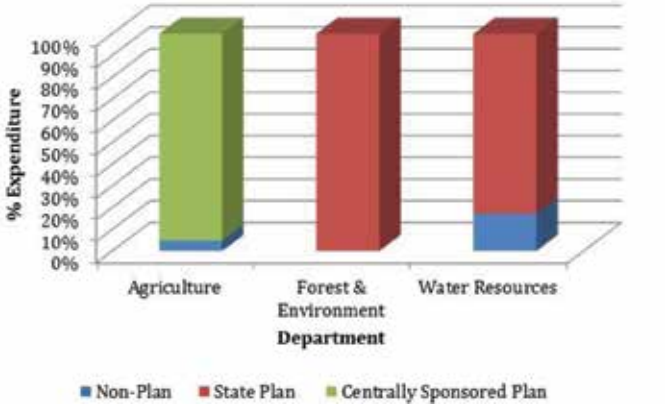


Source: Audited Expenditure Statement, GoO and analysis by the Study team

24 *Developing Financing Strategies for Implementing the State Action Plans on Climate Change* available at http://cdf.ifmr.ac.in/wp-content/uploads/2013/03/SAPCC-Phase-I-Report-Final_CDF_IFMR.pdf

Figure 3.1.6 shows the distribution of *Climate-Oriented* expenditure across budget components. As noted earlier, Agriculture, Forest and Environment and Water Resources are the only Departments that have made *CO* spending in FY 2011-12. The dominance of funding from Plan components is evident in these Departments as well. The State Plan component almost entirely (99.98%) funds the Forest and Environment Department's *CO* expenditure, and about 83% of the Water Resources Department's *CO* expenditure. The Agriculture Department's spending in this category is dominated by Centrally Sponsored Plan component, at 95%.

FIGURE 3.1.6: DISTRIBUTION OF CLIMATE-ORIENTED EXPENDITURE ACROSS BUDGET COMPONENTS (%)



Source: Audited Expenditure Statement, GoO and analysis by the Study team

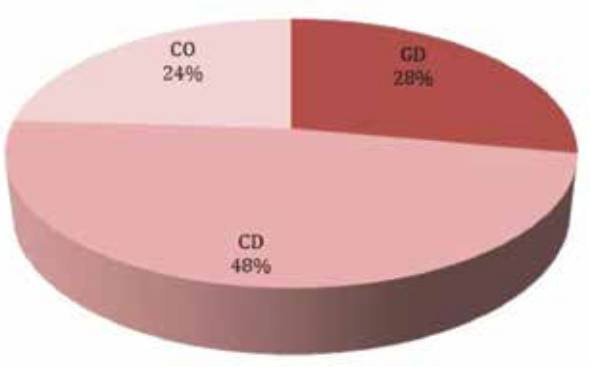
This indicates that the areas of spending identified as implicitly or explicitly climate-relevant by this Study reflect heavy Plan spending. It was also noted earlier that Plan expenditure forms a smaller share of the total spending of most of the adaptation relevant Departments. The dominance of Plan expenditure as reflected in the above analysis only further emphasizes the potential role that can be assumed by Plan schemes in integrating the climate change agenda with mainstream public expenditure.

Contribution of Externally Aided Projects (EAPs)

Revenue and Disaster Management, Forest and Environment, Water Resources, Health, Urban Development, and Panchayati Raj are the only adaptation relevant Departments that have EAP spending flowing through the State budget. The total EAP expenditure for all six Departments combined amounts to approx. Rs. 386 Crores. This accounts for about 2.77% of the total expenditure by all adaptation relevant Departments. The distribution of this expenditure across the climate spectrum is shown in Figure 3.1.7.

The EAP expenditure in the *General Development* category corresponds to the Health and Urban Development Departments. They are the DFID Assisted Orissa Health Sector Plan (OHSP) and the JBIC assisted Integrated Sewerage and Sanitation Project for Bhubaneswar and Cuttack, respectively. They are in the nature of assisting on-going public expenditure on strengthening infrastructure through flagship schemes like the NRHM and JNNURM.

FIGURE 3.1.7: DISTRIBUTION OF BUDGET EXPENDITURE UNDER EXTERNALLY AIDED PROJECTS ACROSS THE CLIMATE SPECTRUM (%)



Source: Audited Expenditure Statement, GoO and analysis by the Study team

EAPs in the *Capacity Development* category are from Coasts and Disasters, Forest and Environment, Panchayati Raj Department, and Water Resources. This accounts for 48% of the total EAP spending through the budget. The EAP spending in Water Resources is close to Rs. 142 Crores, the largest compared to the remaining Departments. EAPs fund 7% of the total *CD* expenditure in the Water Resources Department. There were four EAPs in 2011-12 that were routed through the State budget. These are JBIC assisted Rengali Irrigation Project (phase II), Orissa Integrated Irrigated Agriculture Water Management Investment Programme (OIIAWMIP) with assistance from Asian Development Bank, Orissa Community Tank Management Project with assistance from World Bank, and National Hydrology Project with World Bank assistance. Except for the National Hydrology Project that was targeted towards effective use of hydrological information system, the rest of the projects aimed to expand and optimize irrigation potential, increase farm income through productive irrigation and sustain restored tank systems through community participation and demand driven solutions. The only EAP in the Forest and Environment Department in this category is the World Bank assisted Coastal Ecological System for protection and development. This constitutes 6% of the total EAP spending in the Department. This programme aims to develop an integrated sustainable use of coastal resources while conserving the natural environment and biodiversity. The project implementation costs are

to be shared at approximately 90:10 between the World Bank and the State government. It is being implemented by the joint efforts of ten State Departments and has been piloted in two coastal stretches in the State. The Targeted Rural Initiative for Poverty Termination and Infrastructure (TRIPTI) is the only EAP in the Panchayati Raj Department. It aims to reduce poverty amongst rural households, especially women and disadvantaged groups through the provision of quality education, water supply and sanitation, health, roads and communication networks. It is a programme assisted by the International Development Agency, World Bank and is implemented by the Orissa Poverty Reduction Mission.

In the Coasts and Disasters sector, the World Bank assisted EAP for National Cyclone Risk Mitigation focuses on strengthening infrastructure (like construction of cyclone shelters, enhancement of road connectivity and strengthening of saline embankments), capacity building initiatives and setting up of early warning dissemination system. The investment cost on structural measures is shared between the Centre and State Governments, while investment in capacity building and setting up of early warning dissemination systems along with the project implementation and monitoring costs are borne by the Centre. The spending for these activities flows through the State Plan and Centrally Sponsored Plan component (Ministry of Home Affairs, 2011). The World Bank assisted Integrated Coastal Zone Management Project is another EAP that is currently being implemented in Odisha for sustainable management of the coastal zone. However, the funding for this project is not routed through the State budget.

Forest and Environment is the only Department with EAP spending in the *Climate-Oriented* category, which forms 24% of the total EAP expenditure. This JICA assisted EAP aims at reclaiming degraded forests and promoting sustainable management practices through JFMs and tribal development committees. The project cost is being shared between JICA and the State government in the ratio of 85:15, where the State government's share is provided to the Orissa Forest Sector Development Agency through grants in the State's budget. This project constitutes 94% of the EAP contribution to the Department.

Functional Classification of Existing Expenditure

The expenditure in different Departments for FY 2011-12 was also analysed by categorizing them into important functional areas in order to understand the current orientation of public spending. These functions range from tangible measures like infrastructure development, technology options, operation and maintenance to more intangible functions like training of personnel, research and development, institutional capacity building, etc.

This is important because climate change actions often tend to focus on hard adaptation measures and tend to ignore less tangible ones (Jones, Mitchell, Villaneuva, & Standley, 2012). A common classification with regards to functional areas has not been adopted across all Departments; Based on literature, the categorisation best suited for each sector has been applied to it. Figure 3.1.8 shows the functional classification undertaken for select Departments. An attempt was also made to categorize the proposed OCCAP strategies based on the brief description provided. This was done with the intent of understanding key strategic changes and directional shifts, if any.

While the functional classifications used for different Departments are not strictly comparable, it is interesting to note that the share of expenditure on R&D is low across all Departments. A few such examples from different Departments are discussed below, followed by some additional Department-specific observations.

The current R&D expenditure for the Coasts and Disasters sector has remained dormant in the State. There are no specific schemes under the Department of Revenue and Disaster management that focus on R&D. One of the components of the 13th Finance Commission for disaster response and National Cyclone Risk Mitigation Project is to focus on risk and hazard mapping, and vulnerability analysis. The total actual expenditure in 2011-12 (including all components of the schemes viz. early warning dissemination, structural investments) routed through these schemes is Rs. 15.78 Crores, which is insignificant in comparison to the overall expenditure of Rs. 2,900 Crores in the sector. A significant percentage (25%) of the total proposed budget of Rs. 1,313 Crores for the Coasts and Disasters sector, however, is directed towards activities that support local planning needs and assist in determining the adaptive response. These priorities for adaptation are integrating climate change into existing disaster plans, flood hazard mapping and flood forecasting models**,** risk and vulnerability assessments and monitoring sea level rise.

The Forest and Environment Department too has a small R & D spending, mainly on silvicultural practices and plantation techniques, which amounts to a meagre 2.14 % of the total *Capacity Development* and *Climate-Oriented* spending by the Department. Unlike other Departments, there is no significant change in the proposed budget in R&D for this sector. R&D constitutes only about 2.7% of the proposed budget for the forestry sector. Similarly, the Agriculture Department's R&D spending amounts to only 0.1% of its total *CD* and *CO* expenditure. Activities include undertaking plant & pest research to increase

agricultural productivity. This is despite the fact that both these sectors are vulnerable to current and anticipated climate change.

The Fisheries and Animal Resources Department also exhibits a similar picture, with a meagre 3.23% and 0.66% of its expenditures dedicated to research studies on fisheries and animal resources respectively. Activities include applied research on intensive fish production, development of vaccines and biological products for livestock, and poultry and intensive cattle development. It is notable that these initiatives are currently funded mainly through the Non-Plan component of the budget. There are areas of R&D highlighted in the OCCAP which relate to research on impact of climate change on inland and coastal aquaculture and application of biotechnology to develop better adapted livestock species.

The functional classification for Agriculture and Forest and Environment Departments has been applied only to the *CD* and *CO* expenditure, since that is of primary interest. A major share of the spending by the Agriculture Department went into sustainable products and practices, which comprises of sustainable soil, water and crop management systems, prevention of degraded land, etc. Infrastructure spend surprisingly forms a very minor share of the total expenditure. Given the declining share of agriculture in the State Gross Domestic Product (SGDP), there needs to be additional focus on post-harvest infrastructure. In contrast to existing spending by the Agriculture Department, there seems to be a greater focus on R&D activities among the proposed strategies. There is, however, a complete absence of targeted schemes to build agricultural infrastructure. Some of this might happen through the Integrated Watershed Development Programme (IWDP), but the importance of infrastructure should not be undermined, both from the point of view of raising farm income as well as coping with climate variability.

A similar analysis for the Forest and Environment Department's expenditure reveals that most of the expenditure was targeted towards "forest enhancement & emission control" and "biodiversity conservation & livelihood creation." These two categories together constitute 96% of the total *Capacity Development* and *Climate-Oriented* expenditure. There is very little expenditure on training and capacity building of forest management committees and Department officials. As noted earlier, there is also a dearth of spending on R & D activities within the Department. A bulk of the proposed budget for the forestry sector focuses on forest enhancement, plantations, and carbon sink enhancements leaving a small percentage for training, capacity building and R & D.

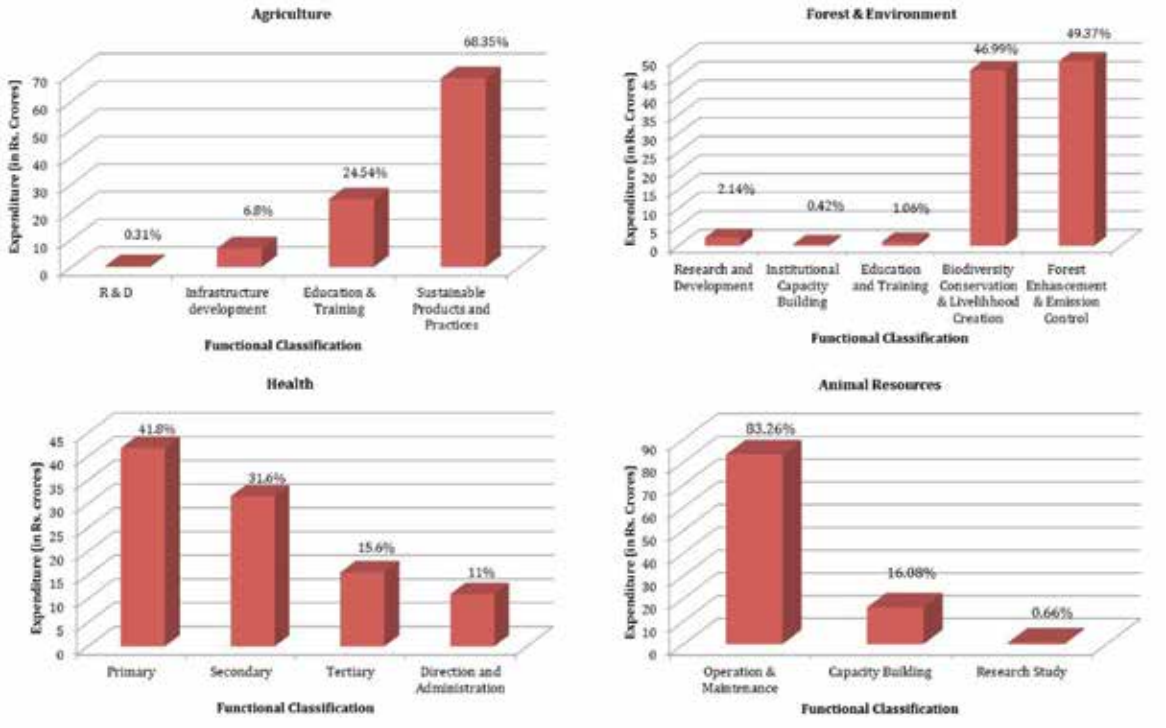
For the Health and Animal Resources Departments, the entire expenditure has been

classified into functional areas for the analysis. Both Departments have very low shares in capacity building and research activities in their current expenditure. The proposed OCCAP budget in the Health sector addresses this gap to a certain extent, by focussing on Tertiary healthcare, which includes aspects of training and research, apart from treatment of complex ailments. This has been proposed through research initiatives to address climate linkages to health and tackling impacts on nutrition and food security. However, the OCCAP still allocates a major share towards Primary and Secondary services by extending the on-going vector-borne and water-borne disease control (NVBDCP and IDSP) schemes. Similarly, the Animal Resources sector too continues to give greater emphasis on Operation and Maintenance activities in the OCCAP. Conservation of local hardy species of livestock, operationalizing gobar gas tanks, methane harvest facilities and disease early warning system form a major portion of the proposed budget, as compared to capacity building activities for livestock keepers.

A juxtaposition of focus areas of current expenditure with proposed strategies based on functional classification for the Coasts and Disasters sector suggests that the current expenditure and proposed strategies focus only on accommodation-based and protection-based responses. However, retreat based measures such as relocating threatened buildings or phasing out development in threatened areas have not been included in the proposed strategies.

A substantial portion (77.8%) of the *Capacity Development* and *Climate-Oriented* spending by the Water Resources Department went into infrastructure, which comprises of capital outlay in irrigation and flood control projects, commercial dam projects, and hydel power plants. Both R&D and Training, and Policy and Planning form a very small percentage - 1.4% and 1.2% respectively - of the overall *CD* and *CO* expenditure. In contrast to the existing schemes, there seems to be an explicit focus on R&D and Training in the proposed strategies, at least in terms of the number of strategies. In terms of the budget, however, infrastructure still remains the major function. About 65% of the total proposed budget goes towards the construction of water harvesting structures.

FIGURE 3.1.8: FUNCTIONAL CLASSIFICATION OF EXPENDITURE: SELECT SECTORS



Source: Audited Expenditure Statement, GoO and analysis by the Study team

Recommendations

1. *Funding sources and their contribution should vary according to the climate relevance and functional orientation of the proposed strategies*

    - Funding for proposed adaptation strategies in the OCCAP needs to come from different tiers of Government based on the nature of activities carried out under each of those strategies. Most of the proposed strategies fall under *Capacity Development*. In line with existing expenditure, these should be funded using a combination of Central and State funds. Since these strategies do not have a *Climate-Oriented* motive, yet provide climate resilience, States will benefit from them even in the absence of climate change. Once the State develops concrete actions around these strategies, more refined targeting of sources should be possible. In the Agriculture sector, for instance, supply of seeds, manufacturing of farm equipment etc., which are *General Development* in nature can be funded by the State Government, whereas activities related to organic farming, training and institutional capacity building can be funded by the Central government or international sources.

- As noted earlier, there has been a neglect of R&D spending in the State's current expenditure. The OCCAP acknowledges this and proposes several strategies in different sectors that fall in the R&D category. Since the return on investments on strategies like R&D, education and training etc. are intangible and long-term in nature, the State may not be inclined to use its own resources for funding such strategies. Central Government funds and international funds should be explored for these strategies. In fact, a lot of these strategies pertaining to collection of data, climate modelling based on agro-climatic zones, and other climate related research almost entirely overlap with the National Mission on Strategic Knowledge for Climate Change. Odisha could potentially access funds available under this Mission in order to implement these strategies. In contrast, Odisha might be more amenable to spending its own resources on *Capacity Development* strategies that are more tangible in nature, such as infrastructure, and sustainable products and practices.
- *Climate-Oriented* strategies form about 24% of the State's proposed budget. Coasts & Disasters and Forestry are the two sectors that have devoted significant portion of their proposed budget to *CO* strategies. Since the State and local Governments may not benefit much from these activities in the absence of climate change, the capacity and willingness for State funding decreases, with an increasing need for funding from Central Government and international sources.
- There are a few sectors, like Agriculture, Water, and Forestry that have proposed strategies that are *General Development* in nature. Most of these are continuation or expansion of on-going programmes. This forms around 21% of the proposed climate budget for the State. Since the State and local Governments will benefit from these programmes even in the absence of climate change, a substantial share of funding these strategies should come from these sub-national governments.
- The analysis of Externally Aided Projects in the State budget suggests that about 72% of the EAP expenditure goes towards funding *CD* and *CO* activities. In addition, the objectives of many of the current EAPs overlap strongly with the proposed climate strategies. This makes a strong case for Odisha to seek additional funds from international donors and either extend the on-going projects or expand their scope.

2. *International funds for adapting to climate change*

Climate change is a global problem and is not necessarily the result of activities undertaken within Odisha. Hence, the State has to adapt itself to the vagaries of

climate change. As all the developed countries have to share the consequences, it is recommended that some of the adaptation strategies be funded by the official development assistance or from the international climate funds. It is recommended that the "additionality" components be maintained. Activities funded out of the State budgets should be excluded and the remaining should be funded through international climate funds. The analysis done to identify overlap between proposed strategies and existing/on-going schemes should assist in determining "additionality." It is important to ensure that outputs of activities funded from international funds are clearly monitored.

3. *Greater priority should be given to existing/on-going schemes that have a high potential for delivering on adaptation goals*

   Although there are sectoral differences, there are some proposed strategies in all sectors that seem to dovetail nicely with on-going schemes. These areas of spending should receive greater focus as they can help accelerate the pace of integrating climate change considerations into on-going programmes. Moreover, while allocating scarce financial resources, any move in the direction of climate-proofing existing schemes that have potential should be accorded with higher priority. Flagship initiatives like Macro Management of Agriculture, National Rural Health Mission, Nutrition Programmes, Urban Infrastructure Governance under JNNURM, National Animal Disease Reporting System (NADRS) etc. are a few examples of key areas to be targeted, which could facilitate prudent use of financial and human resources rather than seeking additional funding and relying on creation of new institutional structures. It is, however, recommended that the performance of these schemes be evaluated by conducting rigorous impact evaluation studies, before large amounts of additional funds are pumped into them.

4. *Greater role for the Department of Rural Development and the Panchayati Raj Department in the OCCAP*

   Poor communities residing in rural areas of India, especially in a natural resource-rich State like Odisha, are the ones most vulnerable to the impacts of climate change. Building resilience and enhancing the adaptive capacities of these rural communities offer simultaneous development and climate benefits. The Department of Rural Development and the Panchayati Raj Department work very closely with these rural communities. In addition to implementing their own Department-specific schemes, they are also the implementing agencies for several Central and State schemes pertaining to other Departments, such as Revenue and Disaster Management, and

Environment and Forests. Hence, it is vital to develop strategies with respect to these two Departments, with attempts to mainstream climate change adaptation with rural development and welfare programmes. For instance, the centrally sponsored programme under the Panchayati Raj Department - the Indira Awaz Yojana, aims to provide dwelling units to SC/ST/freed bonded labourers. Such housing can be constructed in a manner that reduces their vulnerability to floods and earthquakes, thereby making the scheme more climate-relevant.

5. *Geo-referencing*[25]

In order to understand the effectiveness of climate finance it becomes crucial to trace the path of fund flow from the source to its ultimate beneficiary. This would highlight the effectiveness with which the funds were disbursed and utilized. It is important for the State/Central governments, private funding organizations and international donors to evaluate the impact created by their funds not only at the State level but at the district & city level and other lower levels of administration. Precise information of a location showcases whether the aid is being provided to the location with most needs or otherwise. Once the flow of aid and its impacts are mapped, the accountability and traceability of funds are enhanced, which would facilitate timely intervention by any regulatory authority.

6. *Sensitization of policy makers and local communities*

The overlap of proposed actions for climate change with on-going schemes is an important advantage for the State's climate change agenda. However, each Department has its own mandate and key priorities to address. Hence the significance of the climate change agenda should be given greater visibility. In this regard, an important insight drawn from interacting with Department officials is the potential role of sensitization of various stakeholders. It is felt that the entire process of integrating the climate change action plan with the Departments' functioning could be rendered incomplete unless both policymakers and local communities affected by climate change are actively engaged and sensitized. In the absence of a big push from policy makers, large and significant initiatives would not gain momentum. Similarly, for several activities like conservation of indigenous breeds of livestock, promoting new climate resistant crop species, etc. it is vital to secure cooperation and participation from concerned communities. For this reason, a greater dissemination of basic facts relating to climate change and climate risks in simple language could be undertaken in the local media and through the State Departments' existing outreach activities.

25 *Geocoding aid information* is a methodology developed by Development Gateway (Aid Data). The coding framework has been adopted by the World Bank

On the other hand, incentives could be provided to promote government officials to take greater responsibilities and broaden the scope of their activities. For example, targeted capacity building activities, contests to identify best and innovative adaptation practices among Departments, training programmes or study tours could be arranged for them in association with universities.

7. *R&D expertise*

As mentioned earlier, the OCCAP has proposed R&D related strategies in different sectors. These include vulnerability and risk assessments in coastal areas, studying threats to biodiversity, surveillance of disease outbreaks, flood forecasting, water circulation models etc. However existing R&D infrastructure and human resources need to be enhanced in order to conduct these. Collaborations with relevant research institutes are also very important. Although this has been incorporated in the OCCAP in some sectors, there are still a few concerns that need to be addressed. One key issue relates to the policy of staff transfers without taking into consideration the level of progress attained in key R&D projects. It is expensive and time consuming to train new staff and often important research projects get delayed or shelved. The importance of R&D activities with regards to climate change needs to be emphasized. Hence, there should be greater stability in terms of certainty of funding and long term commitments of research staff. A more conducive environment for R&D should be created before taking major steps as envisioned in the OCCAP.

3.1.2 Private Sector in Adaptation

While identifying potential sources of funds to implement climate adaptation strategies in different sectors, the OCCAP largely ignores the contribution and potential role of private sector investments. Although majority of the adaptation funds need to come from governments and international institutions, there are already areas where the private sector is investing in reducing climate related risks and increasing resilience of communities (Mandal, Venkataramani, & Rathi, Developing Financing Strategies for Implementing the State Action Plans on Climate Change, 2012). One of the focus areas of private sector engagement in adaptation is towards conceptualizing technologies that facilitate resilience building against climate change. Some of these initiatives are discussed below.[26]

General Electric collaborated successfully with an Indian manufacturer of water filtration technology to develop and disseminate low cost drinking water solutions to consumers by

26 *Private Sector Initiative - database of actions on adaptation.* Retrieved June 2013, from United Nations Framework Convention on Climate Change: http://unfccc.int/adaptation/workstreams/nairobi_work_programme/items/6547.php

setting up of water kiosks. Many private sector entities are also participating in operation and maintenance of water collection and treatment (Ernst and Young, 2011).

In order to provide electricity to rural island communities, Ankur Scientific Energy Technologies Pvt. Ltd. is involved in the manufacturing and installation of biomass gasifier systems that use local resources, such as biomass. The technology is not only cleaner and cheaper than other existing alternatives such as liquid fuels, but also makes communities more self-reliant and less vulnerable to natural disasters like storms. Another private initiative is the Mobile Agro Advisory System (mKRISHI) introduced by the Tata Consultancy Services' (TCS). This technology provides a range of information pertaining to agriculture and thereby, facilitates decision making on various issues such as pricing and environment conservation etc.

Private sector is also increasingly being known for adopting sustainable practices within its operations. For example, ITC has made investments in watershed management to ensure water supply for pursuing it business activities. Similarly, Unilever and Pepsi India engage in sustainable sourcing by advocating the use of sustainable agricultural techniques and practices to its suppliers. In fact, PepsiCo and Punjab Agri Export Corporation collaborated in 2002 to start a Citrus Development Initiative. This initiative focuses on crop diversification and assists farmers in adapting to water-constrained scenarios. PepsiCo in consultation with local Government successfully managed to introduce less water intensive citrus plantations as an alternative to paddy. Active engagement with such firms can lead to investment opportunities in these areas in the form of Public Private Partnerships.

Private equity funds and contributions from large corporations through their Corporate Social Responsibility (CSR) programmes are also other avenues that hold good potential to finance certain adaptation strategies. There are several private equity firms whose investment mandate overlaps with the strategies mentioned in the OCCAP. Some of these areas include waste water management, organic farming, rural health etc. For example, Nexus India Capital, in 2008, had invested in an organic farming company - Suminter India Organics Pvt. Ltd which promotes organic produce in the textile and food industries.

Funding by large corporate entities through their CSR Programmes already supports initiatives, such as organic farming, social forestry, water resources management etc. However, these are fragmented in nature and implemented at a much smaller scale, mostly through Non-Governmental Organizations. The Central Government could consider revising the guidelines for CSR programmes of large companies to include implementation of the

adaptation measures as proposed by the SAPCCs. Though these are voluntary guidelines, active engagement with the CSR cells of large corporations could spur contributions and investments in the sector.

Another area where the private sector has been operational for quite some time now is agriculture insurance. However, the role of private sector within crop/weather insurance remains restricted as the issue of commercial viability continues to exist. Given the potential of agriculture insurance in reducing climate risks, this report takes a deep dive into this issue to understand the potential bottlenecks and what the State can do to make such insurance schemes more lucrative for the private sector.

Agriculture Insurance

Background

Agriculture as a sector is largely dependent on the natural resource endowment and rainfall in a region. It possesses the highest intrinsic risk and vulnerability to climate change and hence requires quick adaptation strategies. Insurance is a small premium by which farmers can pass this risk onto the insurers. This risk reduction tool has been provided by the government through various crop insurance models since the 1970s. Several flaws in design and implementation were identified with each new agricultural insurance scheme, which the government tried to address in subsequent schemes.

The underlying principle of crop insurance is "*the law of large numbers*"- losses incurred by a few are shared by many in the area. It also assumes that losses incurred in bad (in terms of produce) years would be compensated by resources accumulated in good years.

Specifically, it can be outlined as follows[27]:

a) The uncertainty faced by the individual farmer is transferred to the insurer through participation in large numbers, and the insured farmers pay a risk premium in return.

b) Total loss is shared by participating farmers over a wide area, i.e. horizontal spreading of risks over a wide area and vertical spreading of risks over many years.

c) The risk premium reflects the group risk assumed by the insurer. An indemnity is liable to be paid to the farmer when a loss is incurred due to causes beyond

27 http://www.agdss.riskraft.com/index.htm

his control, as long as he maintains a valid insurance contract by paying the premium without default.

Typically, agriculture insurance models in India have been of two kinds. In the first model, schemes are designed by the government in consultation with public insurance companies, the latter being the implementing agency. In this model, costs are shared by both parties. In the second kind, schemes are developed and implemented by the private insurance companies, and the costs and risks are borne solely by them. Until recently, agriculture insurance in India was provided mostly by the government and public insurance companies. The genesis of agricultural insurance, which has now evolved into the current Crop & Weather Based Index Insurance, is given below:

TABLE 3.1.2: EVOLUTION OF GOVERNMENT AGRICULTURAL INSURANCE MODELS IN INDIA

Insurance Scheme/Model Key Features	Pilot Crop Insurance	Comprehensive Crop Insurance Scheme (CCIS)	National Agricultural Insurance Scheme (NAIS)	Weather Index Based Crop Insurance Scheme (WBCIS)
Year of Implementation	1979	1985	1999	2003
Implementing Agency (IA)	General Insurance Company (GIC)	General Insurance Company (GIC)	Agriculture Insurance Company (AIC)*	Agriculture Insurance Company (AIC)/ Private insurance companies (more recently)
Risk Sharing	Central government and GIC	Premium and risk were shared by both Central and State governments on 2:1 basis	Risk will be shared between the government and Implementing Agency (IA) depending on whether the insured crop is a food crop or oilseed or commercial & horticultural crop. This is maintained until a complete transition to actuarial regime is achieved.	Completely borne by AIC

TABLE 3.1.2 (continued)

Insurance Scheme/Model Key Features	Pilot Crop Insurance	Comprehensive Crop Insurance Scheme (CCIS)	National Agricultural Insurance Scheme (NAIS)	Weather Index Based Crop Insurance Scheme (WBCIS)
Subsidy	Was provided for both claim and insurance charges (50%) for small and marginal farmers shared equally by Central and State Governments	No separate subsidy was provided apart from the premium and risk being shared by the two tiers of government.	50% premium subsidy provided for small and marginal farmers shared equally by Central & State Governments.	A part of the premium is to be borne by the insured farmer while the rest will be shared equally by the Central and State Governments and paid upfront to AIC
Insurance Criteria	Area based approach (based on average yield assessment)	Homogenous Area Approach	Area based approach	Index-based approach
Farmer Penetration	Was applicable for only loaned farmers on a voluntary basis	Covered 15 States and was compulsory for loan farmers growing food crops & oilseeds	Is compulsory for all loaned farmers and voluntary for other farmers.	Is compulsory for any loaned farmer growing a notified crop, voluntary for others
Sum Insured	Initially up to a maximum of 100% of loan taken which later was increased to 150%	100% of crop loan to a maximum of Rs.10,000/-	The threshold yield is the sum insured in most cases which can be exceeded if the farmer is willing to pay premium at commercial rates. For loaned farmers it'll be at least up to the crop loan amount.	Is usually a pre-decided value between cost of production and value of production

Source: Compiled from various websites

** A modified version of the NAIS viz. the MNAIS was implemented by ICICI Lombard in 2010-11. Apart from this, the NAIS was mainly implemented by public insurance companies. In the case of WBCIS both public and private insurance companies have implemented schemes in the past.*

Currently, the National Agricultural Insurance Scheme (NAIS) and Weather Index Based Crop Insurance Scheme (WBCIS) are the two most prevalent agricultural insurance models. Several insurance schemes have been implemented under these two models by the government and a few private insurers. Some examples include the Seb Bima Yojna as Apple Insurance, Rabi Weather Insurance, Weather Insurance (ICICI Lombard) etc. It

is, therefore, important to understand the implementation of these two models in greater detail, with a focus on the State of Odisha.

Odisha is highly dependent on agriculture and majority of its cultivable land is classified as being under rainfed area. Thus, there is an indispensable need for risk coverage for unforeseen agricultural losses as a result of climate change. The NAIS has been operational in the State since 1999-2000. It was reviewed and re-implemented as Modified National Agricultural Insurance Scheme (MNAIS) in 2010-11. WBCIS was introduced in the State in 2009 on a pilot basis for paddy crops only. These models have been promoted by both the State and Central Governments, as well as by private insurance companies.

As per Odisha Agriculture Statistics that tracks Government insurance schemes, only a total of 14,000 and 2,16,000 farmers benefitted from the WBCIS and NAIS respectively in 2010-11 on coverage of both kharif and rabi crops in the State.

