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Assessment of the institutional arrangement and the capacities of the key stakeholders to deliver SAPCCs, and a strategy to address gaps in six states – Assam, Bihar, Chhattisgarh, Kerala, Maharashtra & Orissa

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**A Climate Change Innovation Programme (CCIP) Scoping Study on State Action Plan on Climate Change (SAPCC)**



**Prepared by: The Energy and Resources Institute (TERI) University  
New Delhi, July 2014**

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## Executive Summary

This report is the output of a scoping exercise carried out for assessment of States' capacity requirements for implementing effective climate change adaptation and mitigation initiatives. Based on consultations with key stakeholders, this report suggests a 'roadmap' for institutional capacity building in the six States that can contribute to better planning and mainstreaming of climate actions, enable informed decision-making, and ensure good accountability in the implementation process.

The six study States vary considerable from each other with respect to the status of their respective SAPCCs. While Odisha, Kerala, and Chhattisgarh have officially approved SAPCCs, the remaining three States are yet to complete the preparation of the policy document. Odisha seems to have progressed the most in terms of implementation of the SAPCC and there is already an institutionalized system for monitoring and evaluation.

The existing capacities of the six States have been assessed and categorized on different fronts. Amongst the study States, Odisha scores well on all capacity fronts in relative terms, but 'evidence building' and 'prioritization' come out as weak areas. Chhattisgarh and Kerala are almost equally located at the next level, and with comparatively higher scores than the group consisting of Bihar and Assam. Maharashtra presents a contrast with high scores on 'evidence building', 'prioritization' and 'leadership', but with little to show on 'institutional arrangements' and 'coordination'.

This report includes a SWOT analysis of the institutional arrangements that currently exist or are proposed to be set up in the three States for which the SAPCC preparation process has been completed. A key conclusion is that capacity constraints at the *local* level can seriously hamper implementation efforts. The nature of leadership demonstrated from representatives of the political and bureaucratic establishment in each State has been assessed. Not surprisingly, for the majority of the States political support and engagement has been missing (Odisha and Maharashtra are the exceptions).

Consultations with stakeholders in all the six study States have repeatedly brought out the need for convergence of activities across government departments. It has also been pointed out that among all the concerned stakeholders, the political representatives are yet to be adequately sensitized and engaged on issues related to climate change. This deserves utmost priority and the focus of CCIP should be to create "champions" of meaningful climate action from the political class. Related to this is the need to create strong evidence base of likely climate change impacts at the local level, accompanied by effective feedback loops.

For better planning and mainstreaming of climate actions, the report suggests overarching institutional arrangements and political participation at the level of goal-setting, prioritization and monitoring; mainstreaming of implementation would require capacity building across departments in all States on climate finance and budgeting of climate actions. In fact, access to finance and technology remains a key motivation for most government stakeholders while taking decisions on climate change action. For a successful uptake of the interventions under CCIP, it would be essential to address this expectation quite early in the delivery of the programme.

The roadmap for capacity building suggested in this report is largely a common programme of action for the six study States. While there is undoubtedly great diversity among the States, at a basic level the capacity needs are common and mostly relate to evidence building, prioritization, and co-ordination – all of which require technical and managerial support. The report identifies some key ‘enablers’ in the form of on-going initiatives in each State along with the presence of resource centres that can be partners in CCIP’s capacity building endeavour. There are also a number of initiatives by non-governmental organizations that provide useful models for replication and scaling up – the report gives a sampling of these efforts in the study States.

The roadmap suggested in this report looks as follows:

1. **Activities in the immediate time frame (first 4 to 6 months), for select States**
  - a. *Finalization of SAPCCs (Assam, Bihar)*
  - b. *Enabling the setting up of proposed climate change agencies/resource centres / etc (Chhattisgarh, Kerala, and Odisha)*
  - c. *Enabling the launch of local adaptation action plans (Maharashtra)*
  - d. *Developing/refining State-specific M&E frameworks for SAPCC activities (Chhattisgarh, Kerala, Maharashtra, Odisha)*
2. **Activities in the immediate time frame (first 4 to 6 months), for all States**
  - a. *Sensitizing policymakers on climate change risks and strategies*
  - b. *Creating convergence across Government Departments*
  - c. *Developing capacity for raising and allocation of funds required for implementation of SAPCC strategies*
  - d. *Undertaking policy reviews in key sectors to identify opportunities for ‘mainstreaming’*
  - e. *Establishing State Knowledge Network on Climate Change*
3. **Activities in the short-run time frame (first 8 to 12 months), for all States**
  - a. *Creating State-specific knowledge base on climate change risks to development*
  - b. *Development of a toolkit for climate change vulnerability assessment at the State-level*
  - c. *Developing State-level GHG emissions inventory*
  - d. *Developing strategic management plans / standard operating procedures / guidelines*
  - e. *Developing ToT (Training of Trainers) resource kits on community adaptation to be delivered through State training institutes*
  - f. *Developing long-term innovations-oriented research programmes relevant to the State context to be carried out in Universities within the State*
  - g. *Strengthening observations network*
4. **Activities in the short-run time frame (first 12 to 18 months), for all States**
  - a. *Developing ToRs for pilots and demonstration projects, with corporate sector involvement (possibly under CSR)*
  - b. *Sensitization program for representatives of Panchayats and Urban Local Bodies (ULBs)*
  - c. *Developing communication strategy for public awareness on climate change*
  - d. *Developing State-specific compendia of best practices on adaptation and mitigation*

- e. *Generating satellite accounts for ecosystems and ecosystem services, biodiversity, and sectors such as tourism*
  - f. *Documentation of traditional indigenous knowledge on natural resources management, sustainable farm practices, and coping strategies in the face of natural disasters*
5. **Activities in the medium-run time frame (3<sup>rd</sup> year of the program), for all States**
- a. *Developing adaptation pathways for the States*
  - b. *Building capacity on climate budgeting and innovative financing*
  - c. *Developing documentaries on adaptation and mitigation activities happening in the State*
6. **Activities in the long-run time frame (final 2 years of the program), for all States**
- a. *Scaling up of the pilot activities*
  - b. *Developing Decision Support Systems for district level administrators*
  - c. *Enhancing institutional capabilities in disaster risk reduction (forecasting and early warning)*
  - d. *Enhancing institutional capabilities to provide a range of easily accessible 'climate services' to different stakeholders (especially farmers)*
  - e. *Inter-State data exchange and information management system, especially on flood and droughts*
  - f. *Revisiting the SAPCCs*

## 1. Background

India's National Action Plan on Climate Change (NAPCC) was released by the Government of India in 2008. Following this, the Ministry of Environment and Forests (MoEF) advised each State Government to prepare a State Action Plan on Climate Change (SAPCC). Many State Governments responded to this by setting up a high level Steering Committee to identify focus areas/sectors for strategic intervention. Over the past four years, several States have officially adopted these policy roadmaps, whereas there are a few States which are yet to complete the preparation of the plan document.

In the above context, the DFID- Climate Change Innovation Programme (CCIP) seeks to extend project support to the MoEF, attempting to strengthen resilience of India's development to impacts of climate change. The programme is funded by the International Climate Fund of UK and aims to provide support to six specific Indian States (Assam, Bihar, Chhattisgarh, Kerala, Maharashtra and Odisha) to plan for correct adaptation and mitigation priorities, and to build resilience among people and natural resources against climate change risks through innovative interventions. CCIP's mandate requires the programme components to be developed and delivered in close collaboration with State stakeholders. Targeted to begin from 2014, CCIP will be operational for 5 years.

The operational framework of CCIP includes the involvement of highly qualified international and national experts, who will be available to provide specific technical and advisory support to the six States. A national technical support unit will engage with a State's focal agency to provide hand-holding support for the implementation of the SAPCC. The focus areas of the technical assistance under CCIP include: (a) strengthening of skills and systems at State level to assess and tackle climate change; (b) developing decision making tools for prioritization of actions; (c) designing effective implementation models including some pilots; and (d) facilitating access to necessary finance. The CCIP's approach to implementation is expected to be based on strong stakeholder engagement, targeted capacity building at the institutional level, facilitating implementation of high-impact projects with cross-sector linkages and ability to accommodate innovation, and a focus on complementing ongoing initiatives

## 2. About this Scoping Study

The present study is a core part of CCIP's initial phase, in which a scoping exercise has been carried out for assessing States' institutional capacity requirements for implementing effective climate change adaptation and mitigation initiatives. The understanding gained from the scoping exercise is expected to feed into the planning of the range of activities to be undertaken by the CCIP over the next 5 years.

As per the Terms of Reference for the scoping exercise, this report has attempted to:

- “Undertake an assessment of the current institutional arrangement in the six study States; the key issues and barriers they face/ may potentially face during planning and implementation of SAPCC; timeframe and process of their decision making; potential alternative groups/ institutional structures and sequencing of implementation needed.
- Provide recommendations on what can be supported through existing institutions and what alternate measures will be needed.



- Recommend appropriate institutional arrangements based on assessment to promote holistic, cross-sectoral and pluralistic thinking and links to existing core development planning and budgeting processes at the national and state level.
- Define processes to support rapid and iterative learning, ensuring good accountability for a range of stakeholders through the proposed institutional arrangements.
- Undertake (1) assessment of the capacities of key stakeholders and their ability to provide support and leadership to planning and delivery of SAPCCs and (2) recommend strategy for developing capacities and skills of political leaders, governments, practitioners, and investors on how to appropriately interpret and apply information generated by climate models and in the use of analysis and decision tools.”

The structure of this report is as follows. Sections 3 & 4 are on methodology and data. Section 5 presents the assessment on current institutional capacity in the study States, and Section 6 gives a synthesis account of inputs received from consultations with stakeholders regarding the key issues and priority capacity needs in the context of climate change. Section 7 presents the ‘roadmap’ for institutional capacity building in the six States; Sections 8 and 9 identify some ‘enablers’ in the form of ongoing government programmes, expertise available in government and non-government agencies, and ongoing project initiatives on adaptation and mitigation. For better planning and mainstreaming of climate actions, Section 10 suggests some measures to promote cross-sector approach to climate action and stronger linkages with development planning. Equally important is the need to strengthen processes for iterative learning and good accountability in the implementation process – Section 11 addresses this aspect. Finally, Section 12 concludes.

### 3. Approach and methodology

The methodological approach to the present scoping exercise has taken into consideration a number of established frameworks for institutional capacity needs assessments. These include frameworks that provide generic guidelines on capacity needs assessment across government institutions (i.e., UNDP Capacity Assessment Framework 2008<sup>1</sup>, Institutional and Organizational Development as suggested by DFID 2003<sup>4</sup>); and some specific approaches aimed at building climate change vulnerability management in institutions (i.e., UNDP capacity assessment tools for climate change institutions<sup>2</sup>, and Bellagio Framework alias National Adaptation Capacity Framework developed by the World Resources Institute 2009<sup>3</sup>).

UNDP defines capacity development as the process through which individuals, organizations and societies obtain, strengthen and maintain the capabilities to set and achieve their own development

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<sup>1</sup>UNDP Capacity Development Group, 2008a, *Capacity Development Practice Note*.

<sup>2</sup>UNDP Capacity assessment tools for climate change institutions. Capacity Assessment Scorecard, Institutional Capacities for Climate Change

<sup>3</sup>World Resources Institute, 2012. *Ready or Not Assessing Institutional Aspects of National Capacity for Climate Change Adaptation*, Washington DC, USA

objectives over time’ (UNDP 2008a). According to the UNDP Capacity Assessment Framework (2008), requirements for capacity development lie at three different levels – enabling environment, organizational, and individual. The Framework emphasizes the importance of capacity enhancement particularly at the first two levels and identifies core capacity needs in four different dimensions i.e.,

- 1) **Institutional arrangements** (referring to existing policies, procedures and processes to legislate, plan and manage the execution of plans, etc.)
- 2) **Leadership** (refers to ability to influence, inspire and motivate people, organizations and societies to achieve goals and go beyond goals)
- 3) **Knowledge** (refers to creation, absorption and diffusion of information and expertise)
- 4) **Accountability** (mechanism for adherence to goals or to understandings on responsibilities)

A capacity assessment exercise can plan to consider all or some of the four dimensions based on the context and requirement. It is also important for the assessment to take into consideration both functional and technical capacity needs, which would include core competencies in: 1) engaging stakeholders; 2) assessing a situation and defining a vision and mandate; 3) formulating policies and strategies; 4) planning to budget, manage and implement; and 5) monitoring and evaluation. This study has also found very useful the suggested approach by DFID (2003<sup>4</sup>) for assessing institutional barriers.

The study’s own approach is a synthesis of the various frameworks/methodologies as discussed above. To start with, the adapted version of the UNDP Framework presented below helps us to compare and contrast the current situation on institutional capacities on multiple fronts (relevant for implementation of actions on climate change) in the six study States. Section 5.4 of this report presents the results from the application of this comparative framework.