TABLE 3.1.3: ACHIEVEMENT OF PUBLIC INSURANCE SCHEMES IN ODISHA FOR THE YEAR 2010-11

Item	NAIS	WBCIS
Farmers covered	11.43 lakh	0.75 lakh
Farmers benefitted	2.16 lakh	0.14 lakh
Area covered	1062.89 ('000 ha)	101.72 ('000 ha)
Sum insured	Rs.1947.57 Crores	Rs.122.6 Crores
Compensation paid	Rs.138.26 Crores	Rs.1.25 Crores

Source: Odisha Agricultural Statistics 2010-11

As seen from the Table 3.1.3 above, NAIS has reached out to a much bigger farmer population than WBCIS. It can also be observed that there is a wide gap between the sum insured under both models and the compensation paid for the same year. There could be various reasons for this, including lack of awareness regarding claim procedure, less attention towards design of insurance policy, default in payments or simply no unusual weather patterns that lead to production losses to the farmers. It is, however, evident that WBCIS implemented by the public insurance companies is still relatively underdeveloped in the State in comparison to NAIS and can be tapped to provide greater cover.

Although there is a huge scope for private sector expansion in agriculture insurance, there

are a number of challenges that prevents it from being a viable business opportunity for private insurers. Even the OCCAP does not have any proposed strategies that are specific to agriculture insurance. There is a mere mention of dissemination of climate change information without any indication of its context. The following section presents some of the main drawbacks and makes some recommendations that have the potential to develop agriculture insurance as a viable adaptation strategy for the private sector.[28]

Key Findings

The domain of agriculture insurance had for long been dominated by public insurance schemes implemented by AIC until 2002 when ICICI Lombard pilot tested the WBCIS in collaboration with BASIX India in Mahabhubnagar, Andhra Pradesh. Post a successful implementation, this model was continued and also scaled up to other parts of the State in the next few years. Subsequently, several private insurance companies have started offering agricultural insurance products. After several years of implementation, ICICI Lombard, IFFCO Tokyo, HDFC Ergo, Cholamandalam MS Ltd. now hold considerable market share in this sector. As a recent development in 2012, the Department of Agriculture along with Agriculture Insurance Corporation piloted WBCIS across 21 States, including Odisha. As per Directive of the Central Government in March, 2013, this is being continued for the year 2013-14 as well. With Kharif 2013 five other private insurers have been allowed to implement these models and newer insurance products like the pilot Coconut Palm Insurance Scheme are being tested in States. At this juncture it would apt to evaluate barriers to effective implementation of traditional insurance models and understand the need for new mix models involving public-private partnerships. These models have been working in countries like China, Mexico, Australia with varying degrees of success, and should be looked at to gain insights for India. Here are some of the major challenges facing private insurers:

a) *"The law of large numbers" not always applicable due to grossly inadequate take up:* Both NAIS and WBCIS at some point of time became completely unviable for private companies as the adoption rate by farmers was very low and were unable to generate sufficient returns. This rendered the schemes to be loss-making forcing private players to withdraw themselves from offering them. In the initial years, when having insurance wasn't mandatory or tied to a crop loan,

28 The analysis for this section has been developed using a combination of secondary research and expert interviews.

only farmers who cultivated risky crops or followed a multi-cropping pattern availed coverage for their produce. This resulted in high pay outs by the insurers leading to losses. One private insurer tried using dealers of agricultural seeds in rural areas for selling its insurance schemes. The idea was to leverage the already established distribution channel (for seeds and fertilizers) to promote insurance within the farmer community. But it was later found that the incentive the insurance company could provide to the dealers to sell policies to farmers was too meagre for them to continue with this plan.

b) *Design flaws and complexities reduce the popularity of schemes:* The process of implementing crop insurance schemes included conducting regular crop cutting experiments to identify average crop yield. This can be done at a macro level in the districts (average yield was used as a proxy) or at a granular level in the villages. Irrespective of this, it was a laborious task that involved large human resources and associated costs, which ideally should have earned returns for the implementing agency. But simple design flaws like permitting only land owners to claim insurance, following impractical rainfall standards as benchmarks for claims, etc. didn't allow the farmers to avail their rightful claims, which further demotivated them from opting for any kind of agricultural insurance. The farmer community largely consists of people whose purchasing power is low and hence a small incremental cost or flaw in design might result in huge drop in numbers. This is because of the high demand elasticity as a consequence of their low income levels.

   Most insurance policies hold insufficient rainfall as a key for pay out, but very few schemes considered excess rainfall as an indicator for losses incurred by farmers. This was a basic design flaw, which eliminated claims due to surplus rainfall, thereby not offering any cover for farmers. Another critical design flaw was "adverse selection," which refers to the higher or lower premium that the farmer had to pay as a result of being a part of a categorical group of farmers created by the insurance company. Farmers are often grouped into risk categories where the premium rates are calculated by the insurance company, but receive benefits that are tailored to their individual losses. In such cases, farmers in each group facing lower than average risks may end up paying too much for the average benefits that they have received. This could have been a deterrent for farmers to opt for any insurance because in the case of a severe drought or flood, he would have expected to receive compensation from the Central/State Government.

At times, the take up is affected by lack of knowledge about the importance of insurance cover (Pineda, 2013), its benefits and design information. The bridging of this gap and reducing the scope of miscommunication is important to ensure a positive attitude of farmers towards participation. Also, insurance companies (in some cases of the NAIS) have charged a premium of a few hundred Rupees (which amounts to 2-5% of the overall cost of production), and these weren't actuarial in nature.

c) *Misuse of policy by farmers:* This problem refers to the exploitation of the insurance cover provided by the company/government. It is referred to as *moral hazard,* which relates to a situation where the granting of an insurance contract can lead to a reduction in the application of good crop husbandry practices or an intentional altering of production practices on the farmers' part, resulting in higher loss claims.

d) *Inadequate and costly infrastructure:* This is one of the main reasons for several errors in insurance claims and payments in this sector. There is a fundamental inadequacy in weather monitoring infrastructure across the country. It could lead to a potential mismatch between insurance pay out and actual insurance losses. This is referred to as the *"basis risk"* that the insurance company faces as a result of using weather data from far off stations as a proxy for location-specific data. This, in some cases, resulted in the farmers' distrusting the credibility of the data and weather information provided by the insurance companies and hence their policies. As a remedial measure several insurance companies even tried setting up private infrastructure, but this turned out to be very expensive since only village level infrastructure could have completely eliminated the case of using proxies and earned the farmers' trust. Hence it lead to private companies moving out of crop insurance, which resulted in the government being the sole provider of such services. As a recent initiative, Tamil Nadu Agricultural University (TNAU) is setting up weather stations, which provide information on rainfall, humidity, wind speeds and other parameters across several blocks and villages in Tamil Nadu.

e) *Insufficient historical data weakens the forecasts:* The absence of historical meteorological data in several regions to analyse and predict rainfall pattern or index further weakens the index by itself, which reduces the strength of the forecasts.

f) *Lack of government support to private sector schemes:* The Central/State government offer risk sharing assistance or premium subsidies in the case of public insurance schemes, but the same is lacking for private providers. This meant that the private insurance companies were on their own to cover for farmers' losses with insufficient capital formation during the process. This lead to the initial phasing out of existing private companies from providing crop insurance and discouraged any further entry into the field. In late 2007, a few States had agreed to provide premium subsidies for private insurance schemes, but this was still largely inadequate to ensure profitability.

Recommendations

Based on interviews with experts, selective recommendations have been enlisted below:

a) *Appropriate premium needs to be fixed:* The entire group of farmers could be classified into large, medium and marginal farmers based on the size of their landholding. A comprehensive premium based on their crop type, rainfall requirement and landholding size would be preferred over a mere landholding based amount. This normalizes the risk of losses for both stakeholders. In most cases, the premiums charged by both government and private insurers are miniscule, which amounted to a mere 2-5% of the cost depending on the crops covered. This creates the image of providing almost free insurance to the farmer due to which the scope for moral hazards and negligence arise. Farmers should be asked to pay a proportionately sizeable amount of the premium to increase their interest in maintaining the farm and completing harvests with due diligence.

b) *Effective dissemination of scheme information:* Information on schemes, their design, usage, and claim procedure has to be communicated to farmers in simple terminologies through awareness generation campaigns or multi-stakeholder workshops. Frequent weather forecasts, cropping advice, etc. need to be conveyed to farmers through mobile technology in vernacular languages and if possible, in voice messages, which would then be spread through the village in case the entire community doesn't have access to mobile technology. There needs to be greater emphasis on weather data collection at a more granular level to ensure stronger forecasts and provision of at least historical data in the future.

c) *Public Private Partnerships is the right way to progress in the insurance sector:* The government has faced many problems in implementing schemes in several villages and so have the private companies. A clearly identified mix model is needed where the government initially supports the private insurer with subsidies

and risk sharing for the first few years and share infrastructure costs to ease the expense of setting up weather monitoring stations. Once this infrastructure has penetrated through most villages, it becomes easier for private insurers to implement the schemes. Innovative business models where a private company establishes weather monitoring stations, collects periodic data, and sells them to private and government insurers are the need of the hour.[29] Such interventions ensure that information collection is undertaken in a professional manner and at the level required.

d) *A bottom-up approach should be followed for scheme design:* The insurer needs to examine the cropping and cultivation pattern on a daily/weekly basis to fix criteria and clauses that are mutually beneficial to both the farmers and the insurer. Given below is the rainfall data for Odisha for the year 2010-11. Each crop has a specific water requirement that best suits its growth. The actual rainfall for the crop during a season in most cases might fall short or surpass this requirement, which is a clear indicator for insurance coverage as the productivity is affected by such shortfall/surplus in rainfall.

TABLE 3.1.4: RAINFALL PATTERN IN ODISHA FOR 2010-11

Period	Rainfall (mm)		% Deviation
	Normal	Actual	
Summer (Jan'10 to March'10)	59.50	14.30	(-)76.09
Pre-monsoon (April'10 & May'10)	96.40	101.60	+5.39
Monsoon	156.20	115.90	(-)25.80
June'10	216.50	150.20	(-)30.62
July'10	339.90	290.80	(-)14.45
August'10	356.0	284.10	(-)20.20
September'10	231.90	227.90	(-)1.72
Sub-total Monsoon (June-Sept)	1144.30	953.0	(-)16.72
Post Monsoon (Oct-Dec)	150.70	224.10	+44.77
Grand Total	1451.20	1293.0	(-)10.90

Source: Odisha Agricultural Statistics 2010-11

29 Weather Risk Management Services Ltd. is an example of a private company that has its own weather monitoring infrastructure, and sells weather related data and analytics to different interested users like the government and public or private insurance companies.

As can be seen from the table above, there are deviations in most of the pre-monsoon months and an excess in the post-monsoon months. This requires a more detailed study on the weekly rainfall patterns, which will identify and aid in the estimation of actual losses incurred by a particular farmer. A holistic or a monthly/bimonthly approach may not be the best approach to estimating such losses in which case the farmers stand to lose out on coverage. Hence a more bottom-up approach catering to specific crops and regions at a micro level will ensure satisfaction to the farmers, thereby increasing the uptake of the scheme. It also builds trust in the private company's schemes that results in an increase in market penetration and share for the company.

e) *A well designed and targeted subsidy is a good tool:* The government's subsidy to augment crop insurance isn't a bad choice if it is designed and implemented the right way. The subsidy essentially creates market distortions to keep the market price for insurance under check. Hence if provided at the right place to the right stakeholder, it could prove to be an effective tool to produce desired impacts. For instance, the most common subsidy is in the form of a 10-20% premium subsidy for small and marginal farmers. This is a "one size fits all" kind of an approach without taking into consideration crop type and value. Also, the government could consider paying the subsidy upfront to private insurers based on actuarial rates, which ensure a more robust estimation of losses to be incurred by farmers.

3.2 Mitigation

Odisha emits around 343 million tonnes of CO_2 equivalent from various sources, the details of which are given in Table 3.2.1. The top emitting sectors are transport, thermal power, iron and steel, aluminum, cement and ferrochrome. The OCCAP too accords a high priority with a proposed budget of Rs. 4,215 Crores for the energy sector. After energy, the Industry sector gets a high priority with the budget of Rs. 322 Crores in the OCCAP. The key recommendations for the sector proposed by the OCCAP are to integrate climate concerns in policies and plans for industrial development, prepare GHG emission profile of various industrial clusters and set emission targets for thermal power plants. Odisha's Transport sector has a proposed budget of Rs. 60 Crores. The key mitigation priorities of the sector being enhancing rail transport, shift to low carbon fuel and building low carbon green highways. The approximate budget required to meet the key priorities of the sector is Rs. 4,597 Crores.

TABLE 3.2.1: SOURCES OF GREENHOUSE GAS EMISSIONS IN ODISHA

GHG Emission Sources	CO_2 (million tonnes)	CH_4 (million tonnes)	CH_4 (CO_2e) mt	Total GHG Emission CO_2 e
Coal Mines	0	0.0239	0.5019	0.5019
Thermal Power	54.9	0	0	54.9
Cement	1.22	0	0	1.22
Blast Furnace	6.475	0	0	6.475
Sponge Iron	5.1	0	0	5.1
Sinter Plants	1.048	3.67	77.07	78.118
Pellet Plants	0.2478	0	0	0.2478
Ferro Alloy Plant	1.573	0	0	1.573
Coke Oven	1.799	3.21	67.41	69.209
Aluminum	1.4124	0	0	1.4124
Transport	5.707	6	126	131.707
Other Industrial Energy Use	2.683	0	0	2.683
Total	**82.165**	**0.0248**	**270.981**	**353.147**

Source: Orissa Climate Change Action Plan 2010-2015, GoO

3.2.1 Public Expenditure Analysis

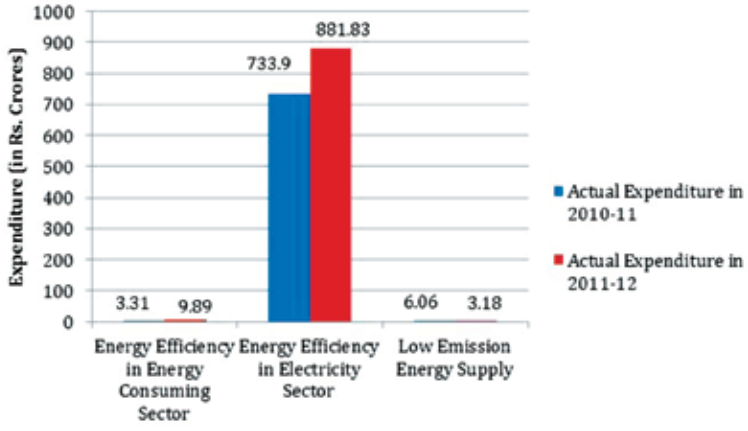
Public expenditure under all mitigation relevant Departments was analysed for the FY 2010-11 and FY 2011-12 to get an estimate of State budgetary expenditure on low carbon interventions in Odisha. The Departments of Industry, Commerce and Transport, and Steels and Mining did not have any schemes with a low carbon emissions component. Public expenditure routed through the Department of Energy and Department of Science and Technology was analysed with a view to estimate the State budgetary expenditure on low carbon interventions for the energy sector in Odisha. The trend is very similar for both FY 2010-11 and FY 2011-12. For the most recent year, the analysis suggests that the highest spending of Rs. 881.83 Crores was on transmission and distribution infrastructure.[30] Major programmes that contributed towards this effort are the CAPEX Programme for development and up-gradation of distribution system, and capital expenditure by Odisha Power Transmission Corporation Ltd (OPTCL) for commissioning new transmission projects and up-gradation of distribution system.[31]

30 Augmenting transmission and distribution networks can significantly reduce T&D losses and in turn reduce GHG emissions.

31 Planning & Coordination Department, Odisha. *Energy Chapter.* Retrieved April 2013, from http://www.odisha.gov.in/p&c/Download/Annual_Plan_2012_13/Vol_I/CHAPTER-10%20(Engy)%20(F)doc.pdf

Budgetary expenditure on energy efficiency in energy consuming sectors and renewable energy for FY 2011-12 are estimated to be at Rs. 9.89 Crores and Rs. 3.18 Crores respectively. The focus areas for expenditure on energy efficiency were: installation of LED lights and energy efficient pumps, awareness on energy conservation and investment grade audit of 100 State Government buildings. Expenditure on renewable energy, which is routed through schemes such as Rural Village Electrification Programme (RVEP) and Solar Photovoltaic Program, focuses on electrification of un-electrified areas by means of renewable energy sources.

FIGURE 3.2.1: ACTUAL BUDGETARY EXPENDITURE ON ENERGY EFFICIENCY AND RENEWABLE ENERGY (IN RS. CRORES)[32]



Source: Budget documents and Detailed Demand for Grants, GoO and analysis by the Study team

The proposed low carbon strategies for the energy sector in the OCCAP follow a similar pattern, wherein a major portion (83%) of the proposed budget for the sector is directed towards interventions that aim at reducing T&D losses. Capital expenditure in this segment is considered a priority since Odisha is still plagued with high T&D losses of about 37% (and AT&C losses of 40.3%).[33]

The reduction of losses has implications not only in terms of GHG emissions but also in terms of providing energy security, which is a large development co-benefit and therefore, is a priority intervention for the State. The remainder of the proposed budget focuses on tapping the renewable energy and energy efficiency potential and the required institutional development for carrying out low carbon interventions in the State.

32 Expenditure on transmission & distribution infrastructure includes budgetary estimates of schemes by PSU (OPTCL). The expenditure under this is not routed through the Department of Energy.

33 Retrieved February 2013, from Planning Commission (Financial Resources Division)- Odisha: http://planningcommission.nic.in/plans/finres/fr/odisha.pdf

3.2.2 Analysis of Proposed Strategies and Recommendations

This report has analysed the energy sector strategies for the purpose of demonstration. However, a similar approach and assessment frameworks could be used for other mitigation-relevant sectors as well. The proposed fiscal instruments and incentives to meet the mitigation priorities set by the OCCAP have been dealt with in detail in Section 3.3.

Overall Orientation of the Proposed Mitigation Options

All the proposed mitigation strategies in the sector were classified according to the following categories - *Concepts and Plans, Infrastructure, Operations and Management Technology Transfer and Capacity Building* (Binstead, Bongardt, Dalmann, Sakamoto, & Ko, 2013) (Table 3.2.2)**.** *Concepts and Plans* form the first stages of climate change mitigation activities. They form the basis on which investment in sustainable infrastructure is made. *Infrastructure* stage intervention is characterized by initial investments made in low carbon infrastructure. *Operations and Management* (O&M) stage, includes elements that control the infrastructure and entities that use the infrastructure. *Technology Transfer* and *Capacity Building* are cross cutting issues that exist across these three mitigation interventions (Binstead, Bongardt, Dalmann, Sakamoto, & Ko, 2013). This categorization is useful to identify knowledge and data gaps (that are reflected in proposed strategies at the concepts and *Concepts and Plans* stage) which can then form the basis on which informed action/appropriate mitigation response can be developed. It also helps in tracing the stage and nature of interventions planned by the State.

Based on this analysis, it was observed that a large number of the proposed interventions are at the *Concepts and Plans* and *Capacity Building* stages (across Concepts and Plans, Infrastructure and O&M). However, a disproportionate share (83%) of the proposed budget for the sector has been allocated to reducing T&D losses, which is a *Technology Transfer* option at the *Infrastructure* stage.

TABLE 3.2.2: OCCAP STRATEGIES FOR THE ENERGY SECTOR[34]

		Technology Transfer	Capacity Building
Concepts and Plans	i) Develop an operational plan for the Fund that will get revenue for the sale of power that is exported ii) Conducting a study for determining the State's emission intensity iii) Revised RPO based on the changing load mix and assessment of evacuation Infrastructure iv) Compiling information from the several studies and initiatives that have been done on fly ash and developing an operational plan for effective utilization of fly ash v) It is proposed to introduce green cess @ 1 paise/ unit for LT and 5 paise/unit for HT and EHT vi) Developing State level energy efficiency standards for sectors adopting ECBC vii) Develop a comprehensive policy and plan to save energy use in order to reduce the demand – supply gap and contribute towards climate change abatement viii) Renewable energy- Identification of sites for hydel power and cultivation of bio-fuels, survey and investigation for hydel and solar, and developing an investment friendly policy framework for hydel, biomass, wind and solar, wind resources assessments, selection of entrepreneurs for hydel power generation	i) Feasibility study for the establishment of coal-based thermal power plants along coast of Odisha, use of saline water and dedicated rail corridor for coal transportation to be conducted ii) Feasibility of implementing emerging clean coal technologies through pilot projects in Odisha iii) Feasibility study of evacuation corridors iv) Pre-feasibility and feasibility reports for hydel, biomass and solar v) Demonstration projects for small hydro, wind, bio-mass and solar vi) Demonstration projects established and hybrid wind-solar plants on degraded hill slopes along with greenbelt development	i) Functional re-organization and capacity building of the Energy Department, energy conservation cell, OREDA ii) Creation of a new cell to creation of separate cell for small & medium hydel plants to have a coherent road map to achieve efficient functioning and implementation of energy efficiency, energy conservation, promotion of renewable energy iii) Training of the members of working group or their representatives of different departments and organizations on sector specific climate change issues iv) For proper energy monitoring, capacity building of energy auditors strengthening of existing Energy Conservation Cell under the Energy Department supported with manpower and infrastructure v) Awareness Generation for Energy Conservation and RE sources like biomass, wind and solar vi) Capacity building of the State Pollution Control Board vii) Capacity building of the farmers/ entrepreneurs for raising plantations and State level agencies for developing renewable energy
Infrastructure	i) Infrastructure development for setting up wind based power plants and areas will be developed as wind farms ii) Developing a biomass supply chain involving agro, agro industrial and other biomass resources including dedicated energy plantation	Augmentation of T and D infrastructure and investment plan	i) Promotion and implementation of the National Bureau of Energy Efficiency's adopting the ECBC for widespread adoption in the State to reduce the energy consumption in buildings ii) Implementation of utility level DSM measures iii) Integrated Super critical (660 MW) IPP Policy (Coal Washeries, Fly Ash based cement and brick plants) Minimum unit size for the purpose of IPP/MPP should not be less than 300 MW to achieve minimum standards of efficiency iv) Promoting investment projects in RE v) Promoting biomass based gasifiers project in agro based industries, solar PV and solar thermal vi) Promoting the establishing of oil extracting units and linking up with the blending infrastructure.
O&M	Enhancing present practices for improved load management		

Source: OCCAP and analysis by Study group

34 Does not include strategies for which no budgets have been proposed. These strategies focus on policy implementation that promotes energy generation through clean coal approaches.

This classification of the SAPCC strategies also helps in understanding the type of climate finance support that is likely to be available within the broad categories of climate change mitigation activities (*Concepts and Plans, Infrastructure, Operations and Management, Technology Transfer and Capacity Building*). For example, the National Clean Energy Fund (NCEF) was instituted by the Government of India to provide funding for research and innovative projects in clean energy technologies. The fund is now also expected to provide low cost loans to investors in renewable energy and for development of renewable energy transmission infrastructure projects.[35] As per the second phase document of the Jawaharlal Nehru National Solar Mission (JNNSM), viability gap funding projects (for utility scale solar projects) will now be financed using funds from the National Clean Energy Fund.[36] The focus areas of the NCEF within the broad categorization of mitigation interventions are: Infrastructure and Technology Transfer.

Some existing funds that support mitigation related activities in the energy sector were reviewed to understand potential sources of funding for the OCCAP strategies. However, this is not a complete list. The purpose was to illustrate the relevance of such an exercise and how States should develop a funding strategy based on available sources and State priorities. It was noted earlier that most of the strategies proposed in the OCCAP are found to be concentrated at the concepts and plans and capacity building stages. From Table 3.2.3 below, it can be observed that most international funds provide financing only for large scale deployment of clean technologies. Therefore, external funding will be largely restricted for technologies that are ready for commercial deployment in the State of Odisha. This would mean that funding for assessments and feasibility related strategies should be mobilised from State finances or through Central assistance. Understanding the available sources of international funding along with their focus areas will be instrumental in optimizing the resources at hand. Furthermore, it is important to note that initially the State should take a proactive role in assisting these projects, but the goal should be to make them self-sustainable in the long run.

35 http://newindianexpress.com/cities/bangalore/%E2%80%98NCEF-plans-to-give-low-cost-loans-for-renewable-energy%E2%80%99/2013/04/11/article1539730.ece

36 http://mnre.gov.in/file-manager/UserFiles/draft-jnnsmpd-2.pdf

TABLE 3.2.3: OVERVIEW OF FUNDING SOURCES AND TYPES OF INTERVENTIONS SUPPORTED

	Concepts and Plans	Infrastructure	Operations and Management	Technology Transfer	Capacity Building
National Clean Energy Fund		✓		✓	
India Solar Generation Guarantee Facility		✓		✓	
GEF Small Grants Programme	✓			✓	✓
South Asia Clean Energy Fund		✓		✓	
Global Environmental Facility	✓	✓	✓	✓	✓
Clean Technology Fund	✓	✓	✓	✓	✓

Source: Compiled from multiple websites and Binstead et al. (2013)

(1) Energy Efficiency in the Electricity Sector: Reducing T&D Losses

The limited availability of long term financing to improve the T&D infrastructure in the State, over the years has resulted in high T&D losses. Distribution companies (DISCOMs) that were privatized during the power reforms in Odisha were not backed by transition support to cover the revenue gap and therefore, had started their businesses with significant liabilities. Their inability to raise funds, coupled with significant debts resulted in low investment levels in distribution infrastructure by the DISCOMs (Karmacharya, 2012). In addition to this, owing to privatization of distribution companies, the State currently does not have access to certain major schemes such as "Financial Restructuring of State Distribution Companies" formulated by the Central Government and "Restructured-Accelerated Power Development & Reforms Programme'' (the flagship programme of Ministry of Power, Government of India with Power Finance Corporation as nodal agency).

These schemes do not provide assistance to private utilities.[37] Therefore, a major proportion of the proposed energy sector budget in the OCCAP to reduce T & D losses has been allocated to T & D infrastructure and investment plan, enhancing practices for improved load management, and feasibility study of evacuation corridors.

37 *Naveen seeks PM's intervention on R-APDRP assistance*. (2012, February). Retrieved April 2013, from Business Standard: http://www.business-standard.com/article/economy-policy/naveen-seeks-pm-s-intervention-on-r-apdrp-assistance-112021300074_1.html, *Financial Restructuring of State Distribution Companies*. (2012, September). Retrieved April 2013, from Press Information Bureau, Government of India: http://pib.nic.in/newsite/erelease.aspx?relid=87951

Recommendations

a) In order to improve the financial position of the DISCOMs, transitional support should be provided to clear its past liabilities. Anti-theft measures should be strengthened to improve their revenues.[38] The transitional support can be complemented with mandatory annual aggregate technical and commercial loss reduction targets (see Table 3.3.1 for reduction of Transmission and Distribution losses).

b) Demand Side Management (DSM) measures can be taken up by the private DISCOMs under regulatory oversight.[39] This can facilitate in rationalizing peak demand and at the same time, save energy. For example, boosting energy efficiency by use of smart meters through distribution franchisee model is currently being opted for by 12 Divisions of CESU (Central Electricity Supply Utility of Orissa-DISCOM). This provides strong incentives to reduce T&D losses, increase energy supply and reduce theft. Therefore, scaling up of the use of smart meters through distribution franchisee based models in areas of other DISCOMs should also be considered as a viable opportunity to reduce T&D losses in the State. The funding support to create a revolving fund for DSM as well as capacity building of State Electricity Regulatory Commissions and DISCOMs is recommended. In order to kick start DSM, there needs to be budgeting of expenditure by DISCOM in the Annual Revenue Requirement which entails an upward revision of tariff. The revolving fund will help ease that burden and the year-end savings can help recuperate the fund.

(2) Energy Efficiency in the Electricity Sector: Promoting Clean Coal Approaches

Against the backdrop of climate change and the low quality of coal in India, the use of clean coal technologies with the least GHG emissions in thermal power generation is integral to ensure a sustainable, reliable and economically efficient power industry. However, Research & Development in the field of coal based power generation by industry, academia and government research labs have largely remained dormant in India. This is evidenced by the lack of innovation and technology development efforts by established energy and fuel research Centres in the country viz. CFRI (Central Fuel Research Institute), CPRI (Central Power Research Institute), and CMRI (Central Mining Research Institute) which have instead acted more like testing houses.[40]

38 Kumar, S. (2013). Energy efficiency. (S. Rathi, Interviewer)

39 Ibid

40 Chaudhary, A. (2013). Clean Coal Technologies in India. (S. Rathi, Interviewer)

Nonetheless, private sector participation in the clean coal technology domain is increasing with companies like Larsen and Toubro (L&T), Jindal Steel Works and Mitsubishi Heavy Industries recently venturing into the Indian power sector and taking up contracts for clean coal based power plants in India. Despite these efforts by the private sector, the investment in R&D is much lesser than expected and initiatives such as investment in recent design centres set up by companies like L&T pose as exceptions rather than the norm.[41]

Financing energy efficiency projects

The process of technology innovation for sustainable energy technology (energy efficiency and renewable energy technologies) follows a pathway which can be categorized along the following stages: research and development, demonstration, pre-commercialization and commercialization. This pathway constitutes the technology innovation phase. Once the technology is commercially proven, it reaches the project development phase and is ready for roll out (Makinson, 2005). Technologies proposed in the OCCAP - gas based combined cycle power plants, coal gasification technologies, carbon capture sequestration plants - fall under the technology innovation phase as they are yet to achieve full-scale commercialization.

Technologies at demonstration and pre-commercialization stage are typically faced with scarcity of capital as they are unable to attract investors. This could occur due to the high risk associated with the maturity of the technology. The risk may emanate as technologies at this stage are subject to extensive time uncertainties, high capital costs, political uncertainty and operational failure due to system complexity (Purkayastha, Gulati, & Subramanian, 2010).

Therefore, governments can introduce new financial mechanisms which are backed by public sources in order to address the financing gaps and thereby facilitate commercial investment and successful introduction of sustainable energy technologies into the market. However, public finance assistance should be appropriate to the financing needs of the stage of maturity in which the technology exists.[42]

Some of the funds set up at the national level that focus on development of technologies which fall under the innovation phase are: the National Clean Energy Fund for financing

41 Ibid

42 Makinson, 2005 & Purkayastha, Gulati, & Subramanian, 2010

research and innovative clean energy projects. The assistance under this fund is received in the form of loan or viability gap funding and this support shall not exceed 40 per cent of the total project cost. Similarly, in order to augment research and clean technology, the United States and India announced a Rs. 2,700 Crores joint fund in the year 2011 through collaboration between Indian and US researchers.[43]

Once the technology is commercially proven, the focus shifts from technology innovation to project development. These projects need to be financed directly or through an ESCO (Energy Service Company) and the costs are recovered from the energy saving made. However, financing for conducting audits, advisory services and assessments of energy use may be difficult. Therefore, public finance mechanisms financing can be offered to cover such costs (Makinson, 2006). Some suitable financing mechanisms based on the maturity of technologies advocated in the plan have been presented in the Table 3.2.4 below. The technologies have been classified based on their maturity in India.

43 *Reuters*. (2011, May 18). Retrieved May 2013, from http://www.reuters.com/article/2011/05/18/india-us-climate-idAFL4E7GI1BU20110518

TABLE 3.2.4: FINANCING CONTINUUM FOR ENERGY EFFICIENCY TECHNOLOGY INNOVATION AND PROJECT FINANCING

	Clean coal technologies Proposed in OCCAP	Maturity of the technology		Existing global mechanisms/ Financing	Innovative Public sector financial mechanisms	
Technology Innovation Phase		R&D		R&D grants		Investment Tax Incentives*
	Coal Gasification, carbon capture and storage in thermal power plants	Demonstration		Capital grants and angel investors	Technology incubators (for capacity building – covering operating costs, market research, training management team advice on business development and raising capital)	
	Gas based combined cycle power plants	Pre-commercialization			Technology incubators Contingent grants, convertible loans, incubators, Public or Private venture Capital	
		Commercialization		Private Venture Capital, Debt	Guarantees	
Project Development Phase	Super-critical technologies and Circulating Fluidized bed boiler technologies renewable energy projects, NOx reduction technologies, Renovation and Modernization of thermal power plants	Roll-out	Energy Audit and assessment	Regulatory incentives during the operation and maintenance stage	Grants and Contingency grants for energy audit, Soft and evolving loans for Audit/ Assessments	
			Project planning/ Financing			
			Project implementation and energy savings over time		Public sector led Third Party Financing, Debt, Loan Guarantees	

Source: Adapted from Makinson (2006)

**Refer Table 3.3.1*

In summary, the OCCAP promotes a range of clean coal approaches mainly through enabling policy regulations, along with conducting feasibility studies and setting up of demonstration plants. These approaches can broadly be summarized as follows: a) new capital investments in electricity generation plants (super-critical technology, gas based

combined cycle power plants, and fluidised bed boiler and coal gasification) and renovation & modernization of thermal power plants b) end of pipe technologies such as NOx systems c) use of washed coal. Though the plan focuses on institutional strengthening for up-take of EE and RE in the State, targeted capacity building efforts towards promoting clean coal technologies at the State (Department of Energy) level can facilitate in successful technology transfer.

Recommendations

a) High risk associated with clean coal technology can act as a significant barrier to its successful deployment. Therefore, appropriate public financing instruments are required to support the full-scale commercialization of these technologies. Public finance assistance for clean coal technologies advocated in the plan should be appropriate to the stage of maturity at which the technology exists. (Refer Table 3.2.3).

b) End-of-pipe technologies such as NOx reduction equipment can be promoted through market based instruments, such as pollution taxes and tradable permits (Nakhooda, Carvalho, & Taschini, 2012). For example, an Emissions Trading Scheme (ETS), aimed at limiting air pollution levels, is currently being piloted in Gujarat and Tamil Nadu.

c) Coal washing interventions (to improve the usability of Indian coal) also it reduces difficulties that arise in the initial stages of technology introduction such as super-critical technologies.[44] Coal washing interventions and Super critical technology in this context, becomes a compelling proposition for meeting energy requirements.[45] The plan proposes to mandate the use of washed coal by the Independent Power Producers (IPPs) and Captive Power Producers (CPPs) for power generation if ash content in coal exceeds 40 percent. These coal washing interventions can be supported through public finance mechanisms such as technology grants, loan guarantees, subsidies, and tax credits (Nakhooda, Carvalho, & Taschini, 2012).

d) Apart from financial incentives, institutional capacity building initiatives such as training for plant operation and maintenance should be complement with the

44 FICCI and MoP.(2006). *Presentation on Ultra-Mega and Super Critical Projects*. Retrieved April 2013, from Ministry of Power Web site: https://www.google.co.in/search?q=financing+continuum&oq=financing+continuum&aqs=chrome.0.57.5826j0&sourceid=chrome&ie=UTF-8#sclient=psy-ab&q=coal+washing+introduction+of+super+critical+technology&oq=coal+washing+introduction+of+super+critical+technology&

45 Chaudhary, A. (2013). Clean Coal Technologies in India. (S. Rathi, Interviewer)

introduction of clean coal technologies like super-critical in the State (The World Bank, 2008). The State and private sector generation companies should leverage knowledge from NTPC's experience of deploying new clean coal technology based power plants (Chikkatur & Sagar, 2009). Additionally, National Thermal Power Corporation (NTPC) has collaborated with United States Agency for International Development (USAID) to develop knowledge linkages through 'Center for Power Efficiency and Environment Protection (CenPEEP)'. This Center aims at improving efficiency and lowering emissions from the power plants through the acquisition, demonstration and dissemination of relevant technologies.[46]

(3) Promoting Energy Efficiency in Energy Consuming Sectors

A transition towards energy efficiency demands substantial capacity building interventions at the State level. The proposed interventions in the OCCAP focus extensively on such capacity building initiatives such as a) Institutional strengthening of Pollution Control Board &State Designated Agency (SDA) - (which has important implications for Odisha obtaining its due share of Central funding under the 1st Perform Achieve & Trade Cycle) b) Conceptualization and consequently the implementation of rules, regulations and standards such Energy Conservation Building Code (ECBC) and Demand Side Management (DSM) measures.[47]

Recommendations

a) The proposed interventions will assist in reducing regulatory uncertainty considerably which can significantly affect investment in energy efficiency (Makinson, 2006); however, the limited availability of long-term financing, high up-front costs and technological risks are issues that also need to be addressed to encourage private sector investments in the State. Therefore, in order to reduce the risk perceptions associated with energy efficiency projects, appropriate financing mechanisms need to be devised by the State. Some examples include facilitating loans at cheaper rates, providing risk guarantees, and setting up of funds that provide equity gap or last mile equity in energy efficiency projects. The scope of the State Energy Conservation Fund (SECF) may also be enhanced for purposes such as developing and financing innovative business models in order

46 *Centre for Power Efficiency & Environmental Protection*. Retrieved April 2013, from NTPC Website: http://www.ntpc.co.in/index.php?option=com_content&view=article&id=23&..

47 These strategies have a cross-cutting relevance for energy efficiency in the electricity sector and renewable energy. However, for the purpose of analysis, the strategy has been placed under the energy efficiency for energy consuming sectors.

to sustain the fund. On the other hand, financial instruments such as grants carry the risk of limiting the market to the size of the grant/subsidy and must be used with utmost caution. Therefore, grant funding should be used only for activities such as market creation/project development, capacity building, awareness etc.[48]

b) Given that many energy efficiency projects are perceived as risky investments, banks usually charge a risk premium over and above the normal interest rates, which makes investments unviable. The State therefore needs to support energy efficiency initiatives by reducing the risk perception and introducing risk guarantees programmes (Kumar, 2013). These guarantee programmes can also facilitate in gaining access to affordable debt financing (Purkayastha, Gulati, & Subramanian, 2010). Partial Risk Guarantee Fund (in the first phase currently provides guarantee support for Government Buildings and Municipalities) will help in securing debt capital for energy efficiency projects.[49]

c) Furthermore, the State did not partake in the first phase of Orange Revolution[50] (launched to achieve Energy Security for the country) by not participating in national energy awareness programmes such as – Rastriya Urja Jan-Jagriti Abhiyan (RUJJA) and Urja Yatra. The State should participate in such national level programmes in order to enhance energy conservation awareness in the State. Energy Efficiency Services Limited (EESL), set up by Ministry of Power, Government of India as the implementing arm for energy efficiency, can be used to support implementation of energy efficiency.

(4) Low Emissions Energy Supply: Renewable Energy

The total potential for renewable power generation in Orissa, as per OREDA's (Orissa Renewable Energy Development Agency) assessment is estimated to be 16230 MW. These estimates vary from the potential estimation by WISE which puts it at 7,874 MW. The difference arises due to the varying estimates of solar energy potential (OREDA estimates at 14,000 MW and WISE at 5,000 MW). There is a need for an accurate assessment of the potential for renewable energy in order to obtain realistic renewable energy generation targets. Incorrectly set targets can have a significant impact on tariffs and also lead to social and environmental problems. (Thimma & Dixit, 2010).

48 Kumar, S. (2010, January). *Promoting Innovative Energy Efficiency Financing Mechanism.* Retrieved May 2013, from http://asiaesco.org/pdf/presentation/6-2.pdf

49 Retrieved June 2013, from Energy Efficiency Services Limited Website: http://www.eesl.co.in/website/PRGF.aspx

50 Orange revolution launched to achieve Energy Security for the country through balancing the diversified forces of Technology, Policies & Market Mechanisms involving all stakeholders.

Despite the high prospects of renewable energy in the State, the installed capacity as on 31.03.2012 is 97.3 MW which is 1.6 per cent of the total installed capacity of 5996.33 MW. This is contributed largely by small hydro and biomass cogeneration plants.

In order to increase the share of renewable energy in the State, the OCCAP proposes the following interventions: early stage research and demonstration projects, planning for enabling policy framework, institutional strengthening initiatives, infrastructure development, and market development strategies that aim at enhancing the material inputs, equipment supplies for clean energy system components.

Private sector sources

Annexure II provides details of the private sector renewable energy projects in the State of Odisha. The information has been collated using the BNEF database. In addition, for the year 2012-13, GRIDCO aimed to procure 1089.96 MU of Renewable Energy consisting of solar, non-solar and co-generation from private sector power plants to meet its RPO (Renewable Purchase Obligation) targets. This break-up is provided in Annexure III.

Recommendations

a) For setting up demonstration renewable energy power plants, technology incubators can be constituted, whereas for large-scale investments in the renewable energy sector, the role of venture capital finance and private equity is prominent in India. In order to foster growth in renewable energy sector and leverage funding from private sources, innovative financing mechanisms can also be constituted in the form of public private investment trust. The Akshaya Shakti Nidhi Trust that is planned in Karnataka to finance renewable energy projects is a good example. The finances of the Trust will be used to make portfolio investments in renewable energy projects. The State Government will contribute Rs. 250 Crores to the total seed money of Rs. 500 Crores. The remaining Rs. 250 Crores is expected to be raised through open market. Further funds will be raised based on utilization of the funds for the renewable energy projects developed (Karanataka Renewable Energy Policy , 2009).

3.3 Fiscal Instruments for Low Carbon Growth

It is important to raise revenues to meet the mitigation targets through appropriate use of fiscal instruments. A few fiscal instruments have been proposed below that can be applied to the State of Odisha. The instruments are divided into revenue instruments and subsidy instruments. The net effect of these is revenue neutralizing while enabling GHG emission reduction.

Some of the possible fiscal instruments which might enable meeting the State targets are:

Financial transaction tax (FTT): FTT involves levy of tax on non-consumer financial trading transactions like stocks and bonds. In India a FTT of 0.125% is levied on all equity transactions. However, this is not earmarked for reducing GHG emissions. The FTT would have less distortionary impacts on the economy unlike other forms of direct taxes. The tax has potential for raising considerable revenue with minimal distortions to long-run investment activity. Earmarking part of FTT (say 10%) for climate change financing is an option. The earmarked funds can be distributed in proportion to the State GHG emissions and priorities. However, the funds should be earmarked for activities that can improve the productive base of the economy.

Primary carbon tax (PCT): This involves levying tax per unit of energy at the point of extraction rather than on the end user. Coal mines are taxed more than natural gas, for example, due to the high emissions per unit of output. Once again the taxes should be used to enhance the productive capacity of the economy. The revenue from these taxes should be channelled to R&D in energy efficiency and for promoting renewable technologies.

Feebates (FB): This involves imposing a fee on dirty products and production processes and passing on subsidies for relatively clean products and processes. For instance, the thermal power plants could be taxed for using coal because it is a polluting input. The thermal plants that are investing in carbon capture and storage are given a subsidy equivalent to the amount of carbon sequestered. Carbon capture and storage refers to technologies that remove carbon from the exhaust streams of fossil fuel-burning plants and store it underground. They can be neutrally designed so as to have minimal impact on the prices. An excise tax on sale of emission intensive product with a subsidy to R&D can achieve the desired reduction and at the same time raise finances. As the petrol prices are already high in the economy, incentives may be given to individuals to buy fuel efficient cars. The road tax of the vehicles with high performance standards should be less than that of low performing vehicles.

Standards and ratings (S & R): Increase in energy efficiency can be achieved through fuel standards of vehicles, rating of appliances, and rebates for use of improved energy efficient products.

Differential taxation (DT): Goods and services associated with environmental damage in production or consumption may be taxed more heavily while goods which are believed to benefit the environment may be taxed less heavily than their substitutes.

Renewable energy subsidy and tax credits (RES & TC): Subsidies and tax credits may be given for the purchase and installation of photovoltaic light, solar water heaters, fuel cells and for investing in renewable energy technology. The tax credits can be given to individuals producing, consuming or investing in renewable energy. Green equipment can be exempted from import taxes.

Carbon sequestration credits (CSC): Any successful attempts to reforest, afforest and prevent deforestation are eligible for carbon credits. These credits can be traded under clean development mechanism.

Accelerated capital cost allowance (ACCA): Energy producers could be allowed an accelerated write-off for certain equipment to enable energy efficient production or shift to renewable sources of energy.

Climate change levy: A levy is charged on the use of electricity, gas and solid fuels so as to encourage businesses to reduce their energy consumption or shift to renewable sources of energy. It could be levied both on high energy consuming households and businesses. As per a study undertaken by Bureau of Energy Efficiency, the energy saving potential has been estimated at 1818 million units for the state of Odisha (National Productivity Council (NPC), Energy Management Group, 2009). Assuming a modest levy of Re. 0.25 per unit of potential electricity saved could generate revenue of Rs 50 Crores. However, this is indicative and not prescriptive. The exact tariff structure has to take into account other existing tax structures, incentives and disincentives already given to a particular business or consumer.

Feed-in-tariff (FIT): Already existent in India, feed-in-tariffs is the assured amount given for generation of renewable energy from solar, wind, hydro and biomass. The generator is paid for gross generation. This can continue for the State of Odisha as per the national programme.

Carbon tax: This is the most popular fiscal instrument already existent in several countries. However, carbon tax has distortionary effects on the economy. Hence, only heavy polluters in Odisha like iron and steel, thermal power producers should be taxed provided other forms of tax are not levied. The regulator can impose a cap on the level of acceptable emissions. Tax is imposed if the emissions exceed the standards set by the regulator. A modest Rs. 10 /tC (0.25 US$/tC) would be enough to generate funds to the tune of Rs. 360 Crores which can fund one-third of the proposed OCCAP budget to mitigate climate change. However, we would recommend that any tax that is levied should be neutral.

Renewable electricity surcharge/VAT: The renewable electricity surcharge guarantees the producers of renewable electricity a price above the market prices. These are used to support renewable energy. Implemented in Germany the surcharge covers the difference between guaranteed prices paid for renewable energy and market prices for conventional energy.

We classify the instruments based on revenue generating, subsidising and cross-subsidy or mandatory capacity building to be able to meet the proposed expenditure, as shown in Table 3.3.1.

TABLE 3.3.1: PROPOSED FISCAL INSTRUMENTS, INCENTIVES TO MEET MITIGATION PRIORITIES SET BY THE OCCAP

Key priority	Proposed budget in OCCAP* (in Rs. Crores)	Proposed Fiscal Instrument/ Incentives	Comment
Energy			
Generating cleaner energy through clean coal approaches	0	Feebates (The coal companies can be levied primary carbon tax for generating coal and can be given subsidies for investing in cleaner energy through clean coal approaches)	
Reducing Transmission and Distribution (T&D) Loss	3500	Mandatory annual aggregate technical and commercial loss reduction targets. In case of failure to achieve targets, penalty in the form of Carbon Tax equivalent to energy lost. This gives incentives to power companies to plug in the T&D losses. They can also be given an option of buying renewable energy certificates if they fail to meet the mandatory loss reduction target. In addition, fiscal incentives may be provided to AB cables and HVDS manufacturers in order to reduce the cost of procurement of these technologies for strengthening the T&D infrastructure^	Strict monitoring is also required to ensure that the mandatory targets are not passed on to consumer bills. Instead the proposed expenditure should be channelled to customers to shift to more energy efficient equipments.
Promoting demand side management and energy efficiency	385	Customers above a certain range of energy consumption (above 500 units per month) should be charged climate change levy Customers should be informed about the energy rating of the products and differential taxes should be levied on dirty products	Part of the expenditure allotted to reduced T &D losses should be given to consumers. Efforts should be channelled towards rating of the products and incentives to step up the transformers

TABLE 3.3.1 (continued)

Key priority	Proposed budget in OCCAP* (in Rs. Crores)	Proposed Fiscal Instrument/ Incentives	Comment
Encouraging effective fly ash utilization and emission reduction	60	Differential taxation (excise duty exemption for utilising fly ash). Clay bricks should be levied higher duty due to the damage done to top soil Mandatory targets given to cement companies to promote the use of fly ash bricks. Mandatory closing of coal mines (fly ash can be utilised to close mines)	Need for strong policy incentives/disincentives to reduce the by-product from power plants
Promoting of small and medium hydel plants	36	Capital subsidies or grants, operating subsidies	
Harnessing the biomass potential	50	Renewable energy subsidies and tax credits, grants, mandatory biomass usage	
Promotion of Grid based wind power generation	50	Feed-in-Tariffs, Renewable electricity surcharge/VAT, Renewable energy subsidies, Tax credits, Accelerated capital consumption allowance	
Maximizing solar power generation	100	Feed-in-tarrifs, Renewable electricity surcharge/VAT, Renewable energy subsidies and Tax credits	
Developing bio fuels	4	Carbon credits through CDM projects, mandatory promotion/usage of biofuels in transport	
Forestry			
Increasing reforestation / afforestation activities in degraded forest areas	1400	Carbon sequestration credits	
Protecting existing forest stocks to act as carbon sink with stronger conservation	400	Carbon sequestration credits	
Increasing planting on non-forest land and also exploring where new and increased tree planting could create barriers to storm and cyclone impacts in coastal zones	40	Carbon sequestration credits / mandatory efforts by carbon emitting firms	

TABLE 3.3.1 (continued)

Key priority	Proposed budget in OCCAP* (in Rs. Crores)	Proposed Fiscal Instrument/ Incentives	Comment
Forestry			
Covering bald-hills with suitable species mix	10	Carbon sequestration credits/ mandatory efforts by carbon emitting firms	
Increasing and protecting existing mangrove cover along the coast	100	Carbon sequestration credits / mandatory efforts by carbon emitting firms	
Mining			
Expanding and maintaining green zones in major mining clusters	0	Mandatory afforestation by the mining companies	This transfers the responsibility to the mining companies to internalise the social cost of their damages
Transport			
Use of alternate fuel to conventional fuel	150	Differential fuel taxation, clean fuels should be taxed less than the conventional fuels	
Blending of bio fuel in automobiles	50	Differential prices, blended fuels priced less than unblended fuels	
Industries			
Integrating climate concerns in policies and plans	30	Mandatory for all firms, can be done as part of CSR strategy	
Promoting recovery, recycle and reuse of waste material like flyash, dolochar, slag etc	10	Can be part of feebates. If a firm is taxed for carbon, they could get tax credits for proving that the waste material is recovered	
Total	**11,715**		

Source: OCCAP and analysis by study group

** only additional budget quoted for each strategy as per the OCCAP has been included. It is assumed that the State has already secured funding for the existing budget*

^ Singh, A. Climate Change and the Indian Power Sector: An Assessment for Clean Coal and Other Policy Options

3.4 Institutional Mechanisms for Implementing OCCAP

The State of Odisha would require a strong and effective institutional mechanism with clearly defined roles and responsibilities to ensure proper implementation of proposed climate change strategies and independent monitoring and evaluation of activities and outputs. It is important to climate proof existing developmental activities, increase accountability and traceability of funds, and assess the impacts of climate actions. (Mandal, Venkataramani, & Rathi, Developing Financing Strategies for Implementing the State Action Plans on Climate Change, 2012). Different States are experimenting with different kinds of institutional set up and while it might be too early to recommend something that might work for Odisha, an attempt was made to understand the current thinking within the Government machinery in this regard.[51]

Existing institutions will continue to play a crucial role in the implementation of the State's climate agenda. The analysis of proposed strategies in different sectors in the OCCAP highlights the considerable overlap between existing/on-going programmes and the proposed strategies. In the Agriculture sector, for example, 67% of the proposed budget for the sector goes towards continuing the existing scheme on livelihood focussed people-centric watershed development in rain-fed regions. Since climate change action (especially adaptation) is not just additional to development but often is development, there is a strong case for maintaining the existing institutional set up for flow of funds and implementation of climate actions. However, a couple of issues should be underscored: a) the science of climate change and its impacts are very complex technical issues and the knowledge about both are evolving. It is, therefore, important for State level policymakers and bureaucrats to understand the issues and respond to them in a structured way. This is currently difficult because of the lack of awareness and technical capacity within different Departments. b) there needs to be some sort of a coordination mechanism within the State in order to monitor and evaluate the activities and outputs and also to ensure accountability and traceability of climate funds.

The Department of Forest and Environment was designated as the nodal agency for designing the Climate Action Plan. There are a few Departments, like the Water Resources and Housing and Urban Development, which have already taken steps to include staff dedicated to the climate change agenda in their organizational structure. The Department of Water Resources has recently created a new internal unit, the GIS and Climate Change

51 The study team interviewed several Odisha Government officials from different Departments, as well as independent experts.

Division. While this Division is yet to become fully active, its role is visualized as one of monitoring schemes of the department that include a climate change dimension Similarly, the Department of Housing and Urban Development has made it mandatory to involve an Environmental Engineer in the preparation of all Detailed Project Reports (DPRs) / City Development Plans (CDPs).

It is clear that all Departments feel the need to strengthen their respective technical capacities in order to address climate change issues relevant to their sector. However, different Departments are at different stages in terms of actually executing this. The manner in which this is done would also depend on the sector-specific needs and availability of funding. It is also not clear what role the proposed Odisha Climate Change Agency will play in this regard. However, inputs from several Departments echo the view that a nodal body which spearheads research and capacity building activities, monitors and evaluates the progress of all sectors with regards to implementation of their proposed strategies, and also supports inter-departmental coordination is considered necessary.

Chapter 4 Sectoral Analysis

4.1 Agriculture

A large majority of Odisha's population (80-85%) is dependent on agriculture and allied activities for their livelihood. However, agriculture contributes to only 17.6%[52] of the State's Gross Domestic Product. Odisha being a large state contains ten agro-climatic zones and is highly dependent on rainfall for its staple crop, paddy. Despite being exposed to frequent cyclones, flash floods and droughts, agriculture productivity in the State has grown at a pace of 4.12% per annum during the 11th Plan period (2007 – 2012). The sector experiences a drop in crop productivity and diversity every time such disasters strike the State. Such extreme weather events are now becoming more frequent due to Climate Change. It is against this backdrop that the existing and proposed activities in the Department should be analysed and interpreted.

4.1.1 Analysis of Public Expenditure

The Agriculture sector constitutes one of the key adaptation sectors in Odisha and the budgetary expenditure for the FY 2011-12 of the nodal department for this sector viz. the Agriculture Department was a massive Rs. 1,226 Crores.[53] For the purpose of analysis, only the on-budgetary expenditure in the mentioned period has been considered. Grant 23 of the Audited Expenditure Statement, Government of Odisha (GoO) is classified into eight major heads viz. Other Social Services, Crop Husbandry, Soil and Water Conservation, Forestry and Wildlife, Agricultural Research and Education, Other Agricultural Programmes, Special Programmes for Rural Development and Secretariat Economic Services. The corresponding Outcome Budget for that year was referred to for schemes, which lacked clarity or required any additional understanding of its core objective and activities.

The budget can be studied through specific Plan and Non-Plan components, which fund various schemes across these major heads. The Plan component constituted 76% of the overall budgetary expenditure and 24% was Non-Plan. Within the Plan component, 70% of the expenditure was from State Plan, 5% from Centrally Sponsored Plans (CSP) and the rest from Central Plan.

52 As per Economic Survey, February 2012, GoO

53 Excludes any recoveries in the budget

4.1.2 Climate Coding of Public Expenditure: Actual vs. Proposed

Actual audited expenditure made by the Agriculture Department in FY 2011-12 through various schemes and programmes was climate coded and analysed. Table 4.1.1 below provides the distribution of this expenditure across major thrust areas and their position on the climate spectrum.

TABLE 4.1.1: DISTRIBUTION OF AREAS OF SPENDING OVER THE CLIMATE SPECTRUM

Climate Spectrum Scores	Ambiguous Development (AD)	General Development (GD)	Capacity Development (CD)	Climate-Oriented (CO)
Areas of Expenditure	Distribution of cash crop seeds and promotion of industrial/export crop production	Production & Supply of seeds,	Food Crop Development, Crop Insurance	
		Integrated Farm projects	Soil Conservation and promotion of bio-fertilizers	Prevention of farm land degradation (Podu cultivation)
			Agriculture Information services	
			Formal education & Training of extension workers	
			Post-harvest protection and technology	
			Climate resistant crop and other agriculture related research	
Distribution of Expenditure (%)	0.65	59.68	39.65	0.02

Source: Audited Expenditure Statement, GoO

As is evident from the table, a major share (59%) of the Department's overall expenditure has gone into *General Development.* This is expected given the immediate needs of the sector. However, it is interesting to note that a substantial portion of the total expenditure (39%) has gone into *Capacity Development.* These comprise of schemes such as refresher training for extension functionaries, support to State Extension Programme, Agriculture College (formal education and training), education and training of Junior Soil Conservation Assistants, strengthening the School of Horticulture, Jute Technology Mission, Coconut,

Arecanut Research, etc. which increase resilience, but are not explicitly targeted towards climate change. There is negligible expenditure on schemes that explicitly target actual or anticipated effects of climate change on the sector.

The OCCAP proposes ten adaptation strategies in the agriculture sector, which the government intends to focus on in the next 5 – 7 years. A similar climate coding exercise was performed to understand the nature of these strategies and compare them with existing schemes and expenditure. Table 4.1.2 provides the distribution of these strategies and the corresponding budgets on the climate spectrum. It also highlights whether or not there is an overlap between proposed strategies and existing/on-going schemes. This has implications for both funding as well as the institutional arrangements through which the funds will flow.

TABLE 4.1.2: DISTRIBUTION OF OCCAP STRATEGIES ACROSS THE CLIMATE SPECTRUM

OCCAP Strategies	Proposed Budget (in Rs. Crore)				Overlap with existing project's / scheme's objectives
	AD	GD	CD	CO	
1) Rapid Screening and strategy assessment of State Agricultural Policy			143		No overlap
2) Establishing an effective institutional delivery mechanism to promote best practices on climate change			100		No overlap
3) Undertaking capacity building					
a) Capacity building and technical support of CBOs for better management of land and water to adapt to climate risks			100		No Overlap
b) Capacity building of extension personnel and farmers			54		Macro management of agriculture, refresher training, etc.
c) Use of GP Hubs for dissemination of information on climate change			4		No overlap
4) Continuing the livelihood focussed, people centric integrated watershed development in rainfed regions*		667	333		On-going programme
5) Increasing the area under perennial fruit plantation			50		No overlap
6) Developing water use efficient minor irrigation methods and individual / community farm ponds			12		Micro irrigation schemes

TABLE 4.1.2 (continued)

OCCAP Strategies	Proposed Budget (in Rs. Crore)				Overlap with existing project's / scheme's objectives
	AD	GD	CD	CO	
7) Improving monitoring and surveillance techniques			24		No overlap
8) Developing sustainable soil, water and crop management practices			2.5		National Project on Management of Soil Health and Fertility and several other schemes
9) Breeding Studies for major crops for tolerance/resistance			2.5		Strengthening of Agriculture research
10) Conducting climate related research and studies					
a) Preparedness to tackle emerging scenarios of pests			2		Strengthening and Modernisation of Pest Management
b) Increased production of rice seeds to meet requirements under various scenarios			2		Several rice intensification and integrated agriculture projects
c) Climate Risk Management services			2		No overlap
Total Budget		**667 (45%)**	**831**		

Source: OCCAP

** This scheme has been climate coded based on its stated outcomes in the OWDM's strategic plan. Out of the six outcomes, four are Capacity Development in nature and the remaining two supports GD. In absence of more granular information on activities and budgets, the overall budget for this strategy has been split in the ratio 2:1 (CD: GD) for the purpose of coding and analysis.*

It is obvious from the table that most of the proposed strategies relate to *Capacity Development*. While this is important, what is also noticeable is the conspicuous absence of strategies explicitly targeting current and future variability in climate change and its impact on the sector. This is particularly so given the context of Odisha's agrarian economy where 80 – 85 % of the State's population is dependent on agriculture and allied activities, and the fact that the State is susceptible to frequent extreme weather events. In terms of overlap with existing schemes, some of the proposed strategies seem to dovetail nicely with on-going schemes although it is not clear from the OCCAP document whether the scope of these schemes will be expanded to fit in new strategies or they will be implemented as separate schemes. In this context, it is also important to note the disproportionate

share of the proposed climate budget in continuing the existing scheme on livelihood focussed people-centric integrated watershed development in rain-fed regions. Given the importance attached to this scheme, it is essential to understand the nature of the scheme and its activities with respect to climate change in greater detail.

The Integrated Watershed Development Programme (IWDP) was first introduced in the State during the 8th Five Year Plan (1992-97). With 56% of its net cultivated area continuing to be rain-fed areas, this programme is essential for the State to supplement its growing agricultural growth with adequate water supply.

The scope of programme was widened to promote community welfare after the release of revised watershed guidelines in 2001 by the Ministry of Rural Development. Until then watershed projects primarily focused on developing water harvesting structures. In order to understand the nature of the program and its climate change orientation, the stated outcomes of watershed programmes as mentioned in the Orissa Watershed Development Mission's (OWDM) strategic plan[54] were analysed by putting them on the climate spectrum.

TABLE 4.1.3: DISTRIBUTION OF WATERSHED PROGRAMME OUTCOMES ON THE CLIMATE SPECTRUM

Expected outcomes from watershed programmes	AD	GD	CD	CO
1) Treatment and development of drainage systems, arable and non-arable lands & reduce land degradation			✓	
2) Participation of user groups/ Panchayats for the maintenance of assets		✓		
3) Training and capacity building of dependent communities			✓	
4) Enhancement of livelihood options and average incomes of communities			✓	
5) Increased cropping intensity and agricultural productivity		✓		
6) Increase in groundwater table due to enhanced recharge			✓	

Source: Perspective and Strategic Plan for Watershed Development Projects, Orissa Watershed Development Mission, Agriculture Department, GoO, Accessed February 2012

54 Perspective and Strategic Plan for Watershed Development Projects, Orissa Watershed Development Mission, Agriculture Department, GoO, Accessed February 2012

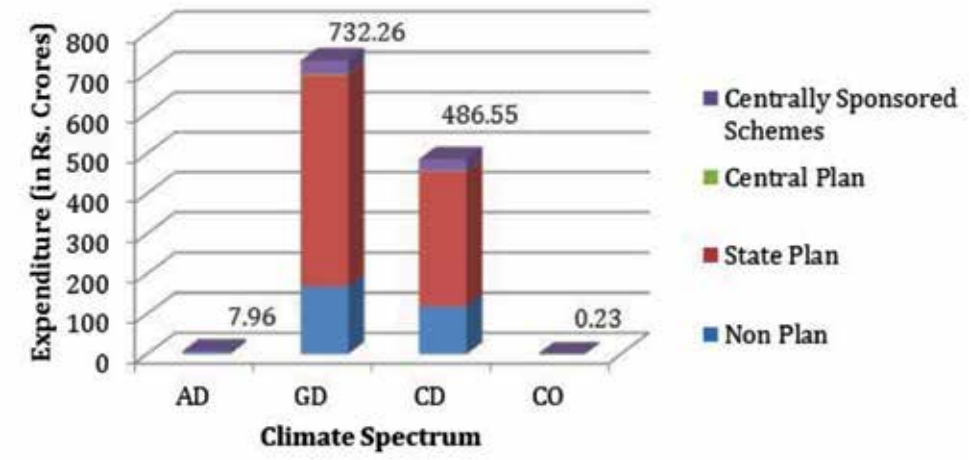
The watershed programme aims at achieving more than its conventional objectives of watershed repair and maintenance. It would be challenging not just to achieve these additional outcomes, but also to ensure their sustainability in the long run. The program should also look at including specific *Climate-Oriented* activities in order to address current and future climate variability. Given the scope, reach and budget of these integrated programmes, they are the right platform to do so and it should be leveraged. Since the State intends to re-invest and continue this program, it's important that one analyses the development and climate change benefits of such a programme.

4.1.3 Funding Sources: Existing Schemes

Analysis by Climate Categories

Figure 4.1.1 below provides the distribution of current expenditure (FY 2011-12) across different climate categories by various budget components.

FIGURE 4.1.1: DISTRIBUTION OF PUBLIC EXPENDITURE IN THE CLIMATE SPECTRUM WITHIN BUDGET COMPONENTS



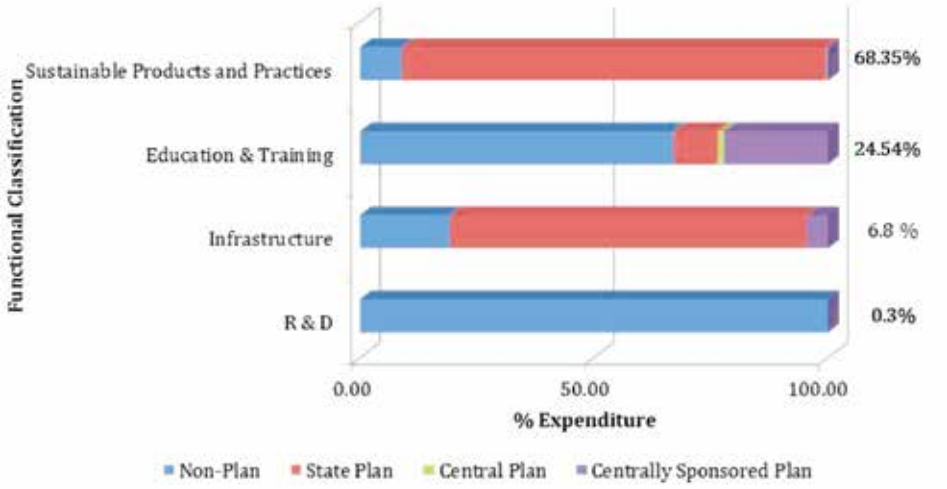
Source: Audited Expenditure Statement, GoO

It is interesting to note that most of the *General Development* expenditure in the sector is funded through the State Plan. As one moves to *Capacity Development* activities, the contribution from the Central Plan and Centrally Sponsored Plan increases. Also, contrary to the common perception that Non-Plan expenditure always comprises of recurring administrative expenses, the graph reveals that some of the *Capacity Development* activities, such as soil and water conservation, training and research were also funded through Non-Plan components.