**Table 1: Comparative framework for assessment of institutional capacity**

Capacity Fronts	Dimensions of assessment	Typology of capacity needs
Institutional arrangements	Refers to specific nodal agency existing in a state that looks after climate change initiatives. Also, takes account of existing policies, procedures, legislative processes and other plans, government orders, circulars in place for mitigation and adaptation strategies	Administrative and Legal
Leadership	Presence of ‘visionaries’ (political or high-level executive) in the state government system, who can contribute to overcoming barriers, inspire and motivate people, organizations and societies for identifying and achieving correct goals	Visionary

<sup>4</sup>DFID.2003. Promoting Institutional and Organizational Development, March

Prioritization and accountability demonstrated towards climate risk management	Existing capacity of the state to assign special importance to particular issues, areas, sectors or population groups. Use of available information on climate risks projections for prioritization of strategies. <i>Accountability</i> is assessed based on demonstration of adherence to goals or to understanding of responsibilities	Technical and Managerial
Evidence building and management of information	Existing system for creation, absorption and diffusion of information and expertise in support of CC risk mitigation and adaptive activities, followed across different sectors. It also refers to instances where a state government has demonstrated initiatives to collaborate with different knowledge based institutions within or outside the state	Technical
Co-ordination	Existing arrangements for co-ordination both within and outside government, process of establishing relationships, sharing of information and raising awareness, including joint decision making	Managerial

#### 4. Data sources

This report is based on the review of SAPCCs (for States where government approval is awaited, the latest version of the draft SAPCC document has been taken), information available on the web regarding activities of State departments, information collected through prior engagement with State government officials (especially in case of Maharashtra<sup>5</sup>) and pre-workshop consultation meetings with State nodal officers, and stakeholder workshops with representation of multiple government departments<sup>6</sup>.

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<sup>5</sup> In case of Maharashtra, the TERI team has been frequently interacting with government officials and other stakeholders over the past four years for preparing the State Adaptation Action Plan. A number of State-level workshops have happened during this period in which the government stakeholders participated and gave inputs on capacity needs in the State. The major workshops are “Awareness Workshop on ‘Assessing Climate Change Vulnerabilities and Adaptation strategies’ for the State of Maharashtra, Mumbai, June 2010; Workshop on Climate Change, Mumbai, February 2011; Conference on “Climate Change and Sustainable Agriculture”, Mumbai, April 2011; Conference on “Climate Variability and Cash Crops of Maharashtra”, Thane, January 2013; State level Brainstorming Session on “Development of Urban Wetlands of Maharashtra: Needs, Gaps and Way Forward”, Mumbai, February 2013

<sup>6</sup> Annexure 1 gives the details of participation in stakeholder workshops conducted in the study States.

## 5. Current status of institutional capacity for SAPCC implementation in the 6 study States

### 5.1 Current institutional arrangements

The six study States vary considerable from each other with respect to the status of their respective SAPCCs. While Odisha, Kerala, and Chhattisgarh have officially approved SAPCCs, the remaining three States are yet to complete the preparation of the policy document. Odisha seems to have progressed the most in terms of implementation of the SAPCC and there is already an institutionalized system for monitoring and evaluation.

The current institutional arrangements at the State level for planning, implementation, monitoring and evaluation of identified climate strategies are presented in the following table.

**Table 2: Current institutional arrangements related to SAPCCs in the six study States**

	Assam	Bihar	Chhattisgarh	Kerala	Maharashtra	Odisha
<b>Setting priorities and goals</b>	Committee of Secretaries headed by the Chief Secretary	State Steering Committee	State Steering Committee	State Steering Committee	Maharashtra State Council on Climate Change	State Steering Committee
<b>Plan document preparation</b>	Department of Environment & Forests	Department of Environment & Forests	Department of Environment & Forests	Department of Environment & Climate Change	Department of Environment & Forests	Department of Forests & Environment
<b>Nodal agencies identified for implementation</b>	Chief Secretary's Office at the helm with Task Forces and Steering Committee augmenting it ( <b>proposed</b> )	The State Planning Board is <b>proposed</b> to act as a Nodal Agency for <u>implementation and coordination</u> of the BAPCC. All sectoral line departments and other key agencies in the state will set up Climate Change Cells in their respective departments/agencies. These	Chhattisgarh State Centre on Climate Change is <b>proposed</b> to act as Nodal Agency for <u>implementation, coordination and M&amp;E</u> of the CAPCC. All sectoral line departments and other key agencies in the state will set up Climate Change Cells	Department of Environment and Climate Change (with dedicated Climate Change Cell <b>proposed</b> ). CC Cell <b>proposed</b> in each line Department for sector level coordination; Functional committees <b>proposed</b> at	Not defined as yet	Odisha Climate Change Agency <b>proposed</b> in the SAPCC as a "single window contact" and will have advisory, supervisory, and coordinating role on climate change issues The
<b>Coordinating nodal agency</b>	Department of Environment & Forests (?)				Department of Environment & Forests (?)	

		Cells will coordinate and oversee all aspects of BAPCC implementation in their respective sectors, as well as liaise/coordinate with the State Planning Board.	in their respective departments/agencies. These Cells will coordinate and oversee all aspects of CAPCC implementation in their respective sectors, as well as liaise/coordinate with the State	the level of Local Self-Government Institutions		Agency is envisaged to function in an independent and autonomous manner, and its functioning style will be collaborative and inclusive.
<b>Monitoring and Evaluation</b>	Not defined as yet	Not defined as yet	Centre on Climate Change.	State Steering Committee headed by Chief Secretary to monitor and review implementation of activities	Not defined as yet	Monitoring and Advisory Committee led by the Chief Secretary (set up in 2011)

For the three States that have approved SAPCCs – Chhattisgarh, Kerala, and Odisha – the following SWOT analysis serves to assess the institutional arrangements (based on UNDP’s institutional capacity indicators).

**Table 3: A SWOT assessment of current institutional arrangements for States with approved SAPCCs**

State	Strengths	Weaknesses	Opportunities	Threats
Chhattisgarh	<ul style="list-style-type: none"> <li>Vertically integrated, down to the level of district administration</li> <li>Encourages cross-sector convergence</li> <li>Provides for independent evaluation</li> </ul>	<ul style="list-style-type: none"> <li>Highly centralized decision-making, with no involvement of local government units</li> <li>Limited non-state stakeholders participation</li> <li>No linkage with political decision-making at state level</li> </ul>	<ul style="list-style-type: none"> <li>State Centre for Climate Change can evolve into a Department</li> <li>Coordination mechanism at district level can promote synergies across programmes</li> </ul>	<ul style="list-style-type: none"> <li>Limited technical expertise within the State can constrain the functions of the State Centre for CC</li> <li>Capacity constraints at the local level can create bottlenecks in implementation</li> </ul>
Kerala	<ul style="list-style-type: none"> <li>High-level monitoring - encourages cross-sector</li> </ul>	<ul style="list-style-type: none"> <li>Coordination mechanisms at LSGI level not clear</li> <li>Limited non-state</li> </ul>	<ul style="list-style-type: none"> <li>Coordination mechanism at state level can promote</li> </ul>	<ul style="list-style-type: none"> <li>Limited technical expertise within the State can constrain the functions of line</li> </ul>

	<ul style="list-style-type: none"> <li>convergence</li> <li>Nodal officers in line departments – institutionalization of implementation and reporting process</li> <li>Role of local self government institutions (LSGIs)</li> </ul>	<ul style="list-style-type: none"> <li>stakeholders participation in monitoring and feedback</li> </ul>	<ul style="list-style-type: none"> <li>synergies across programmes</li> <li>Real decentralized approach to climate policy implementation with LSGI involvement</li> </ul>	<ul style="list-style-type: none"> <li>Depts.</li> <li>Capacity constraints at the local level can create bottlenecks in implementation</li> </ul>
Odisha	<ul style="list-style-type: none"> <li>High-level coordination and monitoring - encourages cross-sector convergence</li> <li>Nodal officers in line departments – institutionalization of implementation and reporting process</li> </ul>	<ul style="list-style-type: none"> <li>Highly centralized decision-making, with no involvement of local government units</li> <li>Coordination mechanisms at district level not clear</li> <li>Limited non-state stakeholders participation in monitoring and feedback</li> </ul>	<ul style="list-style-type: none"> <li>Proposed Climate Change Agency can evolve into a Department</li> <li>Coordination mechanism at state level can promote synergies across programmes</li> </ul>	<ul style="list-style-type: none"> <li>Limited technical expertise within the State can constrain the functions of the State Agency for CC</li> <li>Capacity constraints at the local level can create bottlenecks in implementation</li> </ul>

## 5.2 Leadership on planning and delivery of SAPCC in the six study States

Among all the six study States, the Odisha SAPCC seems to have received the most political and bureaucratic support in its preparation and ongoing implementation. The preparation phase saw the support to the Plan from the Chief Minister himself, and in its ongoing implementation there is regular monitoring and evaluation of progress by a high level Monitoring and Advisory Committee led by the Chief Secretary (set up in 2011). The Climate Change Cell in the nodal Forests and Environment Department is functional with a senior scientist heading a small team. There is already a proposal developed to establish the Odisha Climate Change Agency which will further institutionalize the coordination and knowledge management activities. In fact the idea to have the Climate Change Agency as a “single window contact” is quite innovative and likely to facilitate greater interaction among the stakeholders. The commitment to implementing the SAPCC seems to be high with the Chief Secretary indicating that the action plan will be implemented without waiting for central assistance<sup>7</sup>. Following the successful management of the super cyclone Phailin, the overall governance environment is one of confidence and willingness to innovate – a particularly noteworthy example of this would be the current initiatives related to developing decision support tools by the Odisha State Disaster Management Agency (OSDMA).

Maharashtra is another State in which there is high level political support as well as direct involvement of political representatives and executive heads in the preparation of SAPCC and the prioritization of

<sup>7</sup> The Economic Times, “Odisha set to implement Climate Change Action Plan”, December 12, 2013.

activities under it. A State Council on Climate Change has been set up under the chairmanship of the Chief Minister and the Council has been regularly reviewing the progress of the planning of SAPCC activities. Unlike Odisha, however, there seems to be relatively less ownership of the SAPCC and engagement in the preparation process by departments other than the nodal Environment Department. The “Working Group” approach adopted by Odisha for the drafting of the SAPCC, which had all stakeholder departments involved in the identification of strategies for a priority sector, has been missing in the case of Maharashtra. Moreover, the nodal department is yet to strengthen its capacity for cross-department coordination on planning for climate change. Institutionalized capacity for leadership at the bureaucracy level is yet to be established in this State.

For the other four study States, political support to SAPCC is weak or clearly lacking and it is individual leadership in the bureaucracy that seems to be driving forward the planning process. Such initiative by individual ‘champions’ is particularly evident in case of Bihar and Chhattisgarh where the State nodal officers have been playing a key role.

### **5.3 Prioritization and accountability**

All six SAPCCs (draft and approved) have identified priority sectors or focus areas for action. There is also some evidence of prioritization efforts to identify specific geographical areas as ‘hotspots’ and population groups as most vulnerable communities<sup>8</sup>. However, with one exception (Maharashtra), it is clear that such prioritization has not directly followed from State-specific assessment of future risks of climate change. The general approach has been to refer to climate projections and impact/vulnerability assessments at national or regional level, and use this information to construct the risk context for the State. Some States attempted to kick start the process by organizing national level seminars to discuss the challenges of climate change (e.g., Kerala and Chhattisgarh). Almost all the States constituted State Level Steering Committees to oversee all activities in plan preparation. Consultations were sought through regional workshops that involved representatives from public, private, grass roots, and civil society organizations. It thus seems that the priorities identified in the SAPCCs (excluding Maharashtra) is the result of the combined influence of inputs from stakeholder consultations, government assessment of the climate change induced risk context for the State, and government consideration of current as well as future development priorities of the State. It is difficult to establish the relative importance given to the risk context in this approach.

Maharashtra is the only State to have commissioned a comprehensive vulnerability assessment study which included the task of generating model-based climate projections specific to the State’s geography. However, serious data limitations have led to a restricted application of this approach (especially when it comes to validation of model results with local observations) leading to delay in the SAPCC preparation.

There is also a major difference among the six SAPCCs in terms of the relative emphasis between adaptation and mitigation actions. While the Odisha SAPCC has a major emphasis on mitigation actions, in case of the other SAPCCs the dominant set of actions is that of adaptation.

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<sup>8</sup> Please see the second report on CCIP scoping study for knowledge gaps.

On the accountability front, Odisha has a strong and formal institutional arrangement for review and monitoring of SAPCC actions. Maharashtra's State Council on Climate Change is similarly by design a potentially strong mechanism to ensure accountability in SAPCC implementation. Kerala's SAPCC is yet to be implemented, although the Dept. of Environment and Climate Change headed by the Additional Chief Secretary of the State appears to have at present the convening and coordinating authority that will promote accountability. On the other hand, the workshops conducted in Bihar and Assam clearly brought out the institutional level weakness in these States on this capacity front.

#### **5.4 Evidence building and management of information**

State level institutional capacity for climate action is expected to be influenced by the presence of universities and technical institutes having the potential to provide technical and strategic knowledge support to government agencies. In practice, however, such science-policy linkages at the institutional level seem to have at best remained weak in the six States under study. The scoping exercise on knowledge gaps that was conducted along with this study finds significant differences among the six States with respect to climate change related research and education currently happening in universities and technical institutes located within these States. In the specific context of climate change, Maharashtra and Odisha have taken specific steps to build evidence by commissioning major studies on vulnerability assessment and carbon footprinting, respectively. There is also evidence of strong capacity for management of information in specific government agencies in these two States (e.g. Odisha State Disaster Management Agency, e-Governance initiatives in Maharashtra, etc.)<sup>9</sup>.

#### **5.5 Coordination**

In all the six States, inter-departmental coordination related to SAPCC is the responsibility of the nodal environment department (varyingly named across States – please see Table 2 of this report). Mostly it is the individual State Nodal Officer in the Climate Change Cell of the department who is entrusted with the task. It was obvious from the State-level stakeholders' consultation workshops that the Cells have weak coordination and management capacity, and that participation of departments other than the nodal environment department in the SAPCC is of varying degree and generally still inadequate. Further, coordination on SAPCC with stakeholders outside of the government is yet to emerge strongly in the States, although there are instances of partnerships with Universities and non-government organizations.