Analysis of Public Expenditure over Functional Categories

The expenditure in *Capacity Development* was further categorized into key functional areas to understand the current thrust areas and implications for climate change. This is important because climate change actions often tend to focus on hard adaptation measures like infrastructure development and technical options, and tend to ignore less tangible schemes, such as education and promoting enabling environment for innovation.[55] Agricultural research, for instance, can be used to develop new climate-resistant crops, indigenous high yielding seeds, etc. which salvages accidental loss incurred to farmers due to impacts of climate change. Similarly, formal education and training help in reducing the vulnerability of farmers by enhancing their adaptive capacity to climate risks by keeping them well informed about unforeseen circumstances. Given the inadequacy of *Climate-Oriented* schemes, only *Capacity Development* expenditure was used for this analysis.

FIGURE 4.1.2: COMPARISON OF EXPENDITURE ACROSS KEY FUNCTIONAL AREAS (% OF TOTAL EXPENDITURE)



Source: Audited Expenditure Statement, GoO

A major share of the *Capacity Development* spending went into Sustainable Products and Practices, which comprises of sustainable soil, water and crop management systems, prevention of degraded land, etc. Most of this was sourced from the State Plan. Infrastructure spend surprisingly forms a very minor share of the total expenditure. Given the declining share of agriculture in the SGDP, there needs to be additional focus on post-harvest infrastructure. Again, a large majority (approximately 76%) of infrastructure spending came from the State Plan. Non-Plan component played an important role in

55 Jones et al. 2012 ODI paper

funding Education and Training related schemes. R&D forms a very small component and is financed entirely from Non-Plan expenditure. Non-Plan expenditure is usually incurred when extra-budgetary allocations are required to meet expenses. These could be for activities that weren't included in the Annual Plan and were developed at a later stage. These expenses are predominantly met by the State government. Seen in this light, a substantial portion of the *Capacity Development* was funded by the State Government as part of extra-budgetary spending.

It is difficult to classify the proposed climate budget in agriculture using the same functional categories in absence of more detailed information regarding activities within each of the proposed strategies. However, an attempt was made to categorize the strategies themselves based on the brief description provided. This was done with the intent of understanding key strategic changes and directional shifts, if any.

TABLE 4.1.4: FUNCTIONAL CLASSIFICATION OF OCCAP STRATEGIES

Functional Classification	R & D	Infrastructure	Education and Training	Sustainable Products & Practices
Proposed Strategies	Improving monitoring and surveillance techniques	Use of GP training Hubs for dissemination of information on climate change	Technical support and training for better natural resource management, training of extension farmers, dissemination of information	Sustainable irrigation and perennial plantation
	Breeder studies for climate resistant crops			Sustainable soil, water and crop management
		Integrated Watershed Development Programme		
	Pest management and climate risk management			

Source: OCCAP

In contrast to existing spending, there seems to be a greater focus on R&D activities. There is, however, a complete absence of targeted schemes to build agricultural infrastructure. Some of this might happen through the IWDP, but the importance of infrastructure should not be undermined, both from the point of view of raising farm income as well as coping with climate variability.

4.1.4 Recommendations

1. Funding for proposed adaptation strategies needs to come from different tiers of government based on the nature of activities carried out under the scheme. Most of the proposed strategies fall under *Capacity Development*. In line with existing expenditure, these should be funded using a combination of Central and State funds. Once the State develops concrete actions around these strategies, more refined targeting of sources should be possible. For instance, supply of seeds, manufacturing of farm equipment etc., which are *General Development* activities should be funded by the State government, whereas strategies like organic farming, training and institutional capacity building should be funded by the Central government or international sources.
2. There is a total lack of importance given to risk management initiatives in the agricultural sector. The State is highly prone to natural disasters and is heavily impacted by them. There is a need to develop and design appropriate and easily demonstrable crop insurance schemes, which would cater to all sections of the farming community. This is also an area that has potential to attract investments from the private sector.
3. The State should assign more importance to organic farming in its strategies and budget. Organic farming practices have several derived benefits on the environment. Soil building practices such as crop rotation, inter-cropping enhance the nutrient content. It assists in carbon sequestration in the soil due to sustainable farm practices. It also results in reduced water contamination and sustainable livestock management practices.

4.2 Coasts and Disasters

Odisha is spread over an area of 155707 kms^2 and is divided into two natural plains, the Coastal Plain and the North Western Plateau. The coastline for the State is 480 kms long and is hence constantly plagued with problems of coastline erosion, floods and cyclones.[56] The density of the population in Odisha is significantly concentrated in the coastal regions. Increased death toll and loss of natural resources (like livestock, coconut trees and other fruit bearing trees) have made disaster management efforts the need of the hour. The value of property lost or damaged due to natural disasters increased by Rs. 433.14 Crores between 1971-73 and 1998-99 (Sarangi & Penthoi, 2005). According

56 Retrieved March 2013, from Odisha Disaster Management Authority Website: http://www.osdma.org/ViewDetails.aspx?vchglinkid=GL001&vchplinkid=PL003#

to a human development report, the cyclones occurring in Odisha were not just natural disasters but effects of the unpredictability of climate change (Mahapatra, 2006). Thus, there is a need for adopting a multi-pronged approach towards disaster management. The Indian Meteorological Department (IMD) joined hands with Disaster Management Division of the Ministry of Home affairs and created the National Disaster Management Programme in 1993. In spite of these efforts, poor management of disasters adversely affect the people of Odisha which often leads to post traumatic stress disorder (Kar, Mohapatra, Nayak, Pattanaik, Swain, & Kar, 2007). Odisha is categorised as a State with high vulnerability to climate change based on the frequency of occurrence of cyclones, population density and the existing institutional mechanism for disaster management.[57] The Odisha State Disaster Management Authority (OSDMA), which is the nodal agency for coordinating all disaster management activities, has worked over the last decade in providing relief, restoration, reconstruction and preparing for planning and tackling a range of disasters.

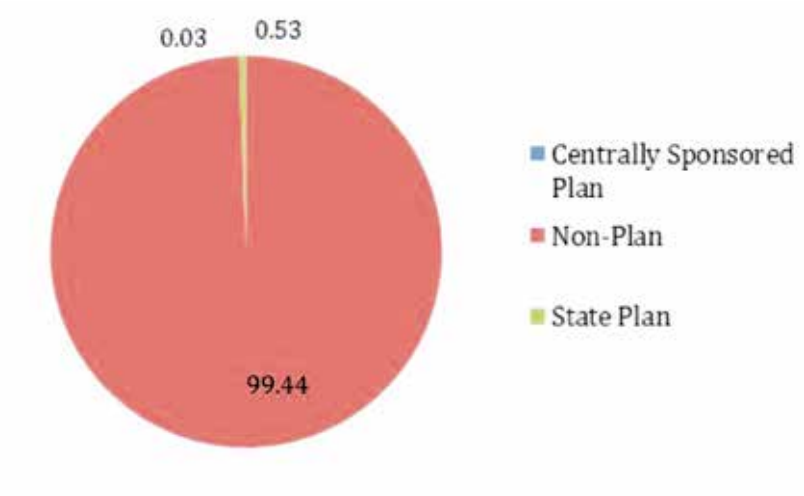
4.2.1 Analysis of Public Expenditure

For the year 2011-2012, Odisha booked an actual expenditure of Rs. 2,909.76 Crores under the major head, "Relief on account of Natural Calamities" - Grant Number 3, which corresponds to the Department of Revenue and Disaster Management.[58] The entire expenditure outlay is distributed between the Non-Plan, State Plan and the Centrally Sponsored Plan component. There is no Central Plan component under this major head. The Non-Plan expenditure accounts for 99.45% of the total budget and the remaining 0.55% is allocated under Plan expenditures (State Plan, Centrally Sponsored Plan). The respective shares of the budget components are shown in Figure 4.2.1 below.

57 Retrieved March 2013, from National Cyclone Risk Mitigation Project : http://ncrmp.gov.in/ncrmp/Cyclone_Impact.html

58 Relief on Account of Natural Calamities is a major head under the Department of Revenue and Disaster Management. The other 11 Major Heads under this Department have not been analyzed as they do not pertain to expenditure on calamity relief and disaster management.

FIGURE 4.2.1: PUBLIC EXPENDITURE – BUDGET COMPONENT-WISE (%) 2011-12



Source: Audited Expenditure Statement, GoO

4.2.2 Climate Coding of Public Expenditure: Actual vs. Proposed

Based on the climate coding of public expenditure, it is found that the government's spending priorities are skewed towards relief, restoration and rehabilitation work. Activities falling under this category are - provision of immediate relief and compensation to victims, rehabilitation assistance such as food provision, access to water, health assistance, and reconstruction, repair and restoration work. These activities help populations return to their previous livelihood or develop a new livelihood in the wake of an emergency situation and therefore are interventions that contribute to *General Development*. About 99.26% of the total spending under this major head falls under the *General Development* category and 0.74% of the total spending falls under the *Capacity Development* category of the climate spectrum. Initiatives falling under the *Capacity Development* category are- emergency service measures such as dissemination of early warning systems, investment in structural projects, crop insurance for farmers and capacity building initiatives such as strengthening of State level agencies and communities. There are no existing schemes that are in the nature of *Ambiguous Development or Climate-Oriented*. Table 4.2.1 shows the distribution of broad areas of public spending on Disasters over the climate spectrum.

TABLE 4.2.1: DISTRIBUTION OF AREAS OF SPENDING OVER THE CLIMATE SPECTRUM

Climate Spectrum Score	Ambiguous Development (AD)	General Development (GD)	Capacity Development (CD)	Climate-Oriented (CO)
Areas of Expenditure		Post calamity relief- food aid, drinking water supply, health and sanitation	Investment in infrastructure such as construction of cyclone shelters, strengthening Saline Embankments , enhancing road connectivity	
		Repairs, Reconstruction and Restoration of damaged properties	Training and capacity building of communities vulnerable to disasters and State level agencies	
		Ex-gratia payments to bereaved families	Setting early warning dissemination systems	
			preparation of district and State level disaster management plans after Risk and Vulnerability analysis	
Distribution of Expenditure (%)	**0**	**99.26**	**0.74**	**0**

Source: Audited Expenditure Statement, GoO and analysis by the Study team

The OCCAP has outlined 16 strategies for the coasts and disaster sector. These are shown in Table 4.2.2. In contrast to the pattern of existing spending (Table 4.2.1), the budgeted expenditure for proposed strategies are focused on *Capacity Development* (55%) and *Climate-Oriented* (45%) initiatives.

TABLE 4.2.2: DISTRIBUTION OF OCCAP STRATEGIES ACROSS THE CLIMATE SPECTRUM

	Proposed Strategies / Actions	Proposed Budget(in Rs. Crores)				Overlap with existing project's scheme's initiative
		AD	GD	CD	CO	
1	Flood mapping, flood forecasting models, downscaled climate change projections modeling, preparation of improved flood management plans			50		National Cyclone Risk Mitigation Project* (NCRMP) (Thirteenth Finance Commission (FC-XIII) for Capacity Building for Disaster Response
2	Integration and strengthening of climate change risk issues in the State Disaster management policy with robust framework for dealing with extreme events associated with climate change with its pro- active and multi hazard approach to disaster management.			0.5		NCRMP, Thirteenth Finance Commission (FC-XIII) for Capacity Building for Disaster Response
3	Constructing flood shelters in unconventionally vulnerable locations and strengthening the community to face the changing patterns of adaptation.			72		NCRMP, Other Relief Measures towards construction of cyclone shelters
4	Developing a hydrological framework with legally binding connotations for ground water conservation/ replenishment through development of watershed both in semi-arid and rain fed areas, identification, protection and rejuvenation of traditional water bodies, natural drainage channels and moribund river channels.			100		No overlap
5	Dredging and widening of river mouths to facilitate speedy discharge of flood water which otherwise aggravate the flood situation by lengthening the duration and depth of flooding arising out of erratic and intense pattern of rainfall due to effects of climate change.				150	No overlap
6	Developing a techno-legal regime for construction of disaster resilient housing and public infrastructure with respect to changing climate conditions such as extreme heat events, flooding of traditionally non flood prone areas and in the areas of coastal erosion and land subsidence.			1		No overlap

TABLE 4.2.2 (continued)

	Proposed Strategies / Actions	Proposed Budget(in Rs. Crores)				Overlap with existing project's scheme's initiative
		AD	GD	CD	CO	
7	Identification of potential location and construction of check-dams to contain flash flooding in high gradient river basins due to extreme rain events possibly owing to changing climate conditions.				300	No overlap
8	Setting up an integrated training and capacity building protocol for raising the level of awareness of the community and major stakeholders with respect to the mitigation and adaptation mechanism arising due to effects of climate change on agriculture and livelihood support systems and disaster preparedness.			100		NCRMP , Thirteenth Finance Commission (FC-XIII) for Capacity Building for Disaster Response
9	Assessment of erosion prone areas with the help of Digital Elevation model			3		NCRMP , Thirteenth Finance Commission (FC-XIII) for Capacity Building for Disaster Response
10	Needs assessment and constructing multipurpose cyclone shelters in the cyclone prone areas of the State along with provision of emergency equipment to the cyclone shelters and strengthening the capacity of the local people for disaster management			220		NCRMP, Other relief measures towards construction of cyclone shelters
11	Assessment of risks due to lightning and thunderstorm. Increase of such climate hazards may have climate change connotations which need to be explored through elaborate scientific study and mitigation measures.			20		NCRMP and Thirteenth Finance Commission (FC-XIII) for Capacity Building for Disaster Response
12	Study of impact of global warming on the biodiversity of coastal ecosystem with special emphasis on flagship species			5		
13	Special study on micro and meso level effects of coastal erosion along the coast of Odisha with special reference to coastal roads and settlement			200		

TABLE 4.2.2 (continued)

	Proposed Strategies / Actions	Proposed Budget(in Rs. Crores)				Overlap with existing project's scheme's initiative
		AD	GD	CD	CO	
14	Micro level vulnerability assessment of different State resources like housing, public infrastructure agriculture land, livelihood issues and socio-economic aspects of different levels of population due to effects of climate change resulting in extreme weather events.			50		NCRMP and Thirteenth Finance Commission (FC-XIII) for Capacity Building for Disaster Response
15	Sustainable shelter belt plantation, natural vegetation, mangrove generation and cropping patterns in view of the changing climate and weather conditions. Utilization of traditional knowledge and adaptive mechanism available with the community in a systematic way through an organized institutional mechanism				40	No overlap
16	Prediction through appropriate modelling the impact of sea level rise on coastal ecosystem			1.5		NCRMP and Thirteenth Finance Commission (FC-XIII) for Capacity Building for Disaster Response
	Total Proposed Budget			823	490	
	% of the total			**62.68**	**37.32**	

Source: OCCAP and analysis by the Study team

** The overlaps identified for the NCRMP is evaluated based on the objectives it aims to achieve throughout the scope of the project that will be implemented over a period of five years, starting from 2011.*

There are three basic adaptation strategies that can be opted for by communities (in coastal zones) that are vulnerable to climate change. These strategies can be classified as follows: Retreat, Accommodate and Protect.[59]

1. Retreat –Involves avoiding risk in order to eliminate a direct impact where no attempts are made to protect the land from the sea.
2. Accommodate- Making alterations to human activities and infrastructure in order to adapt to sea level changes
3. Protect- Protecting the coastline through mechanisms such as seawalls, dams etc.

59 IPCC. *Methodological and Technological Issues in Technology Transfer*. Retrieved March 2013, from http://www.ipcc.ch/ipccreports/sres/tectran/index.php?idp=299

The proposed strategies can also be classified based on the above mentioned adaptive responses, with a view to assess their focus areas and juxtapose them with the focus areas of current spending. This comparison is shown in Table 4.2.3.

TABLE 4.2.3: FOCUS AREAS OF CURRENT EXPENDITURE VS FOCUS AREAS OF PROPOSED BUDGET W.R.T ADAPTATION STRATEGIES

	Current expenditure	Proposed budget based on the SAPCC strategies
Accommodate	Early warning systems, Crop - Insurance, Construction of shelters,	Construction of flood and multi- purpose cyclone shelters, Disaster resilient housing and public infrastructure, Ground water conservation, protection and rejuvenation of traditional water bodies, natural vegetation and cropping patterns in view of the changing climate and weather conditions, protection and rejuvenation of natural drainage channels and moribund river channels
Protect	Raising and strengthening of Saline Embankment	Construction of check dams, Dredging and widening of river mouths, Sustainable shelter belt plantation, mangrove generation
Retreat	-	-

Source: OCCAP and Analysis by Study team

As can be seen from the table above, the focus area of current spending has limited set of accommodation and protection based interventions, whereas the proposed strategies focus on a wide range of Protection-based and Accommodation-based responses. The proposed strategies, however, do not focus on any Retreat-based measures such as relocating threatened buildings or phasing out development in threatened areas. It is important to note that coastal adaptation is not limited to just implementing one of the three basic interventions (Accommodate, Protect, and Retreat) as mentioned above.

It is equally important to consider the priorities for adaptive responses.[60] These priorities for adaptation are – capacity building and risk assessments and monitoring sea level rise which in turn support local planning needs and assist in determining the adaptive response. A significant percentage of the total proposed budget (25%) is directed toward these activities.

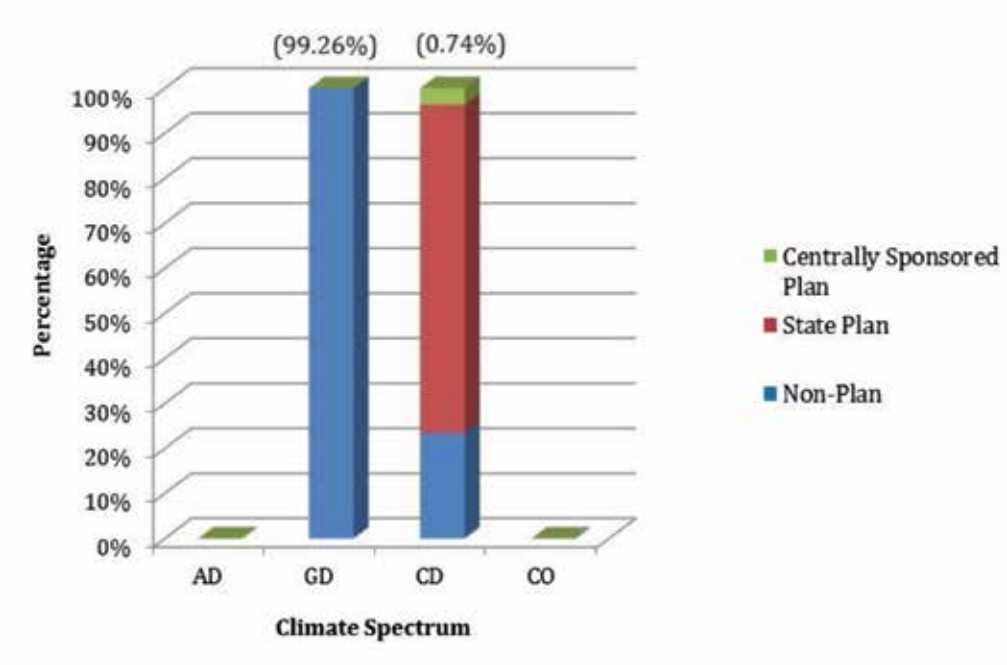
60 IPCC. *Methodological and Technological Issues in Technology Transfer*. Retrieved March 2013, from http://www.ipcc.ch/ipccreports/sres/tectran/index.php?idp=299

4.2.3 Funding Sources: Existing Schemes

Analysis by Climate Categories

Based on the analysis of the public expenditure in the climate spectrum within budget components, the Non-Plan expenditure is focused mainly on *General Development*. However, the "Thirteenth Finance Commission (FC-XIII) for Capacity Building for disaster response" flows through the Non-Plan component only. This scheme contributes significantly (23%) to *Capacity Development* expenditure. The State Plan and Centrally Sponsored Plan components are focused entirely on *Capacity Development* and contribute 73% and 4% respectively to the *CD* expenditure.

FIGURE 4.2.2: DISTRIBUTION OF PUBLIC EXPENDITURE IN THE CLIMATE SPECTRUM WITHIN BUDGET COMPONENTS[61]



Source: Audited Expenditure Statement, GoO and analysis by the Study team

61 The percentages within brackets depict the distribution of total actual budgetary expenditure across the climate spectrum.

4.2.4 Analysis of Projects and Schemes based on their Focus Areas:[62]

The Capacity Development related expenditure is channelled through the following projects and schemes:

1. World Bank assisted Externally Aided Project for National Cyclone Risk mitigation (Ministry of Home Affairs, 2011): This project which was launched in 2011 and will be implemented over a period of five years. The project is funded by the World Bank as an Adaptable Program Loan and its implementation has been approved as a Centrally Sponsored Scheme. The total budget outlay for this project is Rs. 653.79 Crores. The major components of the project for the State of Odisha can be summarized along three categories: a) Investment in infrastructure - investment on structural measures like constructing cyclone shelters, enhancing road connectivity and strengthening saline embankments. The total budget outlay for this component is Rs. 518.95 Crores, b) Training and capacity building initiatives including hard, risk and vulnerability assessments and disaster management planning. The total budget outlay for this component is Rs. 2.43 Crores[63] and c) Setting up of early warning dissemination systems. The total budget outlay for this component is Rs. 38 Crores. The rest of the budget allocation is directed towards implementation assistance. The investment on structural measures is borne between the Centre and State in the ratio of 75:25. The investment in the other two components and the project implementation and monitoring costs are borne by the Centre. The spending for these activities flows through the State Plan and Centrally Sponsored Plan component.
2. Thirteenth Finance Commission (FC-XIII) for Capacity Building for disaster response (Ministry of Home Affairs, 2011) focuses on: a) training/capacity building of State agencies, b) preparation of disaster management plans based on hazard, based on risk and vulnerability analysis, and c) setting up/ strengthening of Emergency Operation Centres (EOCs) in States. This grant supplements existing scheme/budgetary allocation of the Centre and State Government as well as any externally aided project for capacity building on disaster management. The spending for these activities flows through the Non-Plan component.
3. Crop insurance and construction of flood shelters are other important *Capacity Development* initiatives that are undertaken through grants and subsidies and other relief measures. The spending for these activities flow through the State Plan component.

62 The expenditure based on functional categories such as adaptive responses -accommodate, protect and retreat and priorities for adaptive responses cannot be prepared because of lack of data availability for component wise expenditure for each scheme.

63 http://ncrmp.gov.in/ncrmp/Implementation_Status.html

Based on the analysis of the projects and schemes, it can be seen that State's expenditure in disaster management is focused towards crop insurance and infrastructure development such as construction of shelters while the Centre's expenditure covers a wide gamut of disaster management activities that lead to *Capacity Development*. These include capacity building of State level agencies and communities, policy and plan making for disaster management and infrastructure development.

4.2.5 Recommendations

Overall, the budgetary expenditure for disasters management needs to shift from relief, restoration and rehabilitation to planning, preparedness and prevention. Currently, the expenditure on disaster risk reduction and management is almost insignificant. Many of the on-going, multi-disciplinary schemes have been envisaged to achieve similar objectives as proposed in the SAPCC for the coasts and disasters sector. Strategies such as risk and vulnerability assessments, integrated training and capacity building initiatives and integration and strengthening of climate change risk issues in the State Disaster management policy overlap with the objective of NCRMP and Thirteenth Finance Commission (FC-XIII) for Capacity Building for Disaster Response. This suggests that the State is asking for additional funding for activities that are already taking place in some capacity and also implies that the State's coping capacity to deal with disasters management with current level of funding is inadequate. Therefore, expenditure on capacity development and climate oriented development needs to be increased in proportion to the expenditure on relief, reconstruction and rehabilitation.

1. Several proposed strategies have been dovetailed into existing projects. For example, the State is planning to utilise funds from existing sources such as Chief Minister's Relief Fund and World Bank Assisted National Climate Risk Mitigation Programme for construction of flood shelters and multi-purpose cyclone shelters. Similarly, for predicting the impact of sea level rise on coastal ecosystem, the source of funding identified is the World Bank assisted Integrated Coastal Zone Management Project that is currently being implemented in Odisha for sustainable management of the coastal zone. While the proposed strategies are intensive on capacity building and climate oriented activities, as mentioned earlier, some of the interventions planned for the coasts and disasters sector intersect with the objectives of many of the on-going projects and schemes (as mentioned in the major head "Relief on account of Natural Calamities") undertaken by the Department of Revenue and Disaster management in Odisha. This has certain implications for channelling funds for proposed strategies

with over-lapping objectives. The funding for these proposed interventions can be routed through existing scheme and programmes.

2. Research in key knowledge domains such as preparation of planning guidelines, construction techniques for buildings in disaster prone areas, coastal geomorphology change and mapping or modeling of coastal hazards are in progress under various Ministry of Earth Sciences Institutions.[64] Leveraging knowledge from these institutions can benefit the State in planning and implementing its proposed strategies.

4.3 Fisheries and Animal Resources

Fisheries and Animal Resources is an important sector in terms of its potential for incorporating significant climate change initiatives, given that it forms an important supplementary livelihood option for the rural farming population. A vulnerability assessment conducted by the OSDMA[65] indicates that the State's coastal districts are at high risk of wind and cyclonic hazards, and flooding. This poses a significant risk of salt water intrusion to inland fishing as well as threat to coastal fishing infrastructure. Moreover, the density of livestock population is higher in these districts, increasing the risk of livelihood and asset loss. The State's livestock population[66] was 4.5% of total livestock at national level (Livestock Census 2007). About 80% of rural households own livestock and derive close to 30% of their annual incomes from livestock. The Animal Husbandry sector contributes to 15% of the Agricultural SGDP and around 4% of the total SGDP of the State. About 2.95% of the population depends on fisheries as their occupation, of which 70% depend on inland fisheries. The Fisheries sector contributes to around 6% of the Agricultural SGDP and just above 1% of the State's overall SGDP. Odisha has significant potential to develop inland and marine fisheries, given its natural resource endowments – a coastline of 480 kms, about 6.73 lakh ha of fresh water resources (ponds, tanks, rivers, canals, lakes, reservoirs etc.) and 4.17 lakh ha of brackish water resources (estuaries, lagoons, backwaters). The major thrust areas for the sector are livestock breeding farms which also give training support to farmers, disease control through development of vaccines, conservation of local breeds, developing inland fisheries as a viable alternative to marine fishing and greater utilization of fresh and brackish water resources.

64 Retrieved March 2013, from National Mission on Strategic Knowledge for Climate Change: http://www.dst.gov.in/scientific-programme/NMSKCC_July_2010.pdf

65 Orissa Climate Change Action Plan

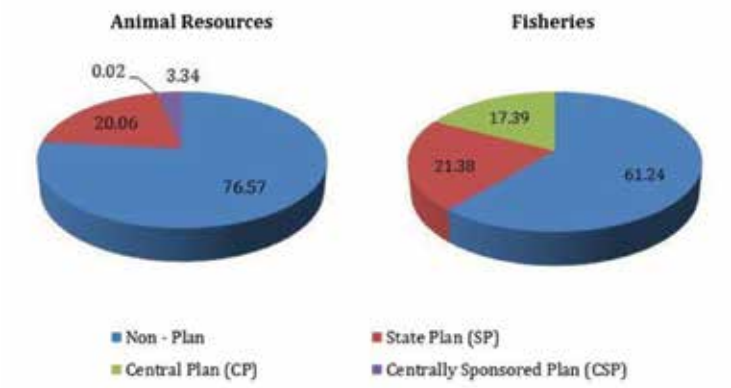
66 Economic Survey 2011-12, Odisha

4.3.1 Analysis of Public Expenditure

The State Government initiatives in animal resource development have been directed mostly at livestock disease control, disease diagnostics, improvement of cattle breeds, fodder development, training and development of dairying and animal husbandry. State interventions in fisheries involve giving greater thrust to pisciculture in reservoirs and ponds, tapping brackish water resources, and up-gradation of crafts and fishermen welfare. Public expenditure pertaining to these initiatives is undertaken by the Department of Fisheries and Animal Resources Development and information from Grant Number 33 has been analysed from the Audited Expenditure Statement provided by the Deputy Accountant General's office, Odisha.

Of the total spending for the year 2011-12 of around Rs. 295.66 Crores[67], expenditure pertaining to animal resources (animal husbandry, dairy development and related capital outlays) accounted for close to 77.5%, while fisheries expenditure was about 20%. The remaining 2.5% went into common administrative expenses.

FIGURE 4.3.1: PUBLIC EXPENDITURE – BUDGET COMPONENT-WISE (%) 2011-12



Source: Audited Expenditure Statement, GoO

Figure 4.3.1 below shows the budget components of each of the sectors of spending. The Non-Plan component attributes to a dominant share (76.57%) in the Animal Resources sector. This mainly consists of administrative expenses, livestock breeding, fodder seed farms, animal healthcare services and in-service training of personnel. The State Plan spending, which was 20.07% of the total, focused on disease surveillance, infrastructure development, genetic up-gradation and conservation of breeds, skill development for self-employment, and dairy development. The Centrally Sponsored Plan schemes accounted

67 Excludes recoveries, which are less than 0.5% of the total spending

for 3.34% of the spending, covering areas like disease control, strengthening of veterinary services and integrated sample surveys. Central Plan component was a negligible 0.02%, mainly comprising of the disease reporting system.

Expenditure in Fisheries also shows a heavy Non-Plan component, at 61.24%, covering training, research, extension and propaganda activities, intensive pisciculture, brackish water aquaculture and off-shore fisheries, apart from administration. State Plan spending was 21.38% of the total, which related to skill up-gradation, improvement of marine fishing infrastructure and implementation of fishing regulation. The Centrally Sponsored Plan component accounted for 17.39%, and covered areas like capacity building, training, modernization of fishing infrastructure, fresh water aquaculture and welfare schemes for fishermen.

4.3.2 Climate Coding of Public Expenditure: Actual vs. Proposed

The State's combined spending under Plan and Non-Plan components were studied across the climate spectrum to highlight the presence and extent of climate-relevance in the on-going expenditure. The two sectors – Animal Resources and Fisheries – were analysed separately. Tables4.3.1and 4.3.2, respectively, show the areas of spending in these sectors over the categories of the climate spectrum. A major portion of expenditure on Animal Resources is under *General Development*, close to 76.55%. This category includes livestock and poultry development, training and promotion of livestock related activities as viable livelihood options, disease surveillance and dairy development. A few items of spending that pertain to genetic up-gradation, conservation of small animals and local breeds, development of biological products for disease control and diagnostics are under the *Capacity Development* category, constituting 23.45% of the sector's spending. These areas have the potential to improve resilience of species, enhancing the disease reporting mechanism and also improving productivity of animal resources.

TABLE 4.3.1: DISTRIBUTION OF AREAS OF SPENDING OVER THE CLIMATE SPECTRUM: ANIMAL RESOURCES SECTOR

Climate Spectrum Score	Ambiguous Development AD	General Development GD	Capacity Development CD	Climate-Oriented CO
Areas of Expenditure		Strengthening of Dairy Organisation	Development of vaccines	
		In-service Training of Personnel	National Animal Disease Reporting System (NADRS)	
		Fodder cultivation and pasture development	Control of Animal Diseases, Disease diagnostics	
		Up-gradation of skill in self-employment under Animal Husbandry	Genetic Up-gradation of small animals	
		Poultry Breeding	Conservation and improvement of threatened indigenous breeds	
		Promotion of commercial poultry entrepreneurs and backyard poultry production		
		Infrastructure development for Live Stock Services		
		Strengthening of Diseases Surveillance		
Distribution of Expenditure (%)	**0**	**76.55**	**23.45**	**0**

Source: Audited Expenditure Statement, GoO and analysis by the Study team

The Fisheries sector schemes fall entirely under the *General Development* category. Table 4.3.2 indicates some of the items of expenditure. These range from core fisheries development (fresh, brackish water and marine) and infrastructure up-gradation to self-employment training and applied research. A major focus of such initiatives is to popularize fisheries activities and encourage higher adoption of fish farming.

TABLE 4.3.2: DISTRIBUTION OF AREAS OF SPENDING OVER THE CLIMATE SPECTRUM: FISHERIES SECTOR

Climate Spectrum Score	Ambiguous Development AD	General Development GD	Capacity Development CD	Climate-Oriented CO
Areas of Expenditure		Aquaculture (Brackish Water, Fresh Water)		
		Development of Inland Fisheries, Pisciculture		
		Off-shore Fisheries		
		Up-gradation and modernisation of fishing infrastructure		
		Fisheries Engineering		
		Applied Research on Intensive Fish Production and Processing		
		Welfare Initiatives for fishermen (Low Cost Housing, Accident Insurance, Savings-cum-Relief)		
		Up-gradation of skill in self-employment under Fisheries		
		Training and Propaganda		
Distribution of Expenditure (%)	**0**	**100**	**0**	**0**

Source: Audited Expenditure Statement, GoO and analysis by the Study team

Keeping in mind the potential climate-related risks to coastal fishing, there is a greater thrust on developing inland fisheries to buffer impacts on livelihoods. The State's Climate Change Action Plan indicates a set of proposed strategies for the animal husbandry and fisheries sectors, with a greater emphasis on the former. This could be attributed to the relatively larger share of animal resource development spending in the budget, as compared to fisheries. The distribution of these proposed actions are shown in Table 4.3.3.