#### **5.6 A comparative assessment of institutional capacity for SAPCC implementation in the study States**

The existing capacities of the six States have been assessed and rated based on the comparative framework presented in section 3; for each of the five dimensions in the framework, a rating scheme has been used as per the following scale:

1 = Low evidence of capacity/ anecdotal evidence of capacity

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<sup>9</sup> Please see the second report on CCIP scoping study for knowledge gaps.

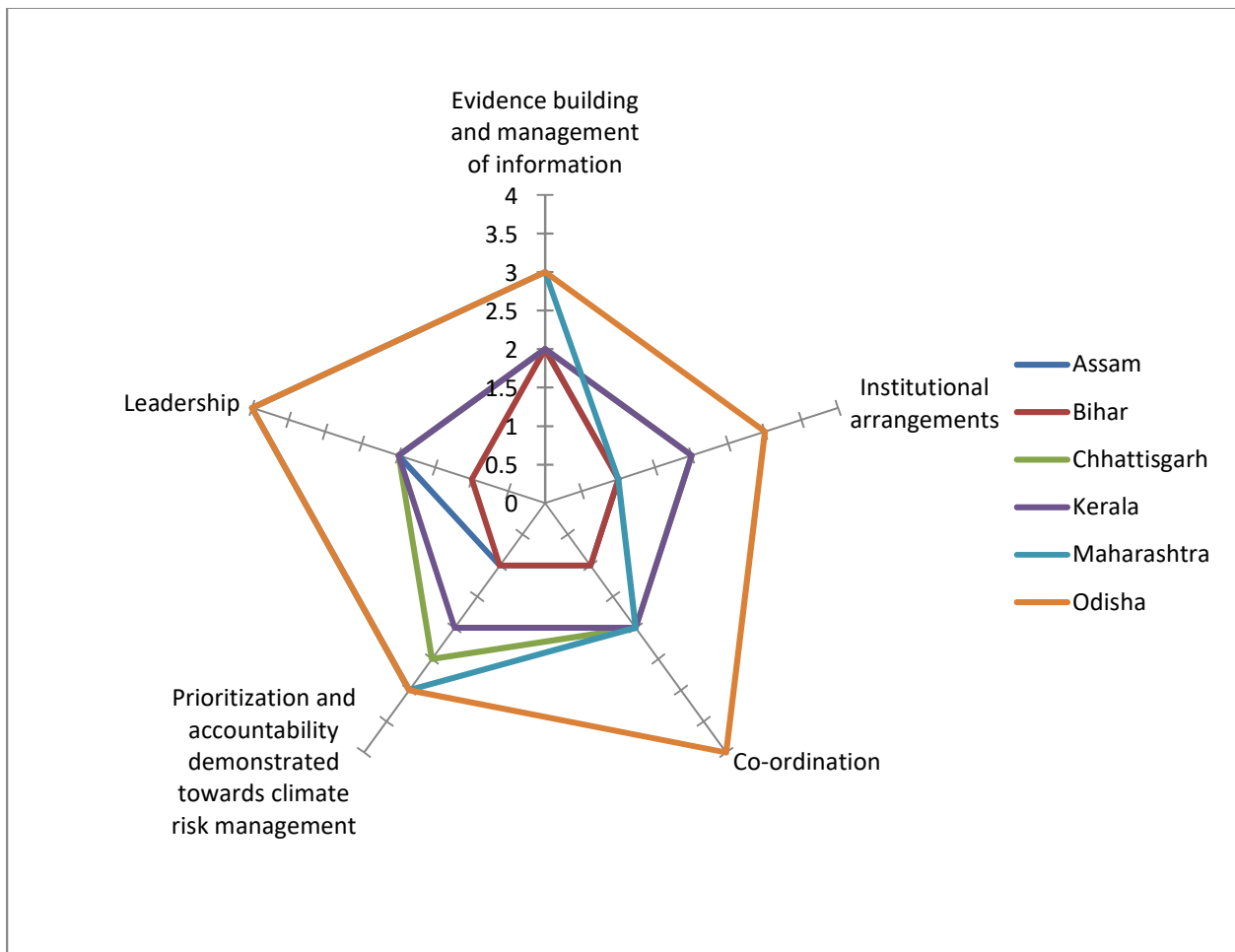


2 = Partially developed capacity

3 = Widespread, but not comprehensive capacity

4 = Capacity developed at considerable level

The figure below presents the relative standing of a State on a particular capacity front in comparison with the other five study States. Odisha clearly scores well on all fronts compared to other States (especially with respect to 'leadership' and 'coordination') – expectedly, since it was the first State in the country to come up with a SAPCC in 2009 – but there is still a need to improve upon the dimensions of 'evidence building' and 'prioritization'. Chhattisgarh and Kerala are almost equally located with the former demonstrating in its SAPCC a better capacity towards 'prioritization and accountability'. Similarly, Bihar and Assam seem to be equally located with the latter demonstrating comparatively greater engagement of the higher levels of executive in the government towards the preparation of the SAPCC. Maharashtra stands unique because of the contrast it presents – on the one hand there has been strong focus on 'evidence building', 'prioritization' and 'leadership', but on the other hand there is till date too little attention to 'institutional arrangements' and 'coordination'.



## 6. Key issues and priority capacity needs (assessment based on stakeholders consultations)

Climate change is an interdisciplinary and cross-sector issue which requires a fresh approach and a good understanding of new management tools, policies and implementation mechanisms. The SAPCCs have justifiably highlighted the need to train human resources and build technical capabilities as a key activity<sup>10</sup>.

The State-level stakeholders' workshops conducted for this scoping study identified the key issues and some priority areas in which capacity creation would be required. These priority needs have been categorized using the typology of capacity needs (Technical, Managerial, Administrative, Legal and Visionary) earlier presented in Table 1. It is obvious from the list of priority needs discussed below that the major emphasis from the stakeholders' side is on building 'technical capacity'. At the same time, it was clear to the study team that there is a need for major capacity building effort to address the existing weaknesses related to political and executive leadership on SAPCC, coordination within the government, planning and implementation mechanisms (prioritization, mobilization of finance, M&E), and developing partnerships with non-government stakeholders. The roadmap presented in section 7 therefore includes suggestions for capacity building that are not restricted to the inputs received in the consultation workshops.

### 6.1 Assam

- **Choice of appropriate technology and design of projects (Technical capacity need):** Agriculture in Assam faces a constant threat due to floods and droughts, and climate change will introduce additional vulnerability. It is important to address flood and related disasters through river bank demonstration projects aimed at protecting large scale inundation, managing social tensions, and reducing out-migration following livelihood loss because of recurrent flood incidences. Some engineering projects are underway for building safeguards against flood and erosion; however the State will benefit from expertise to provide guidance on choice of appropriate technology, design of projects that will have social acceptance, and integrated impacts assessment.
- **Planning for sustainable development pathways (Technical capacity need):** The State recognizes the priority in capacity building among government officials that would help in identifying the correct pathways for development, in accordance with environmental conservation. Some of the important development projects (i.e., projects on hydel power plants) are put on hold on account of environmental clearance requirements, and overall there is confusion that restricts further development planning. Many discourses have emerged in recent years, which however do not lead to any conclusive suggestions on the correct approach. The State hence will require expert assistance in building sustainable development strategies.
- **Building capacity in State universities and frontline government agencies for evidence building on climate change risks and impacts (Technical and Managerial capacity need):** Many climatic phenomena observed over the last one or two decades such as, rainfall, storms, floods, are becoming more and more common. There is a need to build capacity in State universities and frontline government agencies to relate such changes and associated risks to development

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<sup>10</sup> Annexure 3 gives the lists of capacity needs as identified in the approved SAPCCs of Odisha, Kerala and Chhattisgarh.

planning, by undertaking scientific studies. This is expected to contribute towards building an evidence base on climate change risks and impacts while contributing in the long run towards strengthening local research expertise.