It can be seen that in contrast to the current spending pattern, the proposed budget is predominantly *Capacity Development* in nature, with close to 91% in this category. Areas like methane harvest technology, biotechnology research, studies on impact of

climate change on aquaculture and early warning systems are in the nature of *Capacity Development*, while conservation of local hardy species and scaling up of harvesting gobar gas to reduce net emissions are *Climate-Oriented*.

There are a few on-going schemes that can be identified as being in line with the climate change agenda. It is notable that out of Rs. 202.5 Crores under these schemes, about 88% of the expenditure is under the *Capacity Development* category. These include initiatives like livestock disease prevention and control, fodder seed and pasture development, developing know-how on enabling sustained resource use (water harvesting, biogas management, improving operational practices for methane harvesting etc.). The corresponding schemes include the programme on conservation of threatened indigenous breeds and National Animal Disease Reporting System (NADRS, under the Central Plan). For gobar gas compression and packing, the Department has proposed to collaborate with other bodies like the Khadi and Village Industries Commission (KVIC) and Odisha Renewable Energy Development Agency (OREDA). The National Scheme for Welfare of Fishermen, which is centrally sponsored, is also part of the action plan (and hence fully overlapping with an on-going initiative). The on-going components of this scheme include group accident insurance, savings-cum-relief and low cost housing for fishermen. It is intended to improve awareness on insurance and risk transfer products, especially in vulnerable regions, through the action plan.

TABLE 4.3.3: DISTRIBUTION OF OCCAP STRATEGIES ACROSS THE CLIMATE SPECTRUM

Proposed Strategies / Actions	Proposed Budget (in Rs. Crores)				Overlap with Existing project's / scheme's objectives
	AD	GD	CD	CO	
1) Conservation of local hardy animals				1	Conservation and improvement of threatened indigenous breeds
2) Gobar Gas tanks/packing to cylinders by compression like CNG				0.5	No overlap
3) Easy and handy Methane Harvest Technology at farmers point			0.5		
4) Disease Early Warning System			2		National Animal Disease Reporting System (NADRS)
5) Application of biotechnology and skilled animal breeding for development of better adopted species			2		No overlap

TABLE 4.3.3 (continued)

Proposed Strategies / Actions	Proposed Budget (in Rs. Crores)				Overlap with Existing project's / scheme's objectives
	AD	GD	CD	CO	
6) Capacity building of livestock keepers			2.5		No overlap
7) Impact of climate change on inland and coastal aquaculture			3		
8) Development of infrastructure for early warning systems in coastal areas for fishermen			5		
Total Proposed Budget (% of Total)			**15 (90.91)**	**1.5 (9.09)**	

Source: OCCAP and analysis by the Study team

4.3.3 Funding Sources: Existing Schemes

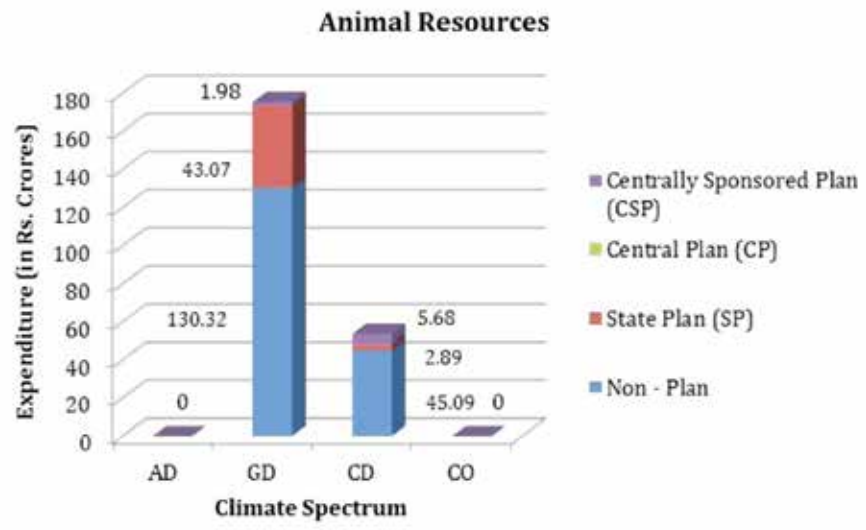
Analysis by Climate Categories

For ease of analysis, the various major heads of spending in the budget have been classified into three sectors – Animal Resources, Fisheries and common expenditure. These sectors, as mentioned before, account for 77.5%, 20% and 2.5% of the total audited expenditure for 2011-12, respectively. Overall, the total spending is predominantly *General Development* in nature, across all three sectors. A sector-wise description is given below.

Spending common to both Animal Resources and Fisheries has a minor *Ambiguous Development* share which pertains to repair works and is about 4% of the common expenditure category. The remaining expenditure (around Rs. 5.36 Crores) under this sector comprises of the Department's administrative spending, with a *General Development* score, as mentioned above, and funded through Non-Plan expenditure.

The Fisheries sector comprises entirely of *General Development* spending (Table 4.3.2). This is composed of 61% of Non-Plan funding and 39% of Plan spending which is almost equally from the State Plan and Centrally Sponsored components (Figure 4.3.1). While routine administration, operations and management of aquaculture, training, propaganda and applied research fall under the Non-Plan component (around Rs. 36 Crores), areas like skill up-gradation, self-employment training, organization of buyer-seller meets are covered by State Plan schemes (close toRs. 12.7 Crores). Development of fresh water and brackish water aquaculture, National Schemes for Welfare of Fishermen and modernization of fishing infrastructure are initiatives that are centrally sponsored (about Rs. 10.3 Crores).

FIGURE 4.3.2: DISTRIBUTION OF PUBLIC EXPENDITURE IN THE CLIMATE SPECTRUM WITHIN BUDGET COMPONENTS (IN RS. CRORES): ANIMAL RESOURCES SECTOR



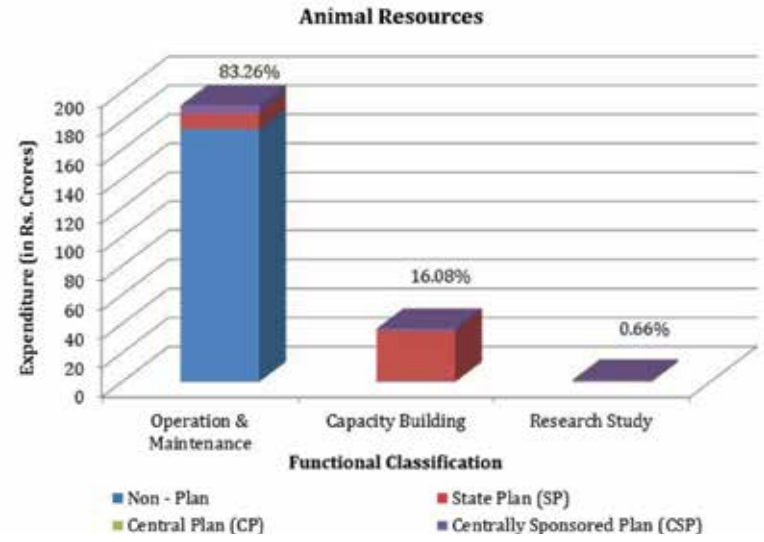
Source: Audited Expenditure Statement, GoO and analysis by the Study team

The distribution of spending over the climate spectrum, across budget components for the Animal Resources sector is shown in Figure 4.3.2. It can be seen that this sector consists of a considerable share of spending (23.45%) in the *Capacity Development* category. About Rs. 45 Crores has been spent under the Non-Plan component in this category in areas like vaccine development, disease diagnostics, exotic cattle breeding and intensive livestock development. Conservation of threatened breeds and genetic up-gradation of small animals are schemes that have been funded under the State Plan component, which amount to Rs. 2.89 Crores. Centrally Sponsored Plan schemes account for Rs. 5.68 Crores of the spending in this category, which have covered animal disease control. The *General Development* category, which accounts for a major 76.55% of expenditure in this sector, consists of Non-Plan funding close to Rs. 130 Crores (covering administration, veterinary services, poultry, sheep and other livestock development, in-service personnel training and publicity). State Plan schemes (Rs. 43 Crores approx.) cover areas like infrastructure development, disease surveillance, fodder and feed development, skill up-gradation, support to commercial poultry entrepreneurs and dairy development. A small share of Rs. 1.98 Crores is centrally sponsored, funding integrated sample surveys and strengthening of veterinary service delivery system.

Analysis of Public Expenditure over Functional Categories

The components of expenditure were also analysed based on the nature of activity as specified by the Climate Change Action Plan. The current expenditure items could be grouped under three of those categories – Operation and Maintenance, Capacity Building and Research Study. Figures 4.3.3 and 4.3.4 show that for both animal husbandry and fisheries, expenditure is concentrated in Operation and Maintenance. For Animal husbandry it's 83% of the total expenditure and for Fisheries its 73%. Current focus on research activities however, is very negligible in both sectors, given that these are critical sectors for increasing climate resilience.

FIGURE 4.3.3: DISTRIBUTION OF PUBLIC EXPENDITURE OVER FUNCTIONAL CLASSIFICATION: ANIMAL RESOURCES SECTOR (IN RS. CRORES)



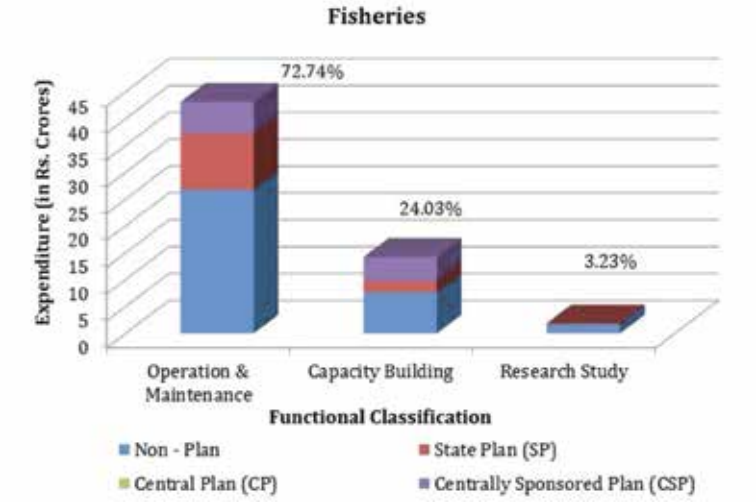
Source: Audited Expenditure Statement, GoO and analysis by the Study team

While the dominance of Non-Plan funding is expected and also observed in all the classes, it is seen that State Plan schemes dominate the Plan expenditure across classes. In Animal Resources sector, Capacity Building activities (training, skill up-gradation, strengthening of infrastructure) are almost entirely under the State Plan and more than 95% of this expenditure receives a *General Development* score on the climate spectrum. This is because this expenditure relates to improving health coverage for livestock and poultry and overall veterinary service delivery. It also includes imparting basic skills to unemployed youth and livestock owners with a view to promoting animal husbandry as a livelihood option. This is an interesting dimension to be compared with the proposed strategies, which

are more towards *Capacity Development*. In view of the same, it should also be noted that the Research Study category falls entirely under *General Development.* This includes expenditure on integrated surveys to estimate livestock production (milk, egg, meat and wool) that aid in strategic planning to improve the sector's growth.

In the Fisheries sector, the State Plan spending is relatively more in the Operation and Maintenance category. Capacity Building activities include training, self-employment skill development, modernization of infrastructure etc, and are jointly funded through the State and Centre. Applied research on intensive fish production and fisheries resource exploration form the Research Study class, and is under Non-Plan funding.

FIGURE 4.3.4: DISTRIBUTION OF PUBLIC EXPENDITURE OVER FUNCTIONAL CLASSIFICATION: FISHERIES SECTOR (IN RS. CRORES)



Source: Audited Expenditure Statement, GoO and analysis by the Study team

The proposed areas of action put forth in the OCCAP are shown across the functional classes in Table 4.3.4. There is an additional Policy Action category in the table. This applies to the proposed strategies more aptly than for existing areas of expenditure; there are some on-going initiatives like conservation of local hardy species, training of in-service personnel, which could benefit from a greater focus on climate sensitive development. However, most of the proposed actions come under Operation and Maintenance. Some of them overlap with on-going schemes; others are in the nature of refining existing operational practices or executing collaborative efforts with other research organizations for roll-out of products/ services.

TABLE 4.3.4: DISTRIBUTION OF OCCAP STRATEGIES OVER FUNCTIONAL CLASSIFICATION

Functional Classification	Operation and Management	Capacity Building	Research Study	Policy Action
Proposed Strategies	Conservation of local hardy animals	Capacity building of livestock keepers	Impact of climate change on inland and coastal aquaculture	Development of infrastructure for early warning systems in coastal areas for fishermen
	Gobar Gas tanks/ packing to cylinders by compression like CNG			
	Easy and handy Methane Harvest Technology at farmers point			
	Disease Early Warning System			
	Application of biotechnology and skilled animal breeding for development of better adopted species			

Source: OCCAP, Audited Expenditure Statement and analysis by the Study team

4.3.4 Recommendations

1. A large share of Non-Plan expenditure in the budget is common to most sectors. However, the significance of increasing the share of Plan spending cannot be understated, especially when targeted spending for an important agenda like climate change is concerned. The on-going initiatives which have been identified as climate-relevant are currently funded from State and Centrally Sponsored Plan schemes. This makes it more imperative that these schemes receive high priority as target areas for expanding existing budgetary support.
2. Some areas in the sector like training of veterinary and para-veterinary staff have been in need of better funding and expansion. It has also been observed that important training modules relating to climate change impacts are yet to be included. These require greater attention as a preliminary step to achieving the strategies outlined by the OCCAP.
3. With the added thrust from a climate change agenda, the long awaited need for better outreach and penetration of veterinary services in remote areas could be fulfilled. The primary objective of doing so would be to sensitise local stakeholders, mainly owners of livestock, on the importance of adopting sustainable practices (especially for moving to hardy local breeds whose productivity is minimally affected by extreme

temperatures) and more vigilant disease reporting. The disease surveillance initiative is one of the proposed actions to be operationalised fully in the first round of the action plan. Real time data would be fed from all grass root level nodes on disease incidence.

4. Mixed farming needs to be given more thrust as crop patterns are prone to undergo alterations, like the instance of millets taking over cereal production due to temperature changes. Such proactive measures could be incorporated into livestock extension services in order to strengthen rural livelihoods as well as build the adaptive capacity of rural farm households in the face of climate change.
5. Similarly, activities that are research-intensive are in need of greater institutional stability for an effective roll out. With the mechanism fraught with transfer of staff and stunted funding, R&D ventures which require long term commitment of funds as well as qualified human resources have been a low priority thus far. While this applies to R&D in other sectors as well, it should be given greater attention in those that are critical to preservation of biodiversity and promotion of sustainable practices for resource use.

4.4 Forestry

Forests play a pivotal role in maintaining the ecological stability of the environment. They provide protection and salvage against impacts of natural hazards like floods, droughts and cyclones. They also provide boundless supply of timber and other Non-timber forest products (NTFP) like mushrooms, fern, berries and other medicinal herbs of high commercial value. In addition to their ecosystem benefits, they also act as a chief means of sustenance and livelihood for the peripheral rural communities. But in the recent decades, forest cover in several countries has been dwindling at a fast pace owing to rising population, industrialization, and increased exploitation of forest resources to meet human needs and urbanization. This has been more rampant in most developing nations, which are still in the nascent stages of development and are keen on accelerating this process.

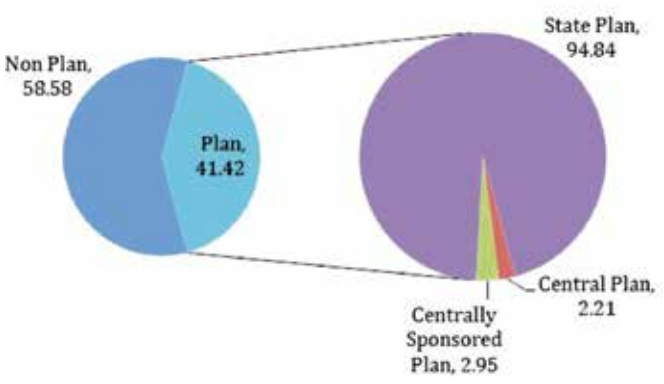
With one of India's National Climate Missions viz. the Green India Mission envisaging the doubling of areas to be afforested and increasing the GHG removal potential of Indian forests to 6.35% of the total annual GHG emissions by 2020, it becomes crucial to streamline expenditure and investments in this sector. Given that this chapter focuses on current expenditure and future strategies to address climate change in the forestry sector, it's useful to provide a brief background of the State's forestry sector.

The latest State of Forests Report[68] claimed approximately 37% of Odisha's geographical area to be covered by forests. The forest cover (density) within the State is unevenly distributed. The coasts which possess a relatively higher density of population and are more vulnerable to coastal disasters are covered more by scrub and open forests, whereas central regions have more of moderately dense forest (MDF) and very dense forests (VDF). In addition to better targeting of funds for forestry sector activities, the following analysis would also assist in identifying underutilized financial sources like Compensatory Afforestation Fund Management and Planning Authority (CAMPA) for funding proposed strategies in the sector.

4.4.1 Analysis of Public Expenditure

The forestry sector comprises of core climate adaptation schemes ranging from direct afforestation/reforestation activities to indirect research and capacity building activities. The spending by the Department of Forest and Environment has been analysed using the expenditure listed under Grant 22 of the Audited Expenditure Statement, Government of Odisha (GoO). The annual audited expenditure for the FY 2011-12 was Rs. 629.46 Crores.[69] Out of this, the Non Plan component constituted approximately 58%, State Plan approximately 39% and the remainder came from Central and Centrally Sponsored Plan components. Figure 4.4.1 shows the break-up of expenditure over various budget components. The Forest and Environment Department expenditure as per the Audited Expenditure Statement, GoO can be categorized into five major heads viz. *Public Works, Forestry and Wildlife, Agricultural Research and Education, Ecology and Environment, Secretariat Economic Services* and *Capital Outlay on Forestry and Wildlife.*

FIGURE 4.4.1: PUBLIC EXPENDITURE – BUDGET COMPONENT-WISE (%) 2011-12



Source: Audited Expenditure Statement, GoO

68 2011. India State of Forests Report, Forest Survey of India

69 Excludes any recoveries in the budget

A brief description of the key schemes under each of the major heads is given below:

Public Works & Secretariat Economic Services: These two major heads mainly feature in the Non-Plan component of the budget and comprise of repair and maintenance of buildings and recurring salary expenditure respectively.

Forestry and Wildlife: This head mainly covers expenditure on establishment and maintenance of wildlife sanctuaries and botanical gardens, zoos, reserve forests, protection of endangered species and plantation activities. Out of the total expenditure under this head, 54% is funded from the Non-Plan component, 44% from the State Plan and the remainder from the Central Plan.

Agricultural Research and Education: This component primarily focuses on silviculture and other forest research activities and is funded entirely from the State Plan.

Ecology and Environment: State Plan contributes to 72% of the expenditure under this head and primarily focuses on promoting eco-tourism within the State, wetland conservation and financial assistance for environmental studies and awards. The 13th Finance Commission grants for the protection of Chilika Lake and World Bank assisted project on coastal protection and ecological development also routed their funds through the State government. The CSP component funded 16% of the total expenditure under this head, and the schemes largely target wildlife conservation.

Capital Outlay on Forestry and Wildlife: This head primarily consists of schemes undertaking urban and rural plantations. The Non-Plan component constitutes 71% of this head's expenditure leaving the rest to the State Plan.

4.4.2 Climate Coding of Public Expenditure: Actual vs. Proposed

An analysis of the budgetary expenditure for the FY 2011-12 reveals that nearly 60% of the total expenditure made by the Department falls under *General Development*. This is primarily due to construction, repair & maintenance and administrative expenses of the Department and its field offices. Table 4.4.1 highlights key schemes/activities within this Department and their placement on the climate spectrum.

TABLE 4.4.1: DISTRIBUTION OF AREAS OF SPENDING OVER THE CLIMATE SPECTRUM

Climate Spectrum Scores	Ambiguous Development (AD)	General Development (GD)	Capacity Development (CD)	Climate-Oriented (CO)
Areas of Expenditure		Construction, repairs and maintenance of forest department and residential buildings	Development and beautification of botanical gardens and zoos	Development of eco-tourism
		Recurring administrative expenses. Salaries, rents of departments and field offices	Establishment of wildlife sanctuaries and national parks	Rehabilitation of degraded forests
		Intensification of forest management activities	Intensive protection of critically endangered areas	Orissa Forest Sector Development Project (EAP - JBIC)
			Conservation and Management of Wet Land	Urban Plantations
			Forest Research	
			Livelihood Option Creation schemes for local communities	
Distribution of Expenditure (%)	**0**	**59.22%**	**20.44%**	**20.33%**

Source: Audited Expenditure Statement, GoO

The residual spending is almost equally distributed between *Capacity Development* and *Climate-Oriented* activities. *Capacity Development* comprises of forest and wildlife conservation activities through protected area policies, conserving natural wetland systems and augmenting rural livelihood strategies, whereas *Climate-Oriented* schemes directly target forest stock enhancement and GHG absorption, contain measures promoting eco-tourism, rehabilitation and reforestation of degraded forest patches and direct urban & rural plantation activities.

TABLE 4.4.2: DISTRIBUTION OF OCCAP STRATEGIES ACROSS THE CLIMATE SPECTRUM (IN RS. CRORES)

OCCAP Strategies	Proposed Budget (in Rs.Crores)				Overlap with On-going programmes
	AD	GD	CD	CO	
Increasing Reforestation/ Afforestation activities in degraded forest areas				1400	Economic Plantation/ Rehabilitation of degraded forest
Protecting existing forest stocks to act as carbon sinks with stronger conservation		400			Intensification of Forest Management*
Increasing planting on non-forested land and also exploring where new and increased tree planting could create barriers to storm and cyclone impacts in coastal zones				40	Economic Plantation, World Bank assisted Coastal Ecological System for protection and development^ Integrated Coastal Zone Management Programme (ICZMP)
Covering bald hills with suitable species mix				10	Bald Hill Plantation
Increasing and protecting existing mangrove cover along the coast				50	No Overlap[&]
Assessing fire management strategies		90			Intensification of Forest Management
Improving tree planting and forest management to integrate with watersheds and water resources management			1200		No Overlap
Working to establish new systems to support for community users			40		Odisha Community Forest Protection and Participatory Management in JFM Mode
Undertaking studies on indigenous trees species to assess their vulnerability to climate change			10		No Overlap
Assessing additional threats to biodiversity and wildlife			80		No Overlap[$]
Obtaining access to updated knowledge on climate change science and policy developments			5		No Overlap[#]

TABLE 4.4.2 (continued)

OCCAP Strategies	Proposed Budget (in Rs.Crores)				Overlap with On-going programmes
	AD	GD	CD	CO	
Capacity development of Panchayati Raj institutions/ communities/JFM institutions to adapt to climate change			5		No Overlap
Monitoring carbon stock and biodiversity at regular intervals			5		Establishment of SEIAA and SEAC
Total Budget	0	490 (15%)	1345 (40%)	1500 (45%)	

Source: OCCAP

** Even though it doesn't directly focus on conservation with the aim of enhancing carbon sinks, the primary objective is to strengthen forest management practices and increase vegetation cover and protect valuable species*

^ It doesn't focus entirely on reducing impacts of natural hazards on the coasts but aims at increasing biodiversity, reducing coastal erosion, coastal R & D and creating livelihood opportunities for coastal fishers

[&] A scheme titled "Conservation and Management of Mangroves" is listed in the Outcome budget 2012-13 but it clearly states that no funding has been sanctioned for the same in that Financial Year

$ There are animal specific reserves which protect specific species, but there are not detailed studies on threats to biodiversity and wildlife

[#] Specific knowledge training and enhancement is being targeted, emerging forest research, management techniques, medicinal plants, etc. but not on climate change and its effects.

Table 4.4.2 highlights the activities that the State proposes to carry out as part of its State Action Plan. Out of these, a few are on-going schemes or have strong overlap with existing schemes, while others are entirely new initiatives being proposed. The OCCAP mainly proposes strategies that aid capacity development and facilitate climate adaptation. Such schemes constitute approximately 84% of the proposed budget for the sector. *Capacity Development* programmes in the OCCAP constitute integrating watershed management with plantations, training, capacity building and carrying out relevant R&D in the forestry sector, whereas *Climate-Oriented* proposals target afforestation through plantations, recovery of degraded forest lands and protecting mangroves.

There is a noticeable difference in the emphasis on *Capacity Development* and *Climate-Oriented* activities while comparing the current expenditure and proposed budget in the sector. While there is a decrease in the prominence of *General Development* activities, there is an intensification of *Capacity Development* and *Climate-Oriented* activities.

The OCCAP proposes a massive budget of Rs. 1,400 Crores for activities involving afforestation and reforestation of degraded areas. It intends to continue an on-going scheme viz. the Orissa Forestry Sector Development Project. The core objective of this programme is to restore degraded forest areas through plantation. The programme also intends to promote sustainable forest management practices through Joint Forest Management (JFM) and tribal development, thereby improving the environment and also alleviating poverty by improving income levels of forest dependent communities. Although the primary objective is climate oriented, the programme's intended mode of achieving its goals is through capacity building of rural forest-dependent communities. Hence it contains both *Climate-Oriented* and *Capacity Development* components.

The second major allocation of Rs. 1,200 Crores as proposed in the OCCAP is for "Improving tree planting and forest management to integrate with watersheds and water resources management". This will be a new initiative by the State. One needs to look more into the scope, objectives and outcomes of the initiative once a detailed proposal is developed to assess the nature of activities and determine appropriate sources of funds and funding mechanisms.

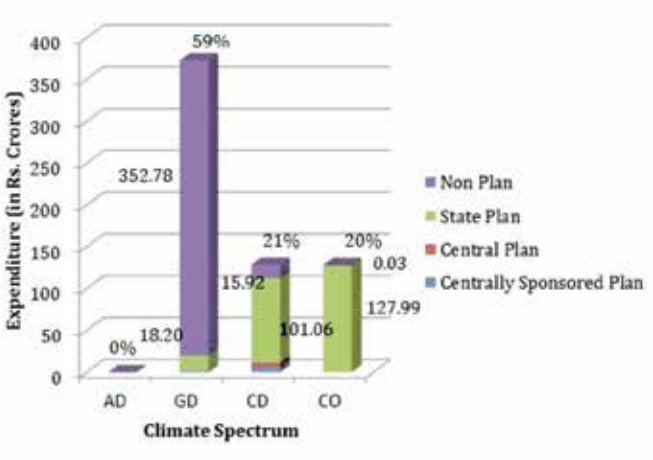
4.4.2 Funding Sources: Existing Schemes

Analysis by Climate Categories

Figure 4.4.2 below provides the distribution of current expenditure (FY 2011-12) across different climate categories by various budget components.

It is interesting to note that most of the *Capacity Development* and *Climate-Oriented* activities are funded from the State Plan. In the case of *Capacity Development*, the State Plan funds 79% of the expenditure, and Non-Plan and CSP contribute 12% and 4% respectively. *Climate-Oriented* activities have been funded entirely from the State Plan. *General Development* activities are almost entirely funded from the Non-Plan component (94%)

FIGURE 4.4.2: DISTRIBUTION OF PUBLIC EXPENDITURE IN THE CLIMATE SPECTRUM WITHIN BUDGET COMPONENTS



Source: Audited Expenditure Statement, GoO

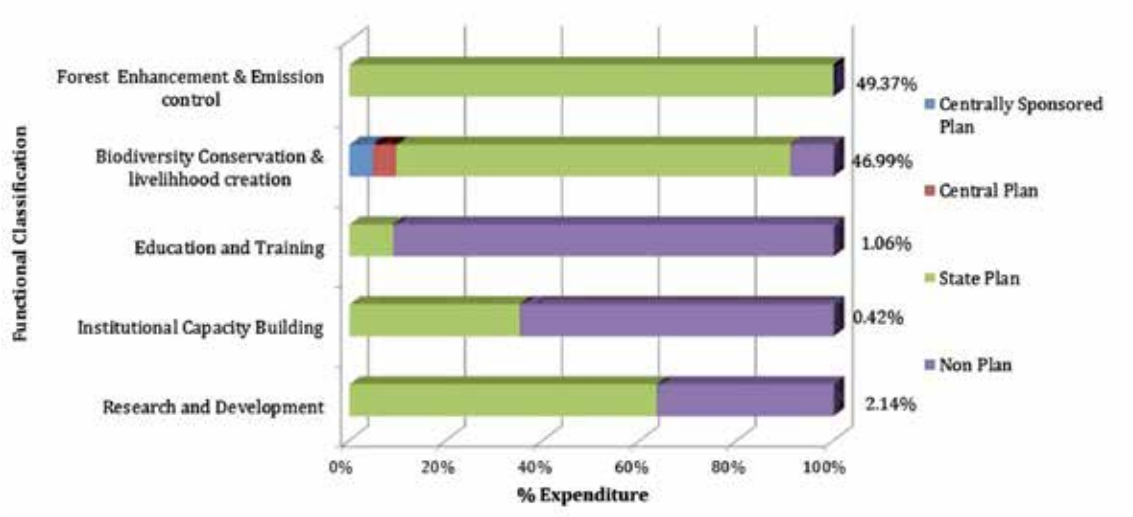
Analysis of Public Expenditure over Functional Categories

The classification of expenditure on the climate spectrum provides important insights into the climate relevance of current schemes and programmes. However, adding another layer to this analysis helps us understand the functional nature of the spending and identifies gaps and potential thrust areas. The expenditure as shown in Figure 4.4.3 below has been categorized into five functional categories viz. Forest Enhancement & Emission Control, Biodiversity Conservation and livelihood creation, Education and Training, Institutional Capacity Building and Research & Development. Only *Capacity Development* and *Climate-Oriented* spending have been included for the purpose of this analysis. The contribution of the different budget components across the functional categories of *Capacity Development* and *Climate-Oriented* expenditure has been highlighted in this section.

It is interesting to observe that almost the entire expenditure under the *Capacity Development* and *Climate-Oriented* activities focuses on Forest Enhancement & Emission Control and Biodiversity Conservation and livelihood creation programmes. Typical examples of the first category are the economic plantation/rehabilitation of degraded forest and the Orissa Forest Sector Development Project which target afforestation and reforestation of degraded lands. These schemes aim at increasing the forest cover in the long run. The second category consists of schemes like Development of Similipal Tiger Reserve, FC-XIII Grant for Development and Maintenance of Forest, and Orissa Bamboo Development Programme. The broad objectives of these schemes are to promote sustainable forest management practices, protect endangered wildlife habitats, and maintain specific plant species through integrated community management techniques.

The combined expenditure in these two functional categories amounts to almost 96% of the *Capacity Development* and *Climate-Oriented* spending. The remaining heads of R &D, Institutional Capacity Building and Training & Education amount to a meagre 4% of this spending.

FIGURE 4.4.3: COMPARISON OF EXPENDITURE ACROSS KEY FUNCTIONAL AREAS (% OF TOTAL EXPENDITURE)



Source: Audited Expenditure Statement, GoO

A similar functional classification has been done for the proposed strategies in the sector as mentioned in the OCCAP. Some of the proposed strategies fall within a single functional category while a few others are cross-cutting in nature.

TABLE 4.4.3: FUNCTIONAL CLASSIFICATION OF OCCAP STRATEGIES

Functional Classification	Forest Enhancement and Emission Control	Biodiversity Conservation and livelihood creation	Education & Training	Institutional Capacity Building	Research & Development
Proposed Strategies	Increasing Reforestation/ Afforestation activities in degraded forest areas				
	Protecting existing forest stocks to act as carbon sinks with stronger conservation				
	Increasing planting on non-forested land and also exploring where new and increased tree planting could create barriers to storm and cyclone impacts in coastal zones				
	Covering bald hills with suitable species mix				
	Increasing and protecting existing mangrove cover along the coast				
			Assessing fire management strategies		
	Improving tree planting and forest management to integrate with watersheds and water resources management				
		Working to establish new systems to support for community users			
					Undertaking studies on indigenous trees species to assess their vulnerability to climate change

TABLE 4.4.3 (continued)

Functional Classification	Forest Enhancement and Emission Control	Biodiversity Conservation and livelihood creation	Education & Training	Institutional Capacity Building	Research & Development
Proposed Strategies					Assessing additional threats to biodiversity and wildlife
			Obtaining access to updated knowledge on climate change science and policy developments		
				Capacity development of Panchayati Raj institutions/ communities/ JFM institutions to adapt to climate change	
				Monitoring carbon stock and biodiversity at regular intervals	

Source: OCCAP, Audited Expenditure Statement and analysis by the Study team

4.4.3 Recommendations

1. Some of the proposed strategies are *General Development* in nature. This constitutes about 15% of the overall budget for the sector. These should be funded primarily by the State and local Governments since they stand to benefit directly from these programs.
2. Many of the proposed strategies overlap partially or entirely with on-going/existing schemes. Some of these are currently funded from the State Plan, and others from EAPs. In addition, some of them, for example, increasing afforestation/reforestation in degraded areas are also congruent with the Green India Mission that has a target of adding 5 million hectares of forest cover by the year 2020. Once more detailed projects are developed around the proposed strategies, better targeting of funds for different components should be feasible.

3. The functional nature of some of the proposed strategies also renders certain kinds of funds to be more suitable for financing them. Strategies classified as "Forest Enhancement and Emission Control," for example, are potential candidates for REDD Plus (Reduced Emissions from Deforestation and Degradation) funding.
4. Given the huge budget for the sector, there is a need to channelize existing resources that are un-utilized. The Compensatory Afforestation Fund Management and Planning Authority (CAMPA) funds, for example, could be diverted towards funding some of the proposed strategies. A few States, like Himachal Pradesh have already sought for the release of unutilized CAMPA funds from the Central Government.

4.5 Health

Odisha is among the low per capita income States of the country, ranking 22nd (out of 23 states) in the Human Development Index[70] (HDI for the year 2007–08). However, its economic growth over the past decade has been above the national average, with a few urban and coastal districts leading the way through expansion of the tertiary sector. The western regions of the State, especially the hilly terrains, have remained backward and also have a higher concentration of the Scheduled Tribes (ST) population. As a result, the improvement in the income dimension of Odisha's HDI has been far higher than in the education or health aspects. Specifically on the health front, the State has achieved notable progress over the past two decades. This includes reduction of Infant Mortality Rate (IMR) by half[71], bringing the Total Fertility Rate (TFR) to 2.4 live births per woman[72] (lower than the national average of 2.7). Yet, Odisha's IMR (61 per 1000 live births) continues to be the second highest in the country (after Madhya Pradesh at 62 per 1000 live births). Similarly, there is much ground to be covered along the lines of under – 5 mortality rates (U5MR), malnutrition among children and women, women's health (maternal health in particular) and access to health services for the marginalized groups. This is a significant concern for the State, whose Scheduled Castes (SCs) and Scheduled Tribes (STs) account for more than 40% of its population.[73]

70 India Human Development Report 2011
71 Economic Survey 2011-12, Odisha
72 Outcome Budget 2012-13, Department of Health and Family Welfare, Odisha
73 India Human Development Report 2011

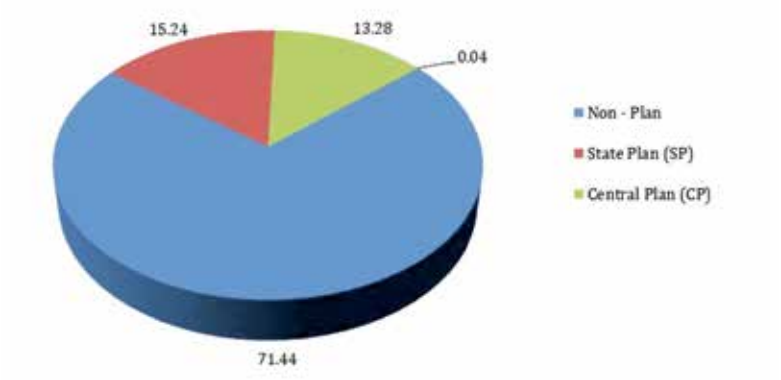
4.5.1 Analysis of Public Expenditure

The State's expenditure on health consists of on-budget provisions (channeled through the State treasury) and extra-budget provision (routed directly from the Centre to the implementing organizations, like the National Rural Health Mission – NRHM[74]). For the purpose of the current Study, the on-budget provisions for the year 2011-12 are analysed. The expenditure data are taken from the Audited Expenditure Statement provided by the Deputy Accountant General's office, Odisha. The section on Grant Number 12, which relates to the Department of Health and Family Welfare, has been used. Inputs from the outcome budgets of the Department have been referred to for information on schemes' objectives and components.

An initial scrutiny of the expenditure of the Department of Health and Family Welfare (total audited expenditure for the year 2011-12 being close to Rs. 1,316.28 Crores[75]) shows that the Non–Plan component accounts for about 71% of the total budget. The remaining 29% is allocated under various Plan expenditures (State Plan, Central Plan and Centrally Sponsored Plan).

The respective shares of the budget components are shown in Figure 4.5.1 below. Non–Plan expenditure comprises of various government expenditures on salaries, office and administrative expenses while the Plan component comprises of expenditures incurred on account of the schemes and programmes envisaged in the Five Year Plans.

FIGURE 4.5.1: PUBLIC EXPENDITURE – BUDGET COMPONENT-WISE (%) 2011-12



Source: Audited Expenditure Statement, GoO

74 About 40% of NRHM's expenditure has been channelled through the State budget in 2011-12 (the remaining having been directly routed through the implementing agency – Orissa State Health & Family Welfare Society)

75 Excludes recoveries, which are less than 0.5% of the total spending

The Department's expenditure is categorized into major heads such as Medical and Public Health, Family Welfare and Secretariat – Social Services. Medical and Public Health covers areas like rural and urban health services, other systems of medicine, control of diseases, medical education, training, research, drug control and health statistics. This category accounts for a major portion of spending – close to 84% of the total budget and is mainly funded from State Plan schemes. Family Welfare deals with rural and urban family welfare centres, training of nurses, midwives and paramedical staff, reproductive and child health initiatives under the National Rural Health Mission (NRHM), State and District level family welfare bureaus. About 15% of the budget is devoted to this category and is funded mainly from the Central Plan. The Secretariat expenses (mainly Non–Plan) refer to the routine expenditure incurred by the Department, which accounts for 1% of its total budget for 2011-12.

4.5.2 Climate Coding of Public Expenditure: Actual vs. Proposed

The Plan and Non–Plan expenditure items were analysed using the CCAPS methodology to understand the current orientation of Odisha's public expenditure on health. It is seen that about 97% of total spending falls under the *General Development* category of the climate spectrum. This is in line with the fact that a major portion of expenditure is under the Non-Plan component while the Plan components are in areas of training, family welfare, prevention and control of diseases.

It is to be noted that expenditure relating to the minor heads `Secretariat' and `Direction and Administration' (mainly administration expenses of directorates and district establishments - accounting for about 16% of total spending) are included in the *General Development* category.

Almost the entire spending on NRHM (about 97%) through the State budget also comes under this category. These expenditures are characterized by basic medical and health services. The remaining share (about 3.3%) of spending falls under *Capacity Development*, which consists of vector-borne disease control measures (targeting malaria, filarial, Japanese encephalitis etc.). There are no existing schemes that are in the nature of *Climate-Oriented* development. Table 4.5.1 shows the distribution of broad areas of public spending on health over the climate spectrum.

TABLE 4.5.1: DISTRIBUTION OF AREAS OF SPENDING OVER THE CLIMATE SPECTRUM

Climate Spectrum Score	Ambiguous Development (AD)	General Development (GD)	Capacity Development (CD)	Climate-Oriented (CO)
Areas of Expenditure		Medical Education, Training and Research (Medical colleges)	Vector-borne disease control (NRHM - NVBDCP)	
		Drug Control Administration		
		Sanitation		
		National Programme for Health Care of the Elderly		
		Prevention and Control of Diseases (NRHM and related initiatives, NPCDCS)		
		Hospitals and Dispensaries - Allopathy and other systems of medicine		
		Family Welfare Services - Rural and Urban (NRHM - Reproductive and Child Health)		
		Training of health workers, nurses, midwives and para-medical staff		
		Revamping of Urban slums		
Distribution of Expenditure (%)	**0**	**96.67**	**3.33**	**0**

Source: Audited Expenditure Statement, GoO and analysis by the Study team

OCCAP has outlined ten strategies for the health sector, to receive special focus in the first five year period of implementation. These are shown in Table 4.5.2, where the first four strategies are to be targeted for the first year, and contain specific actions under them. In contrast to the pattern of existing spending (Table 4.5.1), the proposed strategies are oriented towards *Capacity Development* (89.05%) and *Climate-Oriented* (10.95%) development. While the existing expenditure centers heavily on the *General Development* category, the proposed strategies are intensive on capacity building. Greater emphasis

has been laid on sensitization of staff and service providers and strengthening of health infrastructure. Heat wave conditions, water-borne and vector-borne disease outbreaks are the specific events around which these actions have been planned. Apart from an expressed need to incorporate climate change dimensions at the level of policy-making, most of the other proposed actions are an enhancement over the existing disease control (NVBDCP) and surveillance initiatives (IDSP) of the Department. Hence the proposals are in line with directing the sector's spending towards improving the capacity to deal with climate change related risks.

The OCCAP mentions strategies to handle physical and psychological impacts due to extreme weather conditions caused by climate change and potential risks to nutritional levels, which do not directly overlap with schemes / initiatives of the Department of Health and Family Welfare. However, there are relevant areas of expenditure undertaken by the Department of Women and Child Welfare – like the Integrated Child Development Services, Supplementary Nutrition Programme, National Programme of Mid-Day Meals in Schools and Homes for the Aged. These schemes deal with providing support systems for vulnerable sections of society like children below 6 years of age, pregnant women, the elderly and persons with disability. Close to 65% of the expenditure of this Department is related to that of the Department of Health and Family Welfare, which is almost entirely comprised of Plan expenditure. Hence the existing network of service delivery under this Department could be considered as potential channels to route the above mentioned OCCAP strategies.

TABLE 4.5.2: DISTRIBUTION OF OCCAP STRATEGIES ACROSS THE CLIMATE SPECTRUM

Proposed Strategies / Actions	Proposed Budget (in Rs.Crores)				Overlap with Existing project's / scheme's objectives
	AD	GD	CD	CO	
1) Capacity building of the health sector to meet the challenges of climate change on both adaptation and mitigation aspects			110		No overlap
a) Advocacy and sensitisation work-shop of policy makers, strategy planners and senior level programme implement-ers					

TABLE 4.5.2 (continued)

Proposed Strategies / Actions	Proposed Budget (in Rs.Crores)				Overlap with Existing project's / scheme's objectives
	AD	GD	CD	CO	
b) Sensitisation workshop of service providers such as ASHA, AWW, HWs, MO AYUSH, other MOs and paramedical staff regarding impacts and issues pertaining to climate change in high burden vulnerable areas					No overlap
c) Dissemination of messages through print and electronic media regarding effects of climate change, particularly during heat wave, diarrhoea episodes, dengue epidemics, to influence community behaviour and response					
2) Strengthening approaches to manage vector-borne diseases that have worsened due to climate change impacts			75		National Vector Borne Disease Control Programme (NVBDCP)
a) Strengthening and monitoring evaluation unit / system at different levels (State - Block)					
b) Strengthening of case management at facility level and diagnostic services at regional / district level					
c) Strengthening vector control measures with special focus on high burden areas and vulnerable groups such as infants, pregnant women, etc.					
d) Sensitisation of service providers and IEC / BCC / inter-sectoral collaboration					
3) Strengthening approaches to deal with heat wave conditions exacerbated due to climate change			165		No overlap
a) Identification of heat wave prone areas and vulnerable groups					
b) Strengthening health infrastructure and facilities for managing health impacts due to heat wave					
c) Sensitisation and awareness generation through media activities and peer group sensitization					

TABLE 4.5.2 (continued)

Proposed Strategies / Actions	Proposed Budget (in Rs.Crores)				Overlap with Existing project's / scheme's objectives
	AD	GD	CD	CO	
4) Undertaking measures to manage water-borne diseases that have worsened due to climate change impacts			30		Integrated Disease Surveillance Project (IDSP)
a) Identification and mapping of diarrhoea prone areas and vulnerable groups					
b) Sensitisation of service providers before the onset of monsoon regarding the standard operating procedure					
c) Institutional strengthening through pre-placement of human resources, drugs and other logistics					
d) Strengthening routine surveillance system to keep track of any outbreak of diarrhoea, cholera etc.					
5) Integrating climate change considerations in the State Health policy			1.5		No overlap
6) Strengthening approaches to deal with the physical and psychological impacts due to extreme weather conditions caused by climate change				15	No overlap
7) Addressing drought, nutrition and food security due to increased risk of drought, consequent decline in agriculture and increased malnutrition and food security				35	Nutrition Programmes and Integrated Child Development Services (ICDS)*
8) Research & studies on climate change and health impacts			65		No overlap
9) Addressing food safety that is undermined as a result of increased ambient temperatures and extreme events				5	No overlap
10) Studying the inter-linkages between air quality and climate change, and implications on health			1		No overlap
Total Proposed Budget (% of Total)			**447.5 (89.05)**	**55 (10.95)**	

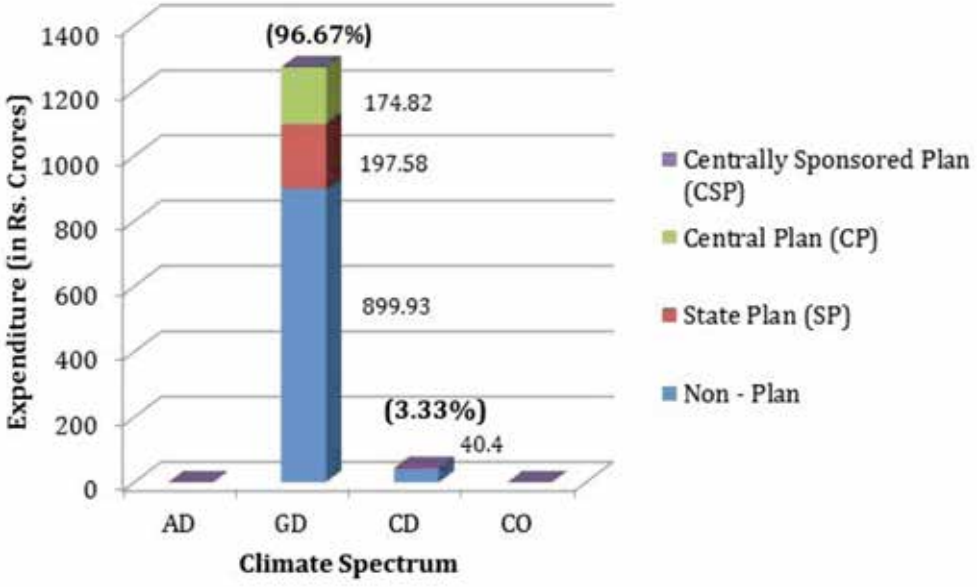
Source: OCCAP and analysis by the Study team
** These are schemes that are routed through the Department of Women and Child Development*

4.5.3 Funding Sources: Existing Schemes

Analysis by Climate Categories

An analysis of the spending across Non-Plan and Plan components reveals that almost the entire audited expenditure (Non-Plan and Plan), about 97%, is *General Development* in nature. This means that there is no intended climate change dimension in the various avenues of spending, but the Department is largely targeting provision of basic health services and improving access to amenities. It is also noted that the only components of Plan expenditure that is in the nature of *Capacity Development* are the Centrally Sponsored Plan schemes, which refers to the National Filaria Eradication Programme and the State Plan scheme on vector-borne disease control.

FIGURE 4.5.2: DISTRIBUTION OF PUBLIC EXPENDITURE IN THE CLIMATE SPECTRUM WITHIN BUDGET COMPONENTS (IN RS.CRORES)



Source: Audited Expenditure Statement, GoO and analysis by the Study team

Figure 4.5.2 shows that the health expenditure which is almost completely in the *General Development* category, contain 70% of Non-Plan funding. Only about 30% is funded by the Plan component (almost equally shared by State and Central Plan schemes). It is significant that the *Capacity Development* category, though having greater potential for targeted spending through Plan initiatives, is dominated by Non-Plan funding (Rs. 40 Crores out of about Rs. 44 Crores).

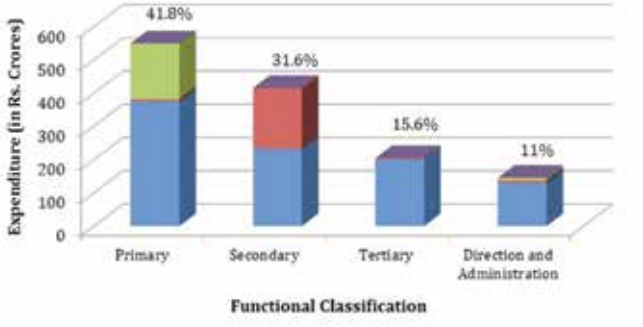
Analysis of Public Expenditure over Functional Categories

Health expenditure has also been classified in a manner that demarcates the various functions of the health delivery system. The Indian Public Health System is a three tier[76] set-up, with primary, secondary and tertiary levels of service. The functional classification corresponding to these levels are: Primary, Secondary, Tertiary and Direction & Administration.

- Basic prevention of diseases and cure of common ailments constitute the Primary level.
- First referral services to primary health care units, specialized health care and district hospitals constitute the Secondary level.
- Tertiary function includes treatment for complex ailments, medical colleges, medical education and training activities.

Using the above classification, Odisha's health expenditure was analysed. Figure 4.5.3 shows the distribution of budget components over the functional heads. A bulk of the expenditure goes towards Primary services (around 42%), followed by Secondary (31.6%) and Tertiary services (15.6%). Given that Non-Plan component is a major portion of the entire health expenditure, the same can be observed under each functional head. Tertiary services are almost completely under Non-Plan funding (this category receives a climate score of *General Development*). It is expected that Direction & Administration expenses are Non-Plan in nature, and account for about 11% of the total expenditure (this category also receives a climate score of *General Development*). Plan components contribute to 32% and 44% of Primary and Secondary services, respectively.

FIGURE 4.5.3: DISTRIBUTION OF HEALTH EXPENDITURE OVER FUNCTIONAL CLASSIFICATION (IN RS.CRORES)

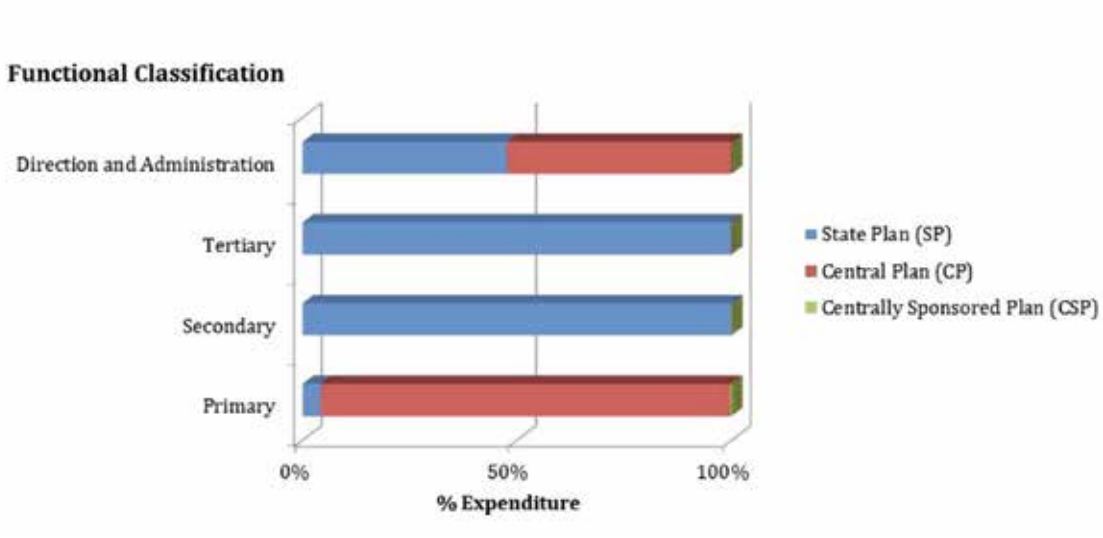


Source: Rout (2010), Audited Expenditure Statement, GoO and analysis by the Study team

76 Sarit Kumar Rout. 2010. "Public Expenditure on Health Care in Orissa: Focus on Reproductive and Child Health Services", *Health and Population Fellowship Programme Working Paper, No 12*, New Delhi: Population Council

A closer look at the Plan expenditure shows that State Plan spending dominates Secondary and Tertiary services (Figure 4.5.4). Central Plan funding is the main source for Primary health care services while both State and Central Plan spending share the Direction & Administration expenses. Centrally Sponsored Plan component shows negligible contribution overall. The Plan component shown in Figure 4.5.4 falls largely under the *General Development* category.

FIGURE 4.5.4: DISTRIBUTION OF PLAN EXPENDITURE OVER FUNCTIONAL CLASSIFICATION



Source: Rout (2010), Audited Expenditure Statement, GoO and analysis by the Study team

The proposed OCCAP strategies can also be analysed across the functional classification. Table 4.5.3 shows that most of the strategies on addressing climate – specific impacts are tertiary in nature, as they are related to building the technical knowledge base (in terms of research) and preparedness in tackling nutritional and psychological impacts. It is found that this category attributes to about a third of the proposed budget. The overall capacity building initiative cuts across all categories because it targets diverse groups, ranging from policy makers to ground-level staff. The more disease-specific strategies belong to the primary and secondary tiers of services, given that heat wave, water-borne and vector-borne diseases receive higher focus. As compared to the existing public expenditure, specific proposals are directed towards strengthening existing disease control and capacity building exercises and a greater role for the tertiary services.

TABLE 4.5.3: DISTRIBUTION OF OCCAP STRATEGIES OVER FUNCTIONAL CLASSIFICATION

Functional Classification	Primary	Secondary	Tertiary
Proposed Strategies	Capacity building pertaining to climate change		
	Preparedness for tackling water-borne and vector-borne diseases		Integrating climate change considerations in the State Health policy
	Preparedness for heat wave conditions		Addressing issues like drought, food security, nutrition, physical and psychological impacts due to extreme weather
			Research & studies on climate change and health impacts
			Studying the inter-linkages between air quality and climate change, and implications on health

Source: Orissa Climate Change Action Plan, Rout (2010) and analysis by the Study team

4.5.4 Concluding Remarks

The above analysis indicates that the more broad-based primary health service delivery is mainly financed by the Centre, while the more specialized health care, district level health institutions for training and education (secondary and tertiary tiers) are financed by the State. This pattern echoes the rationale that initiatives that are of more specific interest to the State are predominantly funded from the State's Plan budget; whereas those areas of overall national importance (or receiving a policy thrust from the Centre) are to be financed jointly by the State and Centre or by the latter alone.

The stakeholder ship pattern in case of financing the proposed OCCAP strategies / actions would also be in line with this logic (as suggested by the climate scores of broad areas of expenditure). International funding is currently directed towards assisting NRHM initiatives, maternal and child health and strengthening of primary health care (the Norway – India Partnership Initiative – NIPI and the DFID Assisted Orissa Health Sector Plan – OHSP are two such projects). The proposed actions are more in the nature of making the existing infrastructure and health delivery system better equipped to respond to the perceived risk areas with respect to climate change. On the *Capacity Development* front, most of these relate to disease control and heat wave conditions. Developing preparedness to deal with unique impacts of extreme events and climate proofing of policy are the more

direct *Climate-Oriented* proposals. In those areas where additional dimensions are being suggested to existing schemes, it would be desirable that Plan expenditure components are utilized to a greater extent. This is because the share of Plan spending itself is only at 29%, so more specific, targeted spending should be leveraged from this space.

4.6 Urban Planning

Odisha is the 11th most populous state (42 million) in the country. Urban population accounts for about 16.7% of the total population as per 2011[77] estimates (the national average is 31.16%). It has witnessed a decadal growth of 27% in urban population[78] from 2001 to 2011. Yet, it is the fifth least urbanized State[79] in India. At the district level, urbanization rate varies from as low as 4.3% (Nayagarh) to 43% (Khurda). With growing urban centres posing greater challenges to the municipal administration, there is an acute need for expanding the reach of and improving governance at the level of the Urban Local Bodies (ULBs). The State has taken a few measures in this direction already. It has introduced e-Municipality[80] services along the lines of the National e-Governance Programme in order to improve service delivery and accountability of the administrative machinery. It is also the first among the states to amend and notify its version of the Energy Conservation Building Code (ECBC) as a step towards reduction of wasteful energy consumption. Yet some areas of concern remain in the urban scenario, like access to safe drinking water and sanitation facilities, especially in slum areas; waste management and strengthening of urban road transport infrastructure. These are also areas where active climate-proofing can be undertaken, to increase efficiency in energy consumption and resource use. Given the low level of urbanisation, the State has the opportunity to proactively safeguard its cities and growing urban centres from issues that have plagued other major Indian cities and metros along their growth path. The high potential of integrating climate considerations at the planning stage has been recognised by the State authorities. Further discussion regarding this is presented in the following sections, where it is observed that master plans, water supply, sewerage and solid waste management designs have been identified for climate-proofing.[81]

77 Census 2011

78 Census 2011

79 Annual Activities Report 2011-12 of the Department of Housing and Urban Development

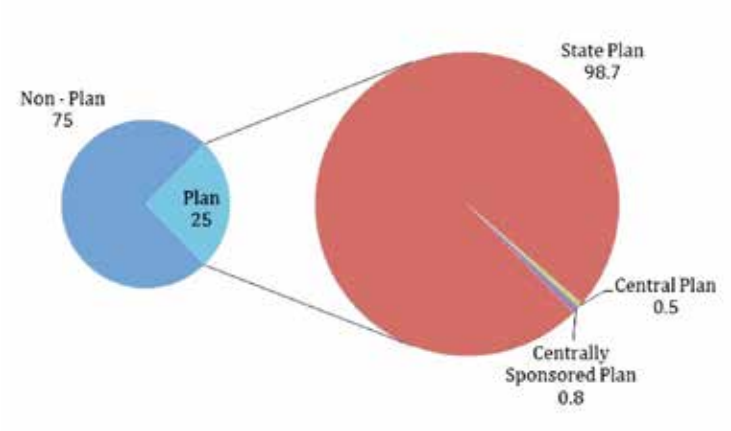
80 Outcome Budget 2012-13 of the Department of Housing and Urban Development

81 Orissa Climate Change Action Plan

4.6.1 Analysis of Public Expenditure

The expenditure by the Department of Housing and Urban Development has been analysed for this sector (Grant Number 13). The total audited expenditure for the year 2011-12 was Rs. 1287.5 Crores[82] (approx.) of which 75% was Non-Plan in nature. The remaining 25% was Plan expenditure, mainly State Plan expenditure (98.7% of total Plan spending). Figure 4.6.1 shows the distribution of expenditure over the various budget components.

FIGURE 4.6.1: PUBLIC EXPENDITURE – BUDGET COMPONENT-WISE (%) 2011-12



Source: Audited Expenditure Statement, Goo

The expenditure is spread across various major heads which include Water Supply and Sanitation, Housing, Loans on Housing, Urban Development, Roads and Bridges, Capital Outlays on each of these, Compensation and Assignment to Local Bodies and Panchayati Raj Department, Public Works, Elections and Secretariat expenses. Some repair and renovation works for other Departments' complexes are also charged to the expenditure of this Department; however this forms a very negligible portion of total spending. A brief description of the important major heads is given below:

- Expenditure related to Water Supply and Sanitation includes urban water supply and sewerage programmes, water supply works of the Odisha Water Supply and Sewerage Board (OWSSB) and Integrated Low Cost Sanitation Scheme. While the OWSSB, Integrated Sewerage and Low Cost Sanitation projects are covered under the State Plan, the provision of regular water supply connections and sewerage networks are Non-Plan expenditures (about 57%).

82 Excludes recoveries, which are less than 0.1% of the total spending

- The major head Housing includes spending on government residential quarters (and hence mainly covered by Non-Plan component), while the urban low cost housing and slum area improvement initiatives are covered under the head Urban Development.
- The Urban Development category also includes schemes under the flagship initiative Jawaharlal Nehru National Urban Renewal Mission (JNNURM) like Urban Infrastructure Governance (UIG), Basic Services to Urban Poor (BSUP), Integrated Housing and Slum Development Programme (IHSDP) and Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT). Close to 60% of this major head is funded by the State Plan (covering the above mentioned programmes) and the remaining 40% by Non-Plan spending (covering grants to ULBs from the Thirteenth Finance Commission, the directorates' and statutory bodies' administrative expenses).
- Expenditure on Roads and Bridges relates to improvement of urban roads (59%, covered by State Plan) and regular maintenance of road infrastructure (41%, under Non-Plan).
- Compensation and Assignment to Local Bodies and Panchayati Raj Institutions (PRIs) is another important major head of spending, which consists of the devolution of finances to the ULBs and PRIs under the Third State Finance Commission. This head is fully under Non-Plan spending.

4.6.2 Climate Coding of Public Expenditure: Actual vs. Proposed

An analysis of the various budget components across the climate spectrum reveals that bulk of the spending (93.87%) comes under the *General Development* category. The broad areas that are covered by this category are regular urban water supply and sanitation projects, slum area improvement, low cost sanitation and housing initiatives, the JNNURM schemes and capacity building of ULBs. These would also cover operations of statutory bodies under the Department, like the Directorate of Municipal Administration, Public Health Engineering Organisation – PHEO (in charge for provision of safe drinking water), OWSSB (execution of major water supply and sewerage projects) etc. About 5% of the total expenditure falls under *Ambiguous Development* (this includes repair works of government buildings and grants to ULBs on account of festive occasions). Areas like planning for integrated urban development, water audit initiatives, protection and conservation of water bodies, increasing urban green cover come under *Capacity Development*. However, this accounts for a mere 1.16% of the total spending. The existing expenditure does not

include any *Climate-Oriented* initiative. Table 4.6.1 depicts the broad areas of spending on urban infrastructure and development across the climate spectrum.

TABLE 4.6.1: DISTRIBUTION OF AREAS OF SPENDING OVER THE CLIMATE SPECTRUM

Climate Spectrum Score	Ambiguous Development AD	General Development GD	Capacity Development CD	Climate-Oriented CO
Areas of Expenditure	Maintenance and Repair under Housing and Public Works (Government buildings, staff residences etc.)	Activities of statutory bodies / wings of the Department - Directorate of Municipal Administration, PHEO, Town Planning Organisation, Valuation Organisation, OWSSB	Planning - Integrated Development Schemes	
	Grants for festive occasions to ULBs	Urban Sewerage Schemes (like Integrated Sewerage and Sanitation Project)	Water audit initiatives	
		Integrated Urban Low Cost Sanitation Scheme	Urban Development Schemes on development of parks, protection and conservation of water bodies etc.	
		National Urban Renewal Mission (IHSDP, UIG, BSUP, UIDSSMT)		
		Slum Area Improvement		
		Water Supply in Urban Areas		
		Urban Roads and Bridges		
		Capacity building of ULBs in Odisha		
Distribution of Expenditure (%)	**4.97**	**93.87**	**1.16**	**0**

Source: Audited Expenditure Statement, GoO and analysis by the Study team

The OCCAP has identified this sector as one having cross-sectoral linkages from a climate point of view, by bringing together aspects like transport management and energy conservation. It is evident from the Plan that various implementing agencies will be involved. These include the Departments of Commerce and Transport, Energy, Works, Water

Resources, OREDA and the State Pollution Control Board. The Action Plan has discussed a few strategies for urban planning, which have been placed along the climate spectrum (Table 4.6.2) for analysis. The proposals are mainly *Capacity Development* in nature. The proposed budget allocates close to 96% towards *Capacity Development* strategies. These are largely focused on integrating climate dimension with the planning process in various spheres – solid waste management, design of storm water and drainage systems and city master plans. Restoration and conservation of water bodies, water harvesting and improving water efficiency are a few other specific actions in this budget. The proposal to strengthen infrastructure to support non-motorised transport is targeted at developing ways to incentivize use of non-motorised transport and also de-congest the urban space. This aspect would be undertaken by the Department of Housing and Urban Development while the traffic management to accommodate non-motorised transport would be under the purview of the Transport Department. About 4% of the proposed budget is in the *General Development* category. This relates to the strategy to developing urban storm water flow models and increasing capacity of the existing drainage systems, which has a budget of Rs.100 Crores. While providing sound drainage and storm water flow networks is a *General Development* activity, the inclusion of climate consideration in their design is *Capacity Development* in nature. Hence, this budget amount has been equally distributed between these two climate spectrum categories.