- **Building capacity in government to review existing policy and frame correct environmental strategies (Technical and Legal capacity need):** Being a bio-diversity hotspot, Assam has a large land area under forests. However, owing to the increasing pressures of land encroachment and extractive activities, in recent years its tropical forests are showing a large scale decline leading to an overall loss of biodiversity (especially medicinal plants). With changes in rainfall pattern, temperature variation, etc there is a risk of further decline of forest cover and loss of biodiversity in the State. Similarly, wetland conservation is urgently needed to protect the vanishing wetland ecosystems. Conservation of forests and wetlands will help wildlife to adapt to the changing climatic situation. All of these needs raise the importance of correct environmental conversation strategies. The State needs to develop capacity in the system that is capable of doing such justice to its ecosystems and wildlife biodiversity.
- **Partnerships with knowledge organizations and non-government stakeholders (Managerial capacity need):** More involvement of diverse types of local institutions is necessary to maximize the utilization of local expertise available within the State for the entire gamut of environmental assessment, planning and implementation. Partnerships with State universities and other academic institutions, science-based organizations, indigenous communities, are still to be developed, which will require assistance for mediation.

## 6.2 Bihar

- **Prioritization among actions (Technical and Managerial capacity need):** Water resources management is easily the dominant priority in case of Bihar with 60% of its districts being flood prone and 40% districts drought prone. There are 24 districts that are affected by floods as there is extensive silt deposition in the river basins. The plains therefore remain water logged and there is increased pressure on the embankments. The flooding in Bihar is mostly a rural phenomenon. Stakeholders felt that considering the status of south Bihar, action needs to be prioritized in that part, so as to reduce the impacts on biophysical resources. The draft SAPCC for Bihar also emphasizes the low adaptive capacity in most districts of South Bihar. Similarly, water stress in districts of Kaimur and Chhotanagpur fringes – Rohtas, Bhabhua, Gaya, Nawada, Munger, Jamui - require priority attention for adaptation to future climate change risks, which are likely to aggravate the stress on local hydrology. 'Where', 'how' and 'what' actions to prioritize therefore becomes a key capacity need for SAPCC implementation.
- **Building capacity for evidence building on local fuel consumption and its sourcing (Technical and Managerial capacity need):** In the energy domain, fuel consumption and its sourcing is an important area of concern. In the forest fringes of the above mentioned districts, it will be needed to conduct surveys to assist the planning for adaptation and mitigation actions. The documentation of traditional knowledge (especially that of tribal communities) in the above mentioned areas will provide important insights for designing effective mitigation /adaptation strategies to counter climate change.
- **Building research capacity in State universities (Technical and Managerial capacity need):** The State possesses automated weather stations and the availability of climate projections at 50X50 resolution. This is being used to conduct impacts assessment studies in the agriculture and

water sectors. A number of initiatives are underway to assess agricultural impacts from climate change risks. RAU and BAU are key universities working on agriculture in the State. A weather alert system have been initiated with provides 2 days advance forecast on weather parameters. Data is being collected at the block level, new tablets and GPRS has been introduced to facilitate the same. A strong need is felt to have long term research programmes and provide for strengthening of data infrastructure.

- **Skill-building on resilient farm practices and livelihood diversification (Technical capacity need):** As 60% districts are flood prone and 40% districts are drought prone, lot of work is being done on developing new varieties of seeds/crops. Bamboo plantations and cash crops cultivation have been introduced so that 1-2 crops can be planted. Lean period subsidized rates are also given to benefit farmers. Bio-fertilizers (cow dung, urine, neem) have been used to overcome the pests that have increased. Skill-building is required on food processing and agro-forestry that can promote livelihood diversification.

### 6.3 Chhattisgarh

- **Building scientific and technical capacity in improved assessment of local taxonomies (Technical capacity need):** With a 44 percent forest cover in the State, the forestry sector undoubtedly bears utmost importance in the climate change adaptation agenda for Chhattisgarh. The need of the hour is to develop the State's own capacity for biodiversity conservation. Scientific and technical capacity in improved assessment of local taxonomies, especially with the involvement of local taxonomic knowledge base (traditional/ folklore), is an important requirement. While there is an ongoing biodiversity assessment exercise by Zoological Survey of India (ZSI) and Forest Survey of India (FSI) assessments, new initiatives are planned under the Compensatory Afforestation Fund Management and Planning Authority (CAMPA) support to cover all districts, which will ultimately lead to publication of a comprehensive database on species in the State.
- **Strengthening capacity to conduct collaborative research on climate change impacts in the State context (Technical and Managerial capacity need):** For the eight priority sectors highlighted in the SAPCC, in general it would be required to conduct local level vulnerability assessment studies since the presently available assessments are inadequate. The threats to indigenous plant species is illustrated by taking the case of rice. Of the total 23,345 varieties of rice which were cultivated in the State earlier, nearly 30-40% varieties have disappeared over the last few decades due to several reasons. Also, the timing for flowering in case of cereal crops and crop-maturity is seen to have largely altered over the recent past. There however remains a need for robust study design with methodological credibility to capture such changes. A number of academic institutions, including the state agricultural universities, have initiated research studies on climate change impacts in the State context, and could very well be involved in this kind of assessment on a collaborative and programmatic mode.
- **Building capacity for evidence building on impacts and coping strategies in the agriculture sector (Technical and Managerial capacity need):** Increased inter-district variation in rainfall and temperature is already evident, along with greater incidents of extreme events. Rainfall during retreat of monsoon in October has decreased to a considerable extent; even the onset of monsoon has shifted by 7 days (10 June to 17 June), and all of these phenomenon are potentially affecting agriculture (such as the northwards shift of the wheat zone in the State).

Importantly, farmers knowingly or unknowingly have started adapting to these changing situations. For a climate resilient agriculture sector the State needs to build up its evidence base of local impacts and coping strategies.