TABLE 4.6.2: DISTRIBUTION OF OCCAP STRATEGIES ACROSS THE CLIMATE SPECTRUM

Proposed Strategies / Actions	Proposed Budget (in Rs. Crores)				Overlap with Existing project's / scheme's objectives
	AD	GD	CD	CO	
1) Building capacity on climate change			20		No overlap
2) Incorporate climate consideration in water supply and sewerage design			5		OWSSB, Urban Infrastructure Governance (UIG) under JNNURM
3) Working towards greater water efficiency			5		Water audit; metering initiatives
4) Preparing a climate-friendly MSW management plan			300		SWM component of Urban Development Schemes
5) Orienting towards energy efficient street lighting through CDM	Mitigation*				No overlap

TABLE 4.6.2 (continued)

Proposed Strategies / Actions	Proposed Budget (in Rs. Crores)				Overlap with Existing project's / scheme's objectives
	AD	GD	CD	CO	
6) Developing climate-responsible master plans			50		No overlap
7) Strengthening infrastructure for promoting non-motorised transport			500		No overlap
8) Improvements to water harvesting in urban areas with restoration of water tanks and artificial recharge			200		UIDSSMT, UIG under JNNURM and National Lake Conservation Programme
9) Developing models of urban storm water flows and capacities of existing drainage systems with climate change considerations		50	50		UIG under JNNURM
Total Proposed Budget (% of Total)		**50 (4.24%)**	**1130 (95.76%)**		

Source: OCCAP and analysis by the Study team
** This proposed strategy, which has a budget of Rs. 20 Crores, is a mitigation strategy. Please refer to section 3.2 Mitigation.*

Table 4.6.2 also highlights those strategies that overlap with some of the existing initiatives and can be considered as extensions of the same. Some of the urban infrastructure schemes, for example, include components of sewerage and storm water drain systems. Similarly, the OWSSB, which is responsible for large scale water supply and sewerage projects, is also the authority to regulate and develop these services. Other urban development schemes, apart from the JNNURM, also have solid waste management as a component. Water conservation and auditing are also areas receiving thrust from existing initiatives on lake conservation and installation of meters respectively.

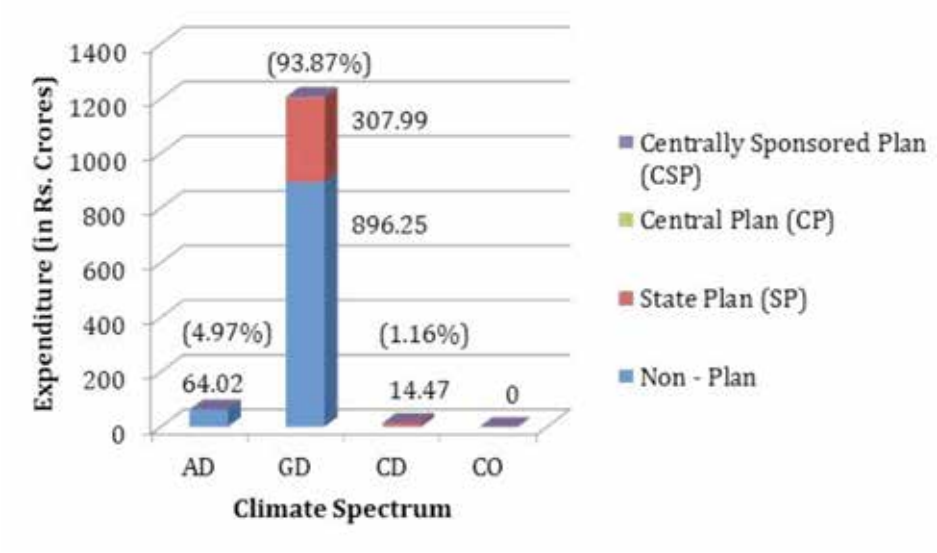
4.6.3 Funding Sources: Existing Schemes

Analysis by Climate Categories

The distribution of various budget components over the climate spectrum reveals that a major portion of both Plan (about 95%) and Non-Plan (over 93%) spending is under *General Development*. This is, however, expected given that 94% of the total spending falls under this category. This indicates that there is no targeted spending on climate oriented actions, and most of the authorities' focus is on enhancing access to basic urban amenities,

like water supply, roads, sanitation services etc. About 6.7% of Non-Plan spending is in the *Ambiguous Development* category. *Capacity Development* has been funded entirely by the State Plan schemes (which include initiatives to improve urban green cover and integrated development schemes). Central and Centrally Sponsored Plan schemes, although a very minor portion of total spending i.e. 0.34%, are entirely *General Development* in nature.

FIGURE 4.6.2: DISTRIBUTION OF PUBLIC EXPENDITURE IN THE CLIMATE SPECTRUM WITHIN BUDGET COMPONENTS (IN RS. CRORES)



Source: Audited Expenditure Statement, GoO and analysis by the Study team

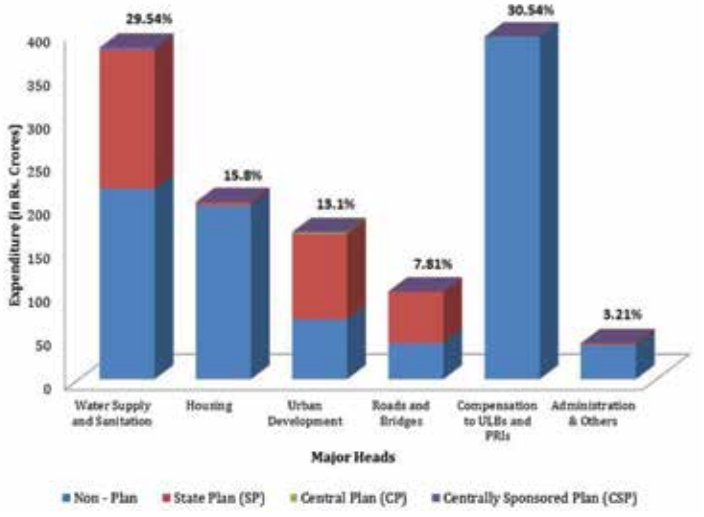
Figure 4.6.2 depicts the budget components across the climate scores (in Crores of rupees). *Ambiguous Development* is fully funded from Non-Plan spending (around Rs. 64.02 Crores). *General Development* too is funded by the Non-Plan component to the extent of 75%, the remaining funded by the State Plan. It should be noted that though Non-Plan spending is a major portion of the total budget, the *Capacity Development* category is mainly funded through State Plan schemes (Rs. 14.47 Crores out of Rs. 14.95 Crores).

Analysis by Important Major Heads

As described earlier, the expenditure of the Department of Housing and Urban Development is classified into major heads. The important major heads taken up for analysis are – Water Supply and Sanitation, Housing (including Loans on Housing), Urban Development, Roads and Bridges, Compensation to ULBs and PRIs, and Administration and Others. The last category `Administration and Others' includes seven major heads – Elections, Public Works, Capital Outlay on Public Works, Medical and Public Health, Labour and Employment,

Social Security and Welfare and Secretariat – Social Services. These are combined into one group because together they account for only 3.21% of the total budget of 2011-12. The capital outlays have been combined with corresponding major heads. Figure 4.6.3 shows the respective shares of each of these major heads in the total expenditure, along with the budget components funding them. It can be seen that Water Supply and Sanitation and Compensation to ULBs and PRIs account for the largest shares (about 30% each) of the budget. The former is financed by the Non-Plan component to the extent of 57%, the remaining by the State Plan schemes (and predominantly in the nature of *General Development*). The latter, however, is completely a Non-Plan item, comprised of devolution of resources and assignment of taxes in order to finance local governance functions. This too falls completely under *General Development*. Housing and Administration are the remaining two categories, which are also completely under the Non-Plan component of the budget. Loans on Housing, included under the former, attribute to the *General Development* score of this major head, as it relates to financing of cost effective housing.

FIGURE 4.6.3: DISTRIBUTION OF PUBLIC EXPENDITURE OVER IMPORTANT MAJOR HEADS (IN RS. CRORES)



Source: Audited Expenditure Statement, GoO

The major heads in which Plan expenditure play a significant role are Urban Development and Roads and Bridges. In both cases, around 59% of the spending is from the State Plan schemes. The integrated development schemes receive a *Capacity Development* climate score, which accounts for about 13% of Plan spending in this major head (the remaining being *General Development*). Roads and Bridges are also *General Development* in nature, consisting of grants to ULBs for improvement and maintenance of urban roads.

Table 4.6.3 shows the spread of the proposed OCCAP strategies across four of the major heads to which they can be traced. It can be seen that most of the strategies are linked with the areas of spending under the Urban Development major head, with a few cross cutting actions (designing of suitable water supply and drainage networks, promotion of non-motorised transport). While the table may not map any proposed action to the Housing major head, the OCCAP has outlined a few activities to be targeted as part of it. These include the adoption of the ECBC code and the green building initiative. Similarly, introduction of solar / electric operated vehicles as part of urban transport has also been proposed. It would be useful to recall that the OCCAP also maps the various agencies to be engaged in implementation of these actions; and they are across Departments. This shows that the potential for engaging other Departments as well as the need to integrate across them is very high in case of a sector like urban planning.

TABLE 4.6.3: DISTRIBUTION OF OCCAP STRATEGIES OVER IMPORTANT MAJOR HEADS

<table>
<tr><th>Major Heads</th><th>Water Supply and Sanitation</th><th>Urban Development</th><th>Roads and Bridges</th><th>Housing</th></tr>
<tr><td rowspan="8">Proposed Strategies</td><td colspan="4">Building capacity on climate change</td></tr>
<tr><td colspan="4">Developing climate-responsible master plans</td></tr>
<tr><td colspan="2">Incorporate climate consideration in water supply and sewerage design</td><td rowspan="5" colspan="2"></td></tr>
<tr><td colspan="2">Developing models of urban storm water flows and capacities of existing drainage systems with climate change</td></tr>
<tr><td rowspan="4">Working towards greater water efficiency</td><td>Preparing a climate-friendly MSW management plan</td></tr>
<tr><td>Orienting towards energy efficient street lighting through CDM</td></tr>
<tr><td>Improvements to water harvesting in urban areas with restoration of water tanks and artificial recharge</td></tr>
<tr><td colspan="2">Strengthening infrastructure for promoting non-motorised transport</td><td></td></tr>
</table>

Source: OCCAP, Audited Expenditure Statement and analysis by the Study team

4.6.4 Recommendations

1. While the existing expenditure of the Department is heavily biased towards *General Development* (about 94%) and is mainly funded through the Non-Plan component, the proposed OCCAP strategies are concentrated on the *Capacity Development* category, accounting for about 96% of the total proposed budget. This shows a favourable shift towards greater climate relevance of spending in the proposed budget. Currently,

Plan expenditure is dominant in the *Capacity Development* category, but *Capacity Development* accounts for a meagre 1.16% of the total expenditure for the year 2011-12. While new sources of funding are being explored on the one hand, a greater role for State Plan expenditure should also be envisioned.

2. A greater thrust to expanding on-going initiatives that are climate-relevant would be desirable. While some smaller initiatives, like conservation of old used water bodies, legislation preventing construction on water bodies etc., are already under way, more important initiatives like urban forestry are yet to be implemented in a comprehensive manner.
3. In the urban context, it must be recognized and understood that climate change related activities are also about energy efficiency in buildings and road transport. Hence the entire climate change agenda has to be integrated with the ecology and local environmental resources of the cities for a more comprehensive approach.

4.7 Water Resources

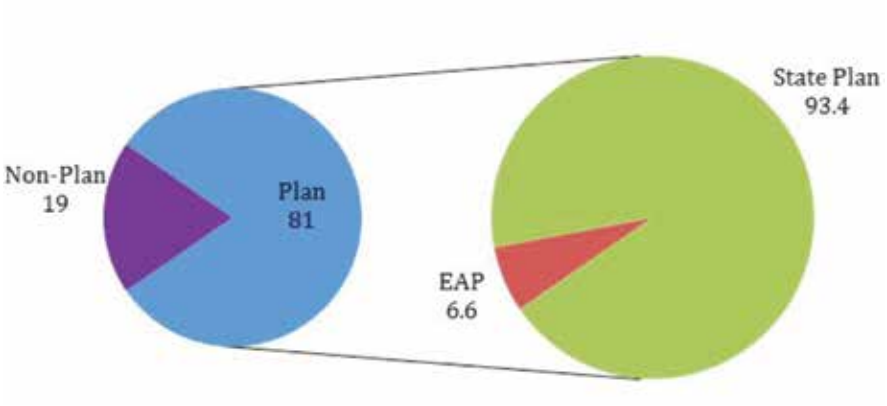
There are some critical challenges facing the water sector in Odisha. There is increasing competition and conflict among different water users. The quality of service delivery in irrigation is very poor affecting the performance of irrigated agriculture. The water sector is also contributing to the fiscal crisis in the State due to less collection of water tax from tail reaches of canal irrigation. Some of these problems are aggravated by the impact of climate change on water resources in the State. Most of these are linked to the vagaries of monsoons creating variability in river flows and increased frequency/intensity in extreme events such as floods, droughts and cyclones. Odisha is most vulnerable to floods and rainfall. The State has experienced 88 such disasters in the last 20 years.[83] Droughts are also a major concern in the State and the impact on farmers has been crippling. Although some of these impacts have been observed and documented, further research and studies are required for a better understanding of climate change impacts on the sector.

4.7.1 Analysis of Public Expenditure

The expenditure by the Department of Water Resources has been analysed for this sector. The total audited expenditure for the year 2011-12 was Rs. 2,661.2 Crores (approx.) out of which 81% came from Plan sources and 19% came from Non-Plan sources. Majority of the Plan expenditure (93.4%) was funded from the State's own sources while the rest came from Externally Aided Projects (EAPs). Figure 4.7.1 below shows the distribution of expenditure over various budget components.

83 OCCAP

FIGURE 4.7.1: PUBLIC EXPENDITURE – BUDGET COMPONENT-WISE (%) 2011-12



Source: Audited Expenditure Statement, GoO

The expenditure is spread across various major heads which include Major Irrigation, Medium Irrigation, Minor Irrigation, Command Area Development, Flood Control and Drainage, Power , Capital Outlay (on Major Irrigation, Medium Irrigation, Minor Irrigation and Flood Control Projects) and Others (Secretariat - Economic Services, Inland Water Transport, Roads and Bridges, Public Works, Other Administrative Services and Labour & Employment). A brief description of the important major heads is given below:

- Expenditure related to Major Irrigation include maintenance and repair work for commercial irrigation projects, maintenance, dam work and establishment charges for commercial dam projects and irrigation schemes, and training, survey and water management activities. Approximately 99.3 % of the expenditure under this head is covered under Non-Plan component, while the rest comes from State Plan.
- Medium Irrigation comprises mainly of repair and maintenance work for commercial irrigation projects. The entire expenditure under this head comes from the State Plan.
- Majority of the expenditure under Minor Irrigation goes towards the Rural Infrastructure Development Fund. NABARD provides loan assistance under this scheme, whose main objective is to assist State Governments for the completion of on-going rural infrastructure projects and also taking up new irrigation, flood control and drainage projects. The entire expenditure for Minor Irrigation is made from the State Plan.

- The Command Area Development Scheme is being implemented in the State since 1976-77 with the main objective of reducing the gap between irrigation potential created and that utilized. Expenditure include soil and water management projects, construction of field channels, crop demonstration, farmers' training, topographical survey, project administration, and maintenance of completed projects. A majority (91%) of the total expenditure under this head is made from State Plan and the rest comes from the Non-Plan component.
- A majority of the total expenditure (58% approx.) is made under the major head Capital Outlay. These are divided into four categories – Capital Outlay on Major Irrigation, Capital Outlay on Medium Irrigation, Capital Outlay on Minor Irrigation and Capital Outlay on Flood Control Projects. The major schemes/activities funded under this head include Accelerated Irrigation Benefit Programme, JBIC assisted Rengali Irrigation Project, Rural Infrastructure Development Fund, Odisha Integrated Irrigated Agriculture and Water Management Project, and National Hydrology Project. Capital Outlay in flood control projects is funded entirely from the State Plan, whereas the rest of the Capital Outlay expenditure is funded through a combination of State Plan and Externally Aided Projects.

4.7.2 Climate Coding of Public Expenditure: Actual vs. Proposed

Expenditure for the FY 2011-12 was analysed by putting them on the climate spectrum, where each scheme/project gets a score according to its climate relevance. It is interesting to note that a bulk of the spending (approx. 75%) come under *Capacity Development*. Water resources is an important sector in terms of climate change and this indicates implementation of a large number of schemes that increase the resilience of human and natural systems. The broad areas covered by this category include irrigation projects, soil and water management projects, command area development projects, and capital outlay on irrigation, dam and flood control projects. About 20% of the total expenditure falls under the *General Development* category. These mostly include direction and administration, maintenance and repair and other general expenses for commercial dam projects and also expenditure towards creation of agriculture infrastructure. Funding for activities such as anti-sea erosion, hydel power generation, bank protection work on river embankment, and flood management come under *Climate-Oriented* expenditure. This constitutes around 4% of the total expenditure. Finally, there is a very small amount (approx. 0.3%) that goes towards *Ambiguous Development*. This includes expenditure on clearance of liabilities and lump sum provision for other works under Capital Outlay on medium and minor irrigation. Table 4.7.1 depicts the broad areas of spending by the Water Resources Department across the climate spectrum.

TABLE 4.7.1: DISTRIBUTION OF AREAS OF SPENDING OVER THE CLIMATE SPECTRUM

Climate Spectrum Score	Ambiguous Development (AD)	General Development (GD)	Capacity Development (CD)	Climate-Oriented (CO)
Areas of Expenditure	Clearance of liabilities and lump sum provision for other works under Capital Outlay on medium and minor irrigation	Public works, other administrative services, labour and employment	Direction and administration and maintenance of canal branches, distributaries under major, medium and minor irrigation schemes	Anti-sea erosion projects
		Direction and administration, and maintenance and repair for commercial dam and barrage projects	Ground water survey and investigation, flood control and drainage and creation of additional irrigation potential under the Rural Infrastructure Development Fund	Hydel power generation
		Other general expenditure for major, medium and minor irrigation projects	Soil and water management program, Command Area Development Program, Accelerated Irrigation Benefit Program	Bank protection work and flood management programs
		Direction and administration and maintenance and repair for flood control projects, roads and bridges and inland water transport	JBIC assisted Rengali Irrigation Project, Orissa Integrated Irrigated Agriculture and Water Management Project	
			Orissa Community Tanks Management Program, Mega Lift project	
Distribution of Expenditure (%)	**0.3**	**20**	**75.7**	**4**

Source: Audited Expenditure Statement, GoO

The Water sector has important cross–sectoral linkages from a climate change point of view. The OCCAP acknowledges this and has identified various organizations for the implementation of the proposed climate adaptation strategies in the sector. These include the Departments of Science and Technology, Odisha State Disaster Management Authority, Central Ground Water Board, Forest and Environment, Energy, Housing and Urban Development, Industry, Rural Development, and Agriculture, among others. The Action Plan discusses some strategies for the Water sector that have been placed along

the climate spectrum (Table 4.7.2) for analysis. The proposals are mostly in the nature of *Capacity Development*. The total proposed budget for the sector is Rs. 726 Crores, out of which Rs. 490 Crores is allocated towards *Capacity Development.* The strategies are in the areas of data collection and research, flood forecasting, impacts of climate change on the sector, water use efficiency, construction of water harvesting structures, improvement of drainage systems, awareness raising activities among *pani* panchayats, provision of data pertaining to agro-climatic zones, and equitable distribution of water across various water users. The two strategies that receive a disproportionately high budget are "construction of water harvesting structures" and "improvement of drainage system." Although the former has been highlighted as a climate adaptation strategy, climate change literature identifies this as a *General Development* activity. Odisha had a budget outlay of Rs. 216.14 Crores in 2012-13 from the State's own resources towards the construction of check dams and in-stream storage structures. The objectives of the scheme were very similar to the ones that have been proposed. Due to these reasons, the total proposed budget for this strategy has been split equally between *General Development* and *Capacity Development* for the purpose of climate coding. Similarly, river flow demand studies are also *General Development* in nature. Combining these two, *General Development* constitutes about 32.5% of the total proposed climate change budget for the Water sector. It is interesting to note that there are no strategies that are *Climate-Oriented* in nature in the list of proposed strategies. Activities under this category typically include erosion control, flood control etc.

TABLE 4.7.2: DISTRIBUTION OF OCCAP STRATEGIES ACROSS THE CLIMATE SPECTRUM

Proposed Strategies / Actions	Proposed Budget (in Rs. Crores)				Overlap with Existing project's / scheme's objectives
	AD	GD	CD	CO	
1) Expansion of hydrometry network			15		No overlap (expansion of the routine functions of the State's Hydrometry Directorate)
2) Development of flood forecasting models			2		No overlap
3) Downscaling of global circulation model			2		No overlap
4) Increasing water use efficiency, benchmarking and water audit in irrigation projects			20		Command Area Development and Water Management (only for irrigation water efficiency)

TABLE 4.7.2 (continued)

Proposed Strategies / Actions	Proposed Budget (in Rs. Crores)				Overlap with Existing project's / scheme's objectives
	AD	GD	CD	CO	
5) Construction of water harvesting structures i.e., check-dam to adapt to the climate change scenario		235	235		In-stream storage structure (check dam) funded from State's own resources, ACA and SCA
6) Improvement of drainage system			200		Rural Infrastructure Development Fund
7) River health monitoring, ecosystem environmental flow demand studies		1	1		No overlap
8) Awareness raising with pani panchayats through farmers' training program and creation of agro-climatic stations			5		No overlap (although several EAPs focus on sustainable water management through community participation)
9) Integrated water resources management			10		Odisha Water Sector Improvement Project (latest status update available for 2008-09)
Total Proposed Budget (% of Total)		**236 (32.5%)**	**490 (67.5%)**		

Source: OCCAP

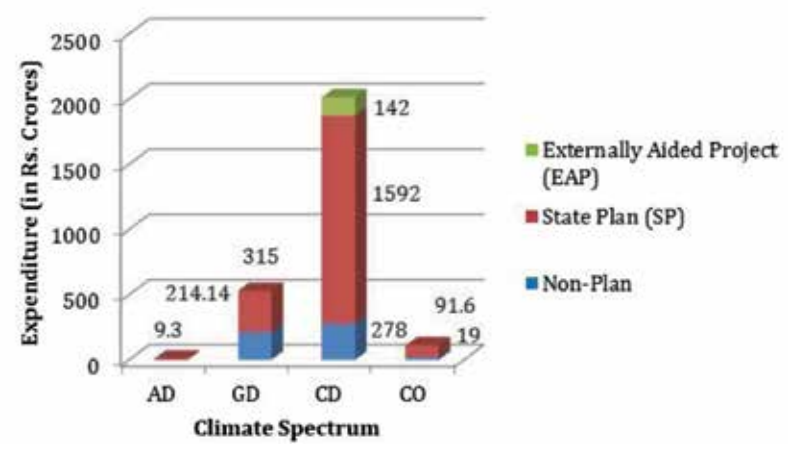
Table 4.7.2 also highlights those strategies that overlap entirely or partially with some of the existing initiatives by the Water Resources Department, and can be considered as extensions of the same. This has implications for funding as well as institutional mechanisms for delivery of finance and execution of projects. It is interesting to note that the first three strategies and the strategy on river health monitoring in Table 4.7.2 pertaining to collection of data and research relating to impacts of climate change on the water sector are all new initiatives proposed by the State and do not overlap with any of the existing schemes/projects. Strategies relating to the construction of water harvesting structures and drainage control overlap entirely with two of the existing schemes – In-Stream Storage Structure and Rural Infrastructure Development Fund respectively. Both these schemes are funded entirely from the State's own resources.

4.7.3 Funding Sources: Existing Schemes

Analysis by Climate Categories

The distribution of various budget components over the climate spectrum leads to a couple of interesting observations. First, all the externally aided projects support *Capacity Development* activities. EAPs fund 7% of the total *Capacity Development* expenditure. There were four EAPs in 2011-12 that were routed through the State budget. These are JBIC assisted Rengali irrigation project (phase II), Orissa Integrated Irrigated Agriculture Water Management Investment Program (OIIAWMIP) with assistance from Asian Development Bank, Orissa Community Tank Management Project with assistance from World Bank, and National Hydrology Project with World Bank assistance. Except for the National Hydrology Project that was targeted towards effective use of hydrological information system, the rest of the projects aimed to expand and optimize irrigation potential, increase farm income through productive irrigation and sustain restored tank systems through community participation and demand driven solutions. Second, a large majority (approx. 94.6%) of *Capacity Development* and *Climate-Oriented* activities is funded from the State Plan, or in other words, the State's own resources.

FIGURE 4.7.2: DISTRIBUTION OF PUBLIC EXPENDITURE IN THE CLIMATE SPECTRUM WITHIN BUDGET COMPONENTS (IN RS. CRORES)



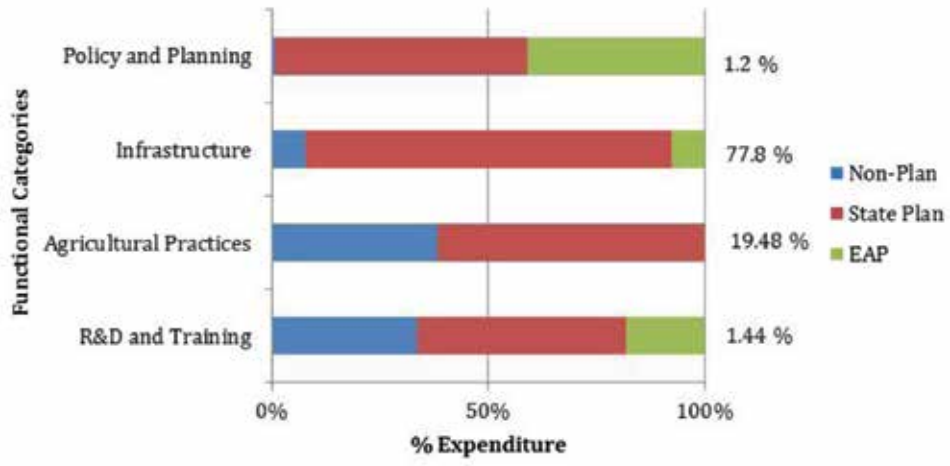
Source: Audited Expenditure Statement, GoO

Figure 4.7.2 above depicts the budget components across the climate scores (in Crores of Rupees). Non-Plan component of the budget funds a substantial portion of the *General Development* expenditure. The rest of the Non-Plan budget goes towards *Capacity Development* and a marginal amount for *Climate-Oriented* activities.

Analysis of CD and CO Expenditure by Functional Categories

The expenditure in *Capacity Development* and *Climate-Oriented* activities was further categorized into key functional areas to understand the current thrust areas and implications for climate change. This is important because climate change actions often tend to focus on hard adaptation measures like infrastructure development and technical options, and tend to ignore less tangible schemes, such as education and training, and promoting enabling environment for innovation. Water research, for instance, can be used to understand local variability in water resources due to climate change, develop new ways of ground water recharge, develop innovative water harvesting techniques etc., which will help farmers and rural and urban communities better adapt to the changing climate. Similarly, formal education and training help in strengthening and building the capacities of water user associations and *pani* panchayats and better equip them to deal with climate risks.

FIGURE 4.7.3: COMPARISON OF CD & CO EXPENDITURE ACROSS KEY FUNCTIONAL CATEGORIES (% OF TOTAL EXPENDITURE)



Source: Audited Expenditure Statement, GoO

As evident from Figure 4.7.3 above, a substantial portion (77.8%) of the *Capacity Development* and *Climate-Oriented* spending went into Infrastructure, which comprises of capital outlay in irrigation and flood control projects, commercial dam projects, and hydel power plants. A majority of the funds for Infrastructure was sourced from the State Plan component, while Non-Plan and EAPs contributed smaller amounts. About 20% of the total *Capacity Development* and *Climate-Oriented* expenditure went towards funding Agricultural Practices. These include irrigation, soil and water management and command

area development projects. A little more than half of this expenditure comes from the State Plan and the balance is sourced from Non-Plan components. It is interesting to note that both R&D and Training, and Policy and Planning form a very small percentage of the overall *Capacity Development* and *Climate-Oriented* expenditure. R&D and Training include activities like research and survey in irrigation, crop demonstration, farmers' training, improving data systems and tools for management of flood and drought, and improving data accessibility. About half of this expenditure is sourced from the State Plan and the rest from Non-Plan and EAPs. Policy and Planning constitute about 1.2% of the total *Capacity Development* and *Climate-Oriented* expenditure. EAPs fund about 41% of this expenditure. This is through the Orissa Integrated Irrigated Agriculture Water Management Investment Program (OIIAWMIP) with assistance from the Asian Development Bank. The rest of the expenditure comes mainly from the State plan. Policy and Planning include activities like preparation of basin development plans, tribal area sub-plan and *Ayacut* development under the Command Area Development Program.

TABLE 4.7.3: DISTRIBUTION OF OCCAP STRATEGIES OVER FUNCTIONAL CATEGORIES

Functional Classification	R & D and Training	Infrastructure	Agricultural Practices	Policy and Planning
Proposed Strategies	Expansion of hydrometry network	Construction of water harvesting structures i.e., check dam to adapt to the climate change scenario	Increasing water use efficiency, benchmarking and water audit in irrigation projects	Integrated water resources management
	Development of flood forecasting models		Increasing water use efficiency, benchmarking and water audit in irrigation projects	
	Downscaling of global circulation model	Improvement of drainage system		
	River health monitoring, ecosystem environmental flow demand studies			
	Awareness raising with pani panchayats through farmers' training program and creation of agro-climatic stations			

Source: OCCAP, Audited Expenditure Statement and analysis by the Study team

Table 4.7.3 shows the spread of the proposed OCCAP strategies in the Water sector across the same functional categories. In contrast to the existing schemes, there seems to be an explicit focus on R&D and Training, at least in terms of the number of strategies. In terms of the budget, however, Infrastructure still remains the major function. About 65% of the total proposed budget goes towards the construction of water harvesting structures. There are also strategies to promote sustainable agricultural practices and integrated water resources planning. In addition, there are a couple of strategies that cut across various functional categories.

4.7.4 Recommendations

1. *Capacity Development* activities constitute about 75% of the current expenditure and approximately 80% of this expenditure is financed from the State's own resources. This highlights the importance of this sector from a climate change perspective. Most of the proposed strategies are also in the nature of *Capacity Development* and some of them overlap with existing projects that are currently funded from the State Plan. There is, therefore, an opportunity for the State to expand and/or climate proof some of these existing projects and rationalize on costs.
2. There are a number of proposed strategies that are in the nature of R&D and Training. In fact, most of them pertain to collection of data and climate modelling at a micro level and also based on agro-climatic zones. These strategies almost entirely overlap with the National Mission on Strategic Knowledge for Climate Change. Odisha could potentially access funds available under this Mission in order to implement these strategies.
3. The entire expenditure under EAPs has gone towards funding *Capacity Development* activities. This is spread across different functional categories, such as Infrastructure, Policy and Planning, and R&D and Training. In addition, the objectives of many of the current EAPs overlap strongly with the proposed climate strategies in the sector. This makes a strong case for Odisha to seek additional funds from international donors and either extend the on-going projects or expand their scope.
4. None of the proposed strategies are *Climate-Oriented* in nature. Given the vulnerability of the sector to actual or anticipated impacts of climate change, there should be targeted strategies towards addressing such impacts arising from erosion, floods and droughts.

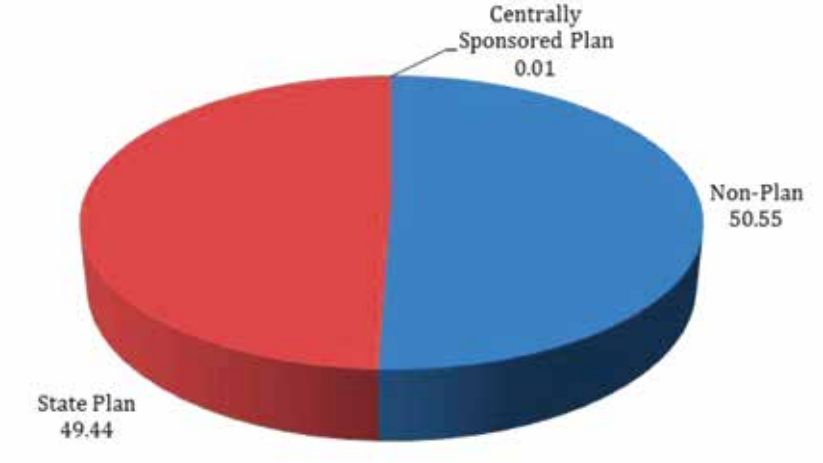
4.8 Rural Development

About 80-85 per cent of the Odisha's population resides in rural areas and relies on sectors such as agriculture and fishing for its livelihood. These climate-sensitive sectors leave communities in rural areas exposed to significant impacts from climate change. Thus, improving resilience to climate change by implementing adaptation strategies is of significant importance.

4.8.1 Analysis of Public Expenditure

For the year 2011-2012, Odisha booked an actual expenditure of Rs. 1396.41 Crores under the Department of Rural Development. The Department's spending has been analysed using expenditure listed in the Grant 28 of the Audited Expenditure Statement, Government of Odisha. The entire expenditure outlay is distributed between the Non-Plan, State Plan and the Centrally Sponsored Plan component. There is no Central Plan component under the Department of Rural Development. The Non-Plan expenditure accounts for 50.55% of the total budget and the remaining 49.45% is allocated under Plan expenditures -State Plan and Centrally Sponsored Plan, where the Centrally Sponsored Plan component accounts for 0.01% of the total budgetary expenditure. The respective shares of the budget components are shown in the Figure 4.8.1 below.