- **Sensitization of government officials across departments (Technical capacity need):** Discussion in the State consultation meeting highlighted the need for appropriate sensitization of government officials across departments. This is all the more needed for personnel in the twelve nodal departments identified for implementation of SAPCC strategies in Chhattisgarh. A list of key-resource persons is already drawn by the Department of Forests, which includes the experts from different public departments, academic institutions, private organizations, apt for serving as a resource-group for further action on the State plan, through their roles as educators or facilitators in building State-capacity in the related domains.
- **Building capacity for financial resource mobilization toward SAPCC implementation (Technical, Administrative and Managerial capacity need):** The priority for the State also would be to enhance capacity for financial resource mobilization, essential for the implementation of SAPCC strategies. This is possible through useful guidance and handholding for an initial period. Financial resources available at present for implementation of SAPCC strategies are minimal and are single sourced through the State's own budget. This clearly will prove to be insufficient for supporting the number of activities that are planned under SAPCC; including the very functioning of the proposed Climate Change Cell in the nodal department.

## 6.4 Kerala

- **Building capacity for evidence building on climate change impacts in the fisheries sector (Technical capacity need):** Fisheries are a priority sector for Kerala. At present there are only a limited number of studies on the likely future changes in sea-surface temperatures and consequent impacts on the fishery sector, which is acting as a constraint to informed decision making. Studies on the impact on livelihood of coastal communities are essential for developing appropriate adaptation strategies.
- **Building capacity of government training institutes to sensitize and train agriculture extension workers on climate change (Technical and Managerial capacity need):** Agriculture is another priority sector that requires significant capacity building. Assessment of vulnerabilities of important cereal and cash crops in the State requires relevant scientific and technical capacity building. Also, building capacity among agriculture extension workers for better dissemination of knowledge among farmers is important. Farmers are failing to understand crucial issues that are becoming uncertain with changing climatic characteristics; hence imparting correct knowledge will create social insurance against CC risks and vulnerability.
- **Building capacity for risk assessment, adaptation planning and implementation in water sector (Technical, Legal and Managerial capacity need):** Capacity building in assessment of risks and in planning appropriate adaptation strategies in the water sector is considered important. This should also include further work on ocean science. Building capacity for assessment of risk exposures from water would carry important relevance for public health programmes in the state. Execution of water conservation schemes has been a major challenge in the State. It could be enhanced through various capacity building initiatives.

- **Building capacity of frontline government agencies on monitoring land-use/land-cover changes over time (Technical and administrative capacity need):** The State has around 1/3rd of its geographical area under forests, which is further expanding under afforestation programme under the Green India Mission. It is essential that the State is capable of monitoring land-use/land-cover changes over time, linking it to invasion of species and bio-diversity and wild life conservation issues. Moreover, there is a need for identifying economic opportunities based on forest products (such as bamboo), and key stakeholders will benefit from capacity creation in this regard.
- **Sensitization of government officials across departments (Technical capacity need):** Overall, Kerala requires building awareness and sensitization on climate change issues across various departments, which would help in expediting the design and implementation of actions. Research and development (R&D), assessment of CC risks, capacity and awareness building need to be pursued with reference to the specific contexts of the three broad physical divisions of the State, viz, hills, plains and the coast.
- **Scaling up of expertise that lies with different resource centers in the State (Technical and Managerial capacity need):** It is important to strengthen the expertise that lies with different resource centers in the State. The State has on-going R&D efforts in the transport sector that can be scaled up. Projects/studies suggested include planning of inland waterways, sustainable urban transportation and comprehensive mobility plans, and pilot projects on electricity / LNG driven water transport for the backwaters.
- **Choice of technology and financial mobilization for waste management (Technical capacity need):** Technical and financial support is needed in the area of waste management in the State. A study on comparison of waste management technologies along with costs, benefits, and linkages with other sectors like agriculture was suggested as a priority.
- **Panchayat level coordination (Administrative capacity need):** The focus/priority action should be on enhancing preparedness at local levels including *Panchayat* level coordination. Capacity building program for ASHAs was suggested for effective communication of coping strategies at the community level.

## 6.5 Maharashtra

- **Building local capacity in efficient groundwater management (Technical capacity need):** Water resources management is among the top priorities of Maharashtra. Rural Maharashtra is heavily reliant on ground water – it provides more than 70% of irrigation and 90% of drinking water for the State’s rural population. The areas with high degree of groundwater extraction have low rainfall but high share of water-intensive crops and deterioration of groundwater quality. Climate change is projected to reduce the availability of water in Maharashtra’s rivers<sup>11</sup> – Tapi, Narmada, Godavari, and Krishna, and increase the frequency of droughts. This will exacerbate the dependence on groundwater. There is therefore a need for building capacity among district officials and line agency officials on efficient technologies and water conservation practices. Also, water user associations can possibly monitor groundwater availability and regulate its use. Building the capacity of communities and local NGOs to build small decentralized water

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<sup>11</sup>Gosain et al 2006

harvesting structures would help scale up such interventions by the government and ensure that they are self-sustaining and locally appropriate.

- **Building capacity among urban water managers (Technical and Administrative capacity need):** Further, urban demand for water will pose an additional stress – Maharashtra already has six million-plus population cities, and is projected to become more than 60% urbanized by the 2050s. In this context, it is critically important to have adaptation strategies that will help take stock of existing water resources and monitor their use, manage the competing demands for water, and augment its supply. Better management of this dwindling resource requires frequent measurement and monitoring.
- **Building capacity in government on climate change awareness campaigns (Technical and Managerial capacity need):** The government needs to come up with extensive awareness campaigns for large scale adoption of efficient irrigation technology and resource efficient farm practices in rural areas. In urban areas, municipalities would need to be made aware of successful urban water initiatives<sup>12</sup> that can be replicated. Demonstration projects on rainwater harvesting would also motivate local communities.
- **Building capacity for enhanced science-policy interface in agriculture sector (Technical, Legal and Managerial capacity needs):** The biggest challenges for agriculture in Maharashtra are to increase productivity and protect farmer livelihoods in a scenario of climate change, over-extraction of groundwater, and soil degradation. This calls for a combination of scientific knowledge and economic incentives to encourage the sustainable intensification of agriculture, diversification to less water-intensive crops, value addition through agro processing, and provision of marketing and infrastructure to farmers.

## 6.6 Odisha

- **Building capacity in disaster risk reduction and convergence of activities (Technical and Administrative capacity needs):** An extended area under coastal belt (about 480kms) makes the State of Odisha particularly vulnerable to multiple natural disasters and more specifically to pre-monsoon tropical cyclones, storm surges and tsunamis. This is further aggravated due to its sub-tropical littoral location. Frequent flooding is observed due to lack of carrying capacity of the rivers with heavy loads of silt. The extent of damages caused by the natural events sometimes becomes enormous, since the coastal belt is densely inhabited. The State hence needs development of capacity in disaster management and over all risks reduction, dealt with utmost priority. To maximize benefits it would be essential to plan for activities with convergence across different government departments. The Odisha State Disaster Management Authority (OSDMA) is the nodal administrative body working in this direction. OSDMA's recent success in the management of cyclone storm Phailin has earned wide appreciation, which as planned by the NDMA may be taken as the model for other States' disaster management plans.
- **Training of government officials on energy efficiency and green energy generation (Technical capacity need):** Another area of priority is tapping of opportunities for alternative energy use.