FIGURE 4.8.1: PUBLIC EXPENDITURE – BUDGET COMPONENT-WISE (%) 2011-12



Source: Audited Expenditure Statement, GoO

4.8.2 Climate Coding of Public Expenditure: Actual vs. Proposed

The Department of Rural Development aims at fostering rural connectivity through construction of roads and its repairs and maintenance, and infrastructure improvements to facilitate water and sanitation services to people in rural areas. The provision of these three key services by the Department falls under the *Capacity Development* category on the climate spectrum as these activities enhance resilience to climate change. Based on the climate coding of public expenditure, it is found that 76.24% of the total spending falls under the *Capacity Development* category of the climate spectrum. About 10.69% of the total spending falls under the *Ambiguous Development* category and 13.07% under the *General Development* category. There are no existing schemes that are in the nature of *Climate-Oriented* development.

Table 4.8.1 below shows the distribution of broad areas of public spending for the Department of Rural Development over the climate spectrum.

TABLE 4.8.1: DISTRIBUTION OF AREAS OF SPENDING OVER THE CLIMATE SPECTRUM: RURAL DEVELOPMENT

Climate Spectrum Score	Ambiguous Development (AD)	General Development (GD)	Capacity Development (CD)	Climate-Oriented (CO)
Areas of Expenditure	Maintenance and Repairs of office buildings	Government infrastructure-Construction of government buildings, office establishment and establishment charges, Government residential buildings		
	Maintenance and Renovation of Quarters of Doctors and Paramedical Staff	Construction of PHCs and up-gradation of health infrastructure	Provision of sewerage and sanitation facilities and related repairs and maintenance expenses	
	Other unspecified expenses	Administrative expenses	Access to pure drinking water and related repairs and maintenance expenses	
Distribution of Expenditure (%)	**10.69**	**13.07**	**76.24**	**0**

Source: Audited Expenditure Statement, GoO and analysis by the Study team

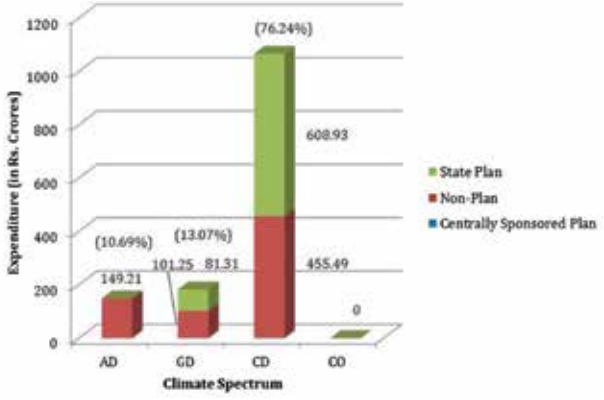
4.8.3 Funding Sources: Existing schemes

Analysis by Climate Categories

Based on the analysis of the public expenditure in the climate spectrum within budget components, 64.5% of the Non-Plan expenditure goes toward funding *Capacity Development* activities. These are mainly in the form of maintenance and repairs of roads and bridges and rural water supply programmes and expenditure on sanitary technicians. About 21.1% of the total Non-Plan expenditure is directed towards activities that are in the nature of *Ambiguous Development.* These are mainly in the form of maintenance and repairs of office buildings. The remaining 14.3% of the total Non-Plan expenditure is directed towards *General Development* activities. These are mainly in the nature of administrative expenses.

A large portion of the State Plan expenditure (about 82%) and the entire Centrally Sponsored Plan component is directed towards *Capacity Development*. *Capacity Development* through the State Plan is in the nature of a) Capital Outlays on Roads and Bridges to improve rural connectivity: these activities are primarily driven through national schemes such as Rural Infrastructure Development Fund, Pradhan Mantri Gram Sadak Yojana, Minimum Needs Programme and Rural Roads, b) availability of safe drinking water through spot sources and piped water supply: this objective is achieved through national schemes such as National Rural Drinking Water Programme and Accelerated Rural Water Supply Programme and c) building of toilets in rural schools, households and Anganwadi Centers: this objective is achieved through Nirmal Bharat Abhiyan / Total Sanitation Campaign. The remainder of the State Plan component (11.8%) goes towards funding *General Development* activities such as construction of government offices and government residential structures and construction of primary health centres. The Centrally Sponsored Plan component focuses on provision of safe drinking water.

FIGURE 4.8.2: DISTRIBUTION OF PUBLIC EXPENDITURE IN THE CLIMATE SPECTRUM WITHIN BUDGET COMPONENTS (IN RS. CRORES)



Source: Audited Expenditure Statement, GoO and analysis by the Study team

4.8.4 Concluding Remarks

The OCCAP does not view rural development and planning as a separate sectoral issue as it was recognized that implementing the key priorities pertaining to rural development has a strong cross cutting relevance. Therefore, no exclusive budgetary requirements and key priorities for rural development and planning have been presented in the OCCAP. The involvement of the Department of Rural Development (along with participation from other departments) as highlighted in the OCCAP focuses on implementing priorities such as construction of flood shelters, assessment of erosion prone areas, and construction of disaster resilient housing and public infrastructure, watershed management and rural development planning to incorporate climate change induced variability to water availability.

However, the scope of the Rural Development Department and Panchayati Raj Department[84] to tackle climate change is also likely to be broadened with the greening initiative proposed by the Ministry of Rural Development. The Rural Development Ministry is planning to use existing schemes like Mahatma Gandhi National Rural Employment Guarantee Act, Indira Awaz Yojana, National Rural Livelihoods Mission, Integrated Watershed Development Programme, Nirmal Bharat Abhiyan, and National Rural Drinking Water Programme as means to promote the green agenda.[85] Table 4.8.2 below shows the set of potential green results that can be derived from existing schemes of the Ministry of Rural Development and implemented at the State level by the Department of Rural Development and Panchayati Raj Department.[86]

84 Dealt with separately in the subsequent section

85 *Report on greening rural development in India released*. (2013, January). Retrieved March 2013, from Live Mint: http://www.livemint.com/Politics/NDlhouoEZNTAYHKJBRKB3H/Report-on-greening-rural-development-in-India-released.html

86 For the State of Odisha, schemes such as Nirmal Bharat Abhiyan and National Rural Drinking Water Programme are administered by the Department of Rural Development. Schemes such as Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA), Indira Awaz Yojana, National Rural Livelihoods Mission, are implemented by the Department of Panchayati Raj and Integrated Watershed Development Programme is implemented by the Department of Agriculture.

TABLE 4.8.2: SCHEMES UNDER DEPARTMENT OF RURAL DEVELOPMENT (CENTRAL MINISTRY) WITH POTENTIAL GREEN OUTCOMES

Schemes	Department at the state level for administration of the scheme	Potential green outcomes from the schemes
Nirmal Bharat Abhiyan / Total Sanitation Campaign	Department of Rural Development	i) Safe disposal of excreta ii) Effective solid and liquid waste management iii) Prevention from untreated waste water from re-entering the water system.
National Rural Drinking Water Programme	Department of Rural Development	i) Safe disposal of sludge after treatment of contaminated water ii) Use of renewable energy for water pumping.
Indira Awaas Yojana	Department of Panchayati Raj	i) Promote efficient use of construction material that is locally available and produced through energy efficient technologies ii) Designing houses that agree with local weather conditions, better ventilation and lighting to reduce energy consumption and thereby promote energy efficiency iii) Promote disaster resilient housing
Integrated Watershed Development Programme	Department of Panchayati Raj	i) Adoption of "green agronomy" practices ii) Promotion of sustainable practices to conserve natural resources as well as groundwater and soil fertility
National Rural Livelihoods Mission	Department of Panchayati Raj	i) To increase the availability of green inputs and advisory services to farmers and livestock herders ii) Promotion of renewable-based energy services for processing activities
Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS)	Department of Agriculture	Works related to soil erosion, improving soil fertility, increasing biodiversity, augmentation of surface and ground water resources for irrigation and household use and increasing carbon sequestration

Sources: Rural Development Department Outcome Budget 2011-12, Greening Rural Development in India (UNDP, 2012).

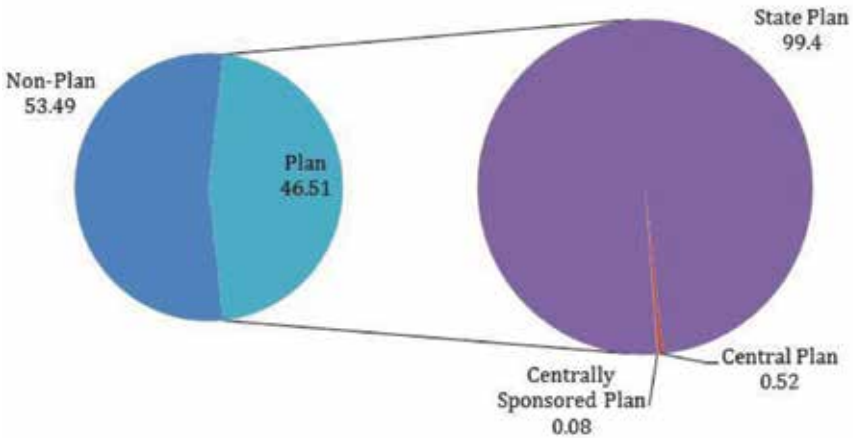
4.8.5 The Role of Panchayati Raj Department

The Panchayati Raj Department is the implementing agency for several welfare related schemes which ensure development of the rural poor through provision of basic services. The ultimate objective of these schemes is to enhance their income generating capacity thereby making them self-sufficient. They also target better natural resource management through community involvement. Some of these schemes/programmes are initiated by the Panchayati Raj Department, while others are cross cutting schemes initiated by the Ministry of Rural Development at the Centre and implemented through the Panchayati Raj Department. The budgetary expenditure of the Department for FY 2011-12 was analysed in terms of its climate relevance to understand the Department's current priorities and scope for integration with future climate change objectives.

Analysis of Public Expenditure

The Panchayati Raj Department's expenditure for the FY 2011-12 comprises mostly of infrastructure development and livelihood enhancement schemes for the rural communities. The Department's spending has been analysed using expenditure listed in the Grant 17 of the Audited Expenditure Statement, Government of Odisha (GoO). The annual audited expenditure for the FY 2011-12 was Rs. 2,240 Crores. Non-Plan and State Plan components constitute 53.49% and 46.23% respectively of the total expenditure, and the remainder is funded from the Central Plan and Centrally Sponsored Plan.

FIGURE 4.8.3: PUBLIC EXPENDITURE – BUDGET COMPONENT-WISE (%) 2011-12: PRIs



Source: Audited Expenditure Statement, Goo

The Department's expenditure can be categorized into nine major heads. A brief description of various schemes comprising the major heads is given below:

Elections: Conducting Zila Parishad elections, establishing State Election Commission, etc. form most of this expenditure.

Public Works: This head consists of expenditure only on renovation and maintenance of non-residential buildings.

Labour & Employment: This consists of programmes that aim to rehabilitate bonded labourers and provide them with livelihood options.

Social Security and Welfare: The Bima Yojana which aims to provide insurance cover to landless agriculture farmers constitutes the total expenditure under this head.

Special Programmes for Rural Development: Self-employment programme for rural poor covering different aspects like formation of Self-help groups (SHGs), providing training, infrastructure, etc. (Swarna Jayanti Gram Swarojgar Yojana) and schemes providing better education, health, sanitation, renewable energy, etc. (TRIPTI, for example) constitute expenditure under this category.

Rural Employment: This includes the flagship Mahatma Gandhi National Rural Employment Guarantee Scheme (MNREGS) and other housing related schemes like the Indira Awaz Yojana and Mo Kudia.

Other Rural Development Programmes: This head includes expenditure incurred for regular district and block establishment, conducting Below Poverty Line (BPL) census, along with specific infrastructure related schemes like Concrete Cement Roads, Gopabandhu Gramin Yojana (provides *Bijli*, *Sadak* and *Pani*). A substantial part of this head also includes schemes pertaining to training and capacity building (Rastriya Gram Swaraj Yojana) which provides knowledge and skill development programmes to elected PRI representatives through the State Institute for Rural Development (SIRD).

Compensation and Assignments to Local Bodies and Panchayati Raj Institutions: The major spending under this head is the financial assistance provided to Zila Parishads and finer government bodies under the 3rd State Finance Commission.

Secretariat Economic Services: This includes expenditure on recurring administrative and management activities for the Panchayati Raj Department.

Climate Coding of Public Expenditure

Analysis of the Department's expenditure reveals that a large majority (74.29%) of it goes towards *Capacity Development*, while 24.09% of the total expenditure is *General*

Development in nature. *Capacity Development* expenditure primarily includes the provision of rural infrastructure (Indira Awaz Yojana, etc.) and enhancement of capacity of rural communities to earn their livelihood (NREGS, TRIPTI, Bima Yojana etc.). The latter is implemented by providing specific skill building activities (Gram Swaraj Yojana) both for the government as well as micro level implementing agencies like the Gram Sabha, Self Help Groups, etc. *Ambiguous Development* constitutes a meagre 1.62% of the total expenditure. It mainly includes maintenance and repairs of non-residential buildings. As shown in Table 4.8.3 below, there is no *Climate-Oriented* expenditure in the Department's spending.

TABLE 4.8.3: DISTRIBUTION OF AREAS OF SPENDING OVER THE CLIMATE SPECTRUM: PRIs

Climate Spectrum Scores	Ambiguous Development (AD)	General Development (GD)	Capacity Development (CD)	Climate-Oriented (CO)
Areas of Expenditure	Maintenance and repair of non-residential buildings	Establishment and strengthening of block organizations and Gram Panchayats.	Bima Yojana (Providing Insurance to landless agriculturers)	
		Conducting Zila Parishad elections	Provision of concrete cement roads	
			Training for extension personnel, Rashtriya Gram Swaraj Yojana	
			Gopabandhu Grameen Yojana (Provision of roads, drinking water, electrification and irrigation)	
			Indira Awas Yojana (Financial support for construction of houses and dwelling units), Mo Kudia	
			NREGS, Swarna Jayanti Gram Swarojgar Yojana	
			Targeted Rural Initiative for Poverty Termination and Infrastructure (TRIPTI) (Reducing poverty through better education, health, roads, telecommunication, etc.	
Distribution of Expenditure (%)	**1.62**	**24.09**	**74.29**	**0**

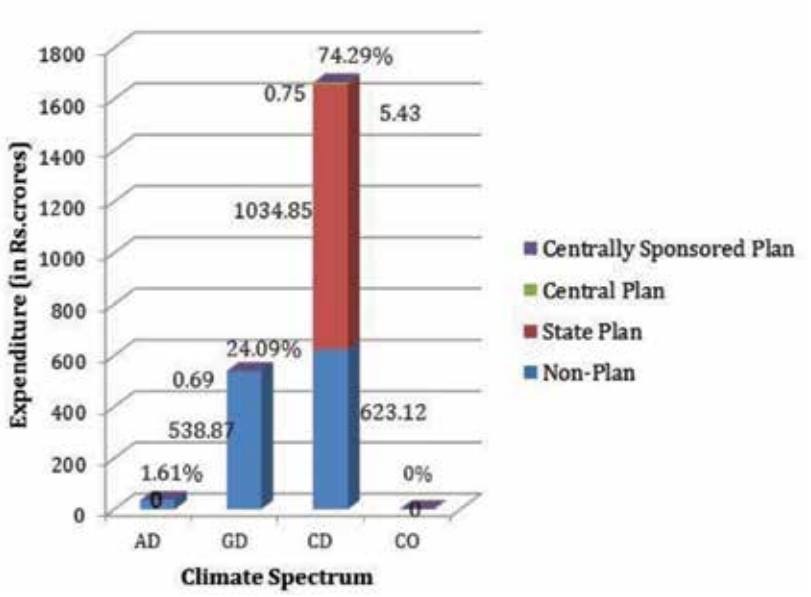
Source: Audited Expenditure Statement, GoO

Many of the current schemes and programs focus on mainstream developmental activities and there is very little attention towards explicit climate outcomes. Some of these schemes, however, can be realigned to enhance adaptive capacities of rural communities towards actual and potential climate change impacts.

Funding Sources: Existing Schemes

Figure 4.8.4 below provides the distribution of the Department's current expenditure (FY 2011-12) across different climate categories by various budget components.

FIGURE 4.8.4: DISTRIBUTION OF PUBLIC EXPENDITURE IN THE CLIMATE SPECTRUM WITHIN BUDGET COMPONENTS (IN RS. CRORES): PRIs



Source: Audited Expenditure Statement, GoO

It is interesting to note that 99% of the *General Development* expenditure is funded by the Non-Plan component of the budget with a miniscule contribution from the State Plan. In contrast, a majority (62.19%) of the *Capacity Development* expenditure comes from the State Plan, while 37.44% is funded from Non-Plan sources. This is congruent with the perception that infrastructure, training and capacity building activities are more likely to be funded from plan sources.

In terms of the functional nature of the spending, most of the programmes implemented by the Department are either oriented towards infrastructure development or target training and capacity building activities.

Role of the Panchayati Raj Department in the OCCAP

Rural communities are more susceptible to climate change as they are least endowed in terms of infrastructure and capacity to absorb any sudden shocks or impacts during resultant exigencies. Although the Panchayati Raj Department is one of the important implementing agencies of most schemes pertaining to rural areas, it fails to secure sufficient emphasis in the OCCAP in terms of budgeting and action strategies. Given the nature of the schemes and the interface between PRIs and the rural communities, there is considerable scope for incorporating climate adaptation strategies in the schemes implemented by the Panchayati Raj Department. The OCCAP, however, lacks adequate emphasis on PRIs and their integration with the functioning of other Departments. Only a couple of sectors, viz. Forestry and Coasts and Disaster Management have proposed strategies, which involve capacity building of Joint Forest Management Committees (JFMCs) and PRI officials with respect to climate change. The stakeholder consultations that were held following the release of the draft OCCAP also highlighted the need for inclusion of PRIs as they play a vital role in the integration of rural development and climate change. Hence adequate importance should be given to this Department in terms of proposing new strategies and also allocating proportionate funds.

Recommendations

1. Mainstreaming climate change into development planning is the need of the hour and it needs to be incorporated not just at the Central Government level but in an all pervasive fashion even at the finest levels of governance, including State Governments, Zila Parishads and Gram Panchayats. Hence as pointed out in the stakeholder consultations, it is extremely important to include the Panchayati Raj Department in the preparation of climate change strategies as they are the ones that are directly involved with the rural communities and are attuned to the local conditions.
2. It also becomes imperative to provide them with actual uninfluenced authority (Pradhan B., 2011) to manage programmes locally and also equip them with sound knowledge and technical expertise to implement strategies mentioned in the OCCAP. The State can utilize the existing institutional set up of the SIRD for training and capacity building of PRIs' elected representatives and field functionaries at the State Head Quarter level.
3. Informal and localized institutions like *pani* panchayats, etc. which have huge influence in the area should be used to steer discussions and strategies to address climate change.

Chapter 5 Conclusion

Phase I of this Study did a comparative analysis of the SAPCCs of six Indian States against a set of criteria and made some recommendations about improving the content of the Plans and their alignment with the national missions in order to increase their chances of funding. The report also made some general recommendations that would be useful for the States while targeting various funding sources. This report takes the Plans as written, conducts an in-depth analysis of the proposed climate actions, and also analyses some of the general recommendations from Phase I in greater detail in order to develop strategies to fund the SAPCCs. Using Odisha as a case study, this report develops some approaches and frameworks that could potentially be applicable to all States in order to analyse their proposed climate change activities and budgets. The immediate observations and recommendations for the State of Odisha are provided in Chapters 3 and 4. This chapter highlights some of the important ones and draws some key insights that might be useful to a wide range of stakeholders, including other States and international donors.

1. Analysis of actual public expenditure and proposed budget by climate categories and functional areas help in understanding the nature of the proposed activities from multiple perspectives. This allows different funding sources to target specific areas / strategies based on their funding objectives and mandate.
2. About 2.5% of Odisha's GDP is already being spent on funding *Capacity Development* and *Climate-Oriented* activities that promote climate change adaptation in various sectors. A substantial portion of this is being sourced from the State Plan, primarily the State's own resources. Therefore, the importance of State funds should not be undermined while developing financing strategies for SAPCCs. Furthermore, 21% of the proposed climate change adaptation budget for the State is *General Development* in nature. Since the State and local Governments will benefit from these programmes even in the absence of climate change, a substantial share of funding these strategies should come from these sub-national Governments.
3. An analysis was done to identify any overlap between proposed adaptation strategies and existing/on-going programmes. This is a useful exercise because of two reasons: a) given more details about the proposed strategies, this could help in identifying requirements that are "additional"

in nature and therefore, help in better targeting of international climate funds; and b) overlapping areas should receive greater focus as they can help accelerate the pace of integrating climate change considerations into on-going programmes. Moreover, while allocating scarce financial resources, any move in the direction of climate-proofing existing schemes that have potential should be accorded with higher priority.

4. A lot of the R&D strategies pertaining to collection of data, climate modelling based on agro-climatic zones, and other climate related research in adaptation-relevant sectors almost entirely overlap with the National Mission on Strategic Knowledge for Climate Change. Such alignment of SAPCC strategies with national missions is a key to accessing Central funds, as it would improve the States' chances of receiving funding through the corresponding missions.

5. The objectives of many of the current EAPs in adaptation-relevant sectors overlap strongly with the proposed adaptation strategies. This makes a strong case for the State to seek additional funds from international donors and either extend the on-going projects or expand their scope.

6. In order to understand the effectiveness of climate finance it becomes crucial to trace the path of fund flow from the source to its ultimate beneficiary. It is important for the State/Central governments, private funding organizations and international donors to evaluate the impact created by their funds not only at the State level but at the district & city level and other lower levels of administration. Once the flow of funds and its impacts are mapped, the accountability and traceability of funds are enhanced, which would facilitate timely intervention by any regulatory authority.

7. The scope for private sector investment in adaptation should be explored by States. Based on current initiatives and investments, these seem to be some of the potential areas: a) conceptualizing technologies that facilitate resilience building against climate change; b) adoption of sustainable practices by the private sector, especially by agri-business, food and beverage companies; c) private equity funds and contributions from large corporations through their CSR programmes to finance certain adaptation strategies.

8. There are a number of ways in which the State can intervene to make agricultural insurance a viable opportunity for the private sector.

9. Classifying climate mitigation strategies along the following categories - *Concepts*

and Plans, Infrastructure, Operations and Maintenance, Technology Transfer and *Capacity Building* can facilitate in understanding the nature of strategies planned by the State and identifying knowledge and data gaps that need to be addressed for building appropriate mitigation interventions. It can also help ascertain the different sources of funds available based on the type of mitigation strategies.

10. Most international funds and private sources are focussed on financing large scale deployment of clean technologies. Therefore, concerted efforts from State and Central Governments towards financing and assisting in conducting assessments, feasibility studies and demonstration projects and capacity building related strategies will be required. This assistance will further leverage private sector and international sources of funding for large scale investments in clean technology.

11. High risk perceptions associated with energy efficiency projects pose as a deterrent to their financing. Therefore, innovative public finance mechanisms will be needed in order to reduce these risk perceptions and the subsequent financing gaps that emerge. However, public finance assistance should be designed appropriately to suit the stage of maturity in which the technology exists. It is important for innovative public finance mechanisms to be developed at the State level. For example, the scope of the State Energy Conservation Fund (SECF) can be enhanced with the objective of developing and financing innovative business models in order to sustain the fund.

12. Public finance instruments such as grants have the potential risk of restricting the energy efficiency market to the size of the grant/subsidy and therefore, it is advised that the tool be used with utmost caution. It is recommended for grants to be used as a financing instrument for activities such as market creation/project development, capacity building, awareness etc.

13. It is important to raise revenues to meet mitigation targets through appropriate use of fiscal instruments. There are several fiscal instruments and incentives that could be used at the State level, including feebates, carbon tax, differential taxation, carbon sequestration credits etc. However, a couple of points are important while using these instruments: a) fiscal instruments should be divided into revenue instruments and subsidy instruments - the net effect of these should be revenue neutralizing while enabling GHG emission reduction; and b) funds generated through the use of fiscal instruments should be earmarked for activities that improve the productive base of the economy.

States have drafted their Climate Action Plans according to their State-specific needs, vulnerability to climate change, socio-economic profile etc. Some States have not yet come up with SAPCCs, but are still affected by current and future variability in climate, and have on-going funding needs. In addition, different States are at different stages in terms of preparedness and current expenditure on climate change. Although the approaches and frameworks developed in this Study would be useful for all States, the actual financing strategies, as well as the ability of States to raise funds would vary from State to State.

As noted earlier, the cost of implementing the SAPCCs is enormous and there may not be enough funds to meet the requirements of all the States. While States will compete against each other to get the most resources from various funding sources, Central Government and international sources, in particular should act in a concerted manner and follow a set of criteria and guidelines in financing various aspects of the Plans. In using scarce financial resources, some kind of balancing of priorities is needed – among States, among sectors, among functional areas (R&D, Infrastructure, Policy and Planning, Awareness and Capacity Building, Sustainable Practices etc.), between mitigation and adaptation etc. This report should also help funders achieve that objective. Climate actions in the SAPCCs are now written as high level strategies. Once they are developed further into detailed projects and programmes, better and more effective targeting of funds should be possible.

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Annexures

ANNEXURE I: LIST OF INTERVIEWEES

1. Dr. Ajay Kumar Nayak, Joint Secretary, *Department of Commerce and Transport, Government of Odisha (GoO)*
2. Mr. Ankur Chaudhary, Researcher, *IIT, Delhi*
3. Mr. Anuj Khumbat, CEO, *Weather Risk Management Services Ltd, Kanpur*
4. Mr. Ashok Kumar Singha, *Complete-transformation (C-TRAN)*
5. Dr. Dhirendra Nath Nayak, Public Health & HR Implementation Expert, *Technical and Management Support Team, Odisha*
6. Dr. Gopal K. Tripati, Lecturer, *Veterinary Officers Training Institute, Bhubaneswar*
7. Mr. Injeti Srinivas, Principal Secretary, *Department of Housing and Urban Development, GoO*
8. Mr. K.K. Mishra, Director, *GIS and Climate Change, Department of Water Resources (DoWR), GoO*
9. Dr. Krishnan Mani, Professor, *Tamil Nadu Agricultural University, Coimbatore*
10. Mr. Narendra Kumar Swain, Financial Advisor cum Joint Secretary, *Department of Forest and Environment, GoO*
11. Dr. Pradeep Harichandan, Urban Poverty Specialist, *Programme Management Unit (PMU), Department of Housing and Urban Development, GoO*
12. Mr. Pramod Prusty, Senior Scientist, *Department of Forest and Environment, GoO*
13. Mr. Rachit Bansal, Asst. Vice President, *ICICI Lombard, Star Union Dai-ichi*
14. Mr. Satheesh Arjilli, Senior Manager, Micro Insurance, *BASIX India, Hyderabad*
15. Mr. Satya Priya Rath, O.S.D cum Under Secretary, *Finance Department, GoO*
16. Mr. Satyabrata Sahu, Commissioner-cum-Secretary, *Department of Fisheries and Animal Resources Development, GoO*
17. Mr. Saurabh Kumar, Program me Officer, *UNEP Regional Office for Asia and the Pacific (ROAP)*
18. Mr. Srikumar Jena, Social Development Expert, *PMU, Department of Housing and Urban Development, GoO*
19. Mr. Subrat Rath, Director, *Hydrology and Water Planning, DoWR, GoO*
20. Mr. Suresh Chandra Mahapatra, Principal Secretary, *DoWR, GoO*
21. Mr. Venu Pratapani, Manager, *Insurance Operations, BASIX India*

ANNEXURE II: FINANCIAL DETAILS FOR PRIVATE SECTOR RENEWABLE ENERGY PROJECTS, ODISHA

Name of the project	Capacity Total	Status	Financial details	Financing Date
Rake Sundergarh Biomass Power Plant (Biomass and waste)	23 MW	Financing secured/ Under construction	The total project cost is Rs. 1.12 Billion. On May 2011, Shalivahana Green Energy Ltd, Rake power's parent company secured Rs. 676 Million from IFC. The loan would be used for the development of the Sundergarh plant and another plant located in Ramagarh. On December 2011, the project received Rs. 399.86 Million in debt from IFC. The loan tenure would run for a period of 12 years.	30-12-2011
Abacus Sonepur PV plant	1 MW	Commissioned	Abacus Holdings Pvt. Ltd has financed the development of the plant. BNEF assumes it was balance sheet financed (developer's equity, and or corporate level finance)	13-12-2011
Pantime Tangi PV Plant	1 MW	Commissioned	Pantime Finance Company Pvt Ltd secured debt for development of the project. BNEF assumes it was balance sheet financed (developer's equity, and or corporate level finance)	12-12-2011
ASPL Bolangir PV Plant	5MW	Project got permitted under JNNSM. NTPC is the nodal agency for implementing the first phase of the programme.	ASPL financed the development of the plant. BNEF assumes it was balance sheet financed (developer's equity, and or corporate level finance)	07-11-2011
SGEL Lower Sunki Small Hydro Project	24 MW	Financing secured. Under construction and advanced stages of implementation.	SGEL financed the development of the Small Hydro Plant (SHP)	25-10-2011
SGEL Upper Sunki Small Hydro Project	8 MW	Financing secured. under construction and advanced stages of implementation.	SGEL financed the development of the SHP	25-10-2011

ANNEXURE II (continued)

Name of the project	Capacity Total	Status	Financial details	Financing Date
SGEL Ankedeli Small Hydro Plant	12 MW	Financing secured. under construction and advanced stages of implementation.	SGEL financed the development of the SHP	25-10-2011
Molisati Ranja PV Plant	1 MW	Commissioned. Project allotted under GBI scheme, Under Roof Top PV and Small Solar Power Generation Programme	Molisati Vinimay Private Ltd financed the development of the plant	22-09-2011
Shri Mahavir Bonai PV Plant	1 MW	Project allotted under the GBI scheme under Roof Top PV and Small Solar Power Generation Programme. Project commissioned in 2012. Applied for CDM benefits as part of bundled solar CDM project titled "2 MWp grid connected bundled solar power project in Orissa"	Secured debt for the project	08-06-2011
Tata BP Solar Cuttack Plant	1 MW	Commissioned under Roof Top PV and Small Solar Power Generation Programme administered by IREDA under JNNSM. Applied for CDM benefits as part of bundled solar CDM project titled "2 MWp grid connected bundled solar power project in Orissa". PPA signed with OSEB for 25 years	-	23-05-2011

ANNEXURE II (continued)

Name of the project	Capacity Total	Status	Financial details	Financing Date
Octant Sambalpur Biomass Project	10 MW	Financing secured, under construction	Octant signed an MoU with OREDA- It will invest Rs 550 Million for the development of 10 MW Plant over a period of 15 months. Octant paid committed fee of Rs 5.5 Million and signed PPA with GRIDCO.	01-04-2011
Raajratna Bolangir PV Plant	1 MW	Commissioned under Roof Top PV and Small Solar Power Generation Programme	The total project cost is Rs. 170 million. Rs. 119.6 Million Loan provided by Rural Electrification Corporation Ltd	09-12-2010
SGEL Malkangiri SHP	15MW	Financing secured, under construction	The total project cost is Rs. 814.5 Million. Rs. 163 million Loan provided by PTC financial.	09-06-2009

Source: BNEF database

ANNEXURE III: PROPOSED PROCUREMENT FOR RENEWABLE ENERGY FOR FY 2012-13

Proposed Procurement for Renewable Energy for FY 2012-13	Energy Proposed (MU) for FY 2012-13	Rate (P/U)	Total Cost (In Rs. Crores)
Small Hydro			
Meenakshi Small Hydro	150	368	55.2
Samal Small Hydro	150	368	55.2
Biomass			
SGEL Biomass Power Plant	122	487	59.41
Co-generation power plants			
NINL	100.74	2.75/3.10	28.1634
Arati Steel	26.28	2.75/3.10	7.27
Tata Sponge	100.74	2.75/3.10	28.1634
SMC power	4.38	2.75	1.2045
Pattnaik Steel & Alloys	8.76	2.75	2.409
IFFCO	17.52	2.75	4.818
VISA Steel	201.48	2.75/3.10	59.3928
VAL, Lanjigarh	26.28	2.75	7.227
Shyam Metalics and Energy	26.28	2.75/3.10	7.2708
Bhushan Steel	65.7	2.75	18.0675
Sree Mahavir Ferro Alloys.	4.38	2.75	1.2045
Action Ispat	8.76	2.75	2.409
Aryan Ispat	17.52	2.75	4.818
Rathi Steel & Power	4.38	2.75	1.2045
Orange Sponge Iron	8.76	2.75	2.409
Solar			
8 Nos. of Solar PV projects of 1MW each under RPSSGP	13	628	8.164
20 MW from NVVN through 'New Projects' scheme under JNNSM	33	474	15.642

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