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<sup>12</sup> An example is that of the Badlapur Municipal Corporation, which implemented an institutional eco-sanitation facility including recycling and reuse of waste-water, together with biogas plant and a horizontal flow constructed wetland system.



State capacities would require to be built for providing energy supply to villages, public facilities and other localities which are either not connected to grid electric supply or receive dismal services. Several capacity needs are identified for extending alternative energy supply through hybrid grids, and mini-grids for remote areas. Developing options for green-energy generation would also require appropriate training of officials. Enhancing energy-use efficiency is undoubtedly an important area where there remains a significant capacity gap. The State nodal agency, Odisha Renewable Energy Development Agency (OREDA) has been identified for various projects under SAPCC.

- **Creation of evidence base at the local level (Technical and Managerial capacity need):** A key capacity need is creation of appropriate evidence base at the local level, based on demonstration projects on multiple aspects, viz, conversion of fallow lands to agro-forestry projects; clean energy use for cooking and lighting; management of disaster situations with successful convergence across departments; projects on integrated water resource management; disease surveillance systems; weather-based crop insurance; etc.
- **Strengthening capacity to conduct collaborative research on climate change impacts in the State context (Technical and Managerial capacity need):** Additionally developing State's capacity for assessments of climate change threats on particular communities (i.e., fishermen), crops (i.e., rice) or vegetation (i.e., land-use/land-cover) is an essential pre-requisite for correct decision making. This needs strengthening of appropriate technical capabilities at different levels across government departments. Various academic institutions present in the State can collectively and collaboratively act as a resource group, which can play a dominant role for enhancement of knowledge and capacity in many of the above mentioned aspects.
- **Creation of knowledge and awareness among government officials and the general population (Technical and Managerial capacity need):** To be able to link up with the eight Missions outlined under the NAPCC and to recognize the State's relevance to these missions, the State-department officials will require enhancement of knowledge and awareness on the overall dimensions of climate change determinants, which appears somewhat lacking at present. Creation of knowledge and awareness among general population on the aspects of climate change threats and uncertainties is important to modify practices that have large implications both for mitigation and adaptation domains.
- **Building capacity in utilization of decision support system tools and techniques (Technical capacity need):** Enhancing capacity in utilization of decision support system tools and techniques is deemed to be essential. The use of remote sensing technology for assessment of heat-islands phenomenon could be very well planned for appropriate urban planning. There is need to develop basin level assessments, which would require specific skill building among the State officials. Environmental assessment for forecasting, future climate scenarios building, projections of resource availability, etc –these newer developments require relevant skills to be developed among technical personnel in the State agencies.



## 7. Recommended activities to build institutional capacity – a roadmap for CCIP

The roadmap for capacity building suggested in this report is largely a common programme of action for the six study States. While there is undoubtedly great diversity among the States, at a basic level the capacity needs are common and mostly relate to evidence building, prioritization, and co-ordination – all of which require technical and managerial support as per the framework presented in Table 1 of this report. The immediate requirement is to complete the process of putting in place the SAPCC related institutional arrangements in all six States. The roadmap proposes that this process be completed within the first 4 to 6 months of the CCIP with targeted support to select States as explained in sub-section 7.1 below. Complementing such support, and during the same time frame, the CCIP should aim at creating the necessary administrative and managerial capacity within the government in all States – the necessary activities in this regard are given in sub-section 7.2. Thus, in the immediate time frame, necessary institutional capacity is created for planning, prioritization, coordination, and monitoring of SAPCC implementation. The emphasis of the roadmap then shifts to addressing technical capacity needs for SAPCC implementation in all six States - sub-sections 7.3 to 7.6 identify the capacity building activities in this regard.

### 7.1 Activities in the immediate time frame (first 4 to 6 months), for select States

#### 7.1.1 Finalization of SAPCCs (Assam, Bihar)

<b>Relevance</b>	The States of Assam and Bihar are yet to finalize their SAPCCs and the institutional capacity to accomplish this is sorely lacking.
<b>Link with CCIP/SAPCC goals</b>	One of the key outputs under CCIP is support for preparation/ refinement of SAPCC through risk assessment studies, institutional strengthening, and awareness building.
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Expert consultation on the existing draft SAPCCs</li> <li>• State level sensitization workshop for technical experts from nodal departments; participatory ‘mapping and prioritization’ exercise to obtain inputs regarding strategies and actions</li> <li>• Endorsement by Steering Committee</li> </ul>
<b>Stakeholders to be targeted</b>	CC Cell in nodal environment department; nodal officers identified in other departments; members of high level Steering Committee
<b>Expected outcomes</b>	A clear and comprehensive roadmap for policy response on climate change at the State level, consistent with NAPCC principles

#### 7.1.2 Enabling the setting up of proposed climate change agencies/resource centres / etc (Chhattisgarh, Kerala, and Odisha)

<b>Relevance</b>	This activity caters to specific proposals made in this direction in the approved plan documents of Chhattisgarh, Odisha, and Kerala.
<b>Link with CCIP/SAPCC goals</b>	A key CCIP output is to strengthen institutional structure for planning, implementation and monitoring of SAPCC.

<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Personnel training and systems building for the proposed Chhattisgarh State Centre on Climate Change, which is envisaged to act as Nodal Agency for implementation, coordination and M&amp;E of the SAPCC.</li> <li>• The Govt. of Kerala has inaugurated a <b>Climate Institute</b> on 5th of June, 2014 at Kottayam. The Institute is mandated to impart training on related issues, to conduct research studies, and to provide useful advisories to the State government departments. The institute will benefit from support under the CCIP to develop training resources, knowledge products, long-term research programmes (especially on climate change impacts on marine ecosystems), and international academic collaborations.</li> <li>• Development of <b>single-window system</b> as proposed in the Odisha SAPCC would require significant capacity building on ICT-based knowledge and database management (KM). The proposed Odisha Climate Change Agency can over time evolve into a full-fledged Department – accordingly personnel training and systems building would be important.</li> </ul>
<b>Stakeholders to be targeted</b>	<ul style="list-style-type: none"> <li>• Technical experts in the Nodal Departments identified in the SAPCCs for implementation of strategies – this will create a cadre that can contribute to the staffing of the proposed climate change agency / institute / etc.</li> <li>• Also, known experts from University departments / centres of excellence within the respective States, as well as from national institutes in the State.</li> </ul>
<b>Expected outcomes</b>	Enhanced institutional capacity within each State for planning, implementation, and monitoring of the SAPCCs.

### 7.1.3 Enabling the launch of local adaptation action plans (Maharashtra)

<b>Relevance</b>	Local adaptation action plans are crucial to building resilience at the community level. Also, since the impacts of climate change will be felt at the local level, the action on adaptation should ideally be based on local priorities and capabilities.
<b>Link with CCIP/SAPCC goals</b>	This links directly to CCIP’s goal to facilitate implementation of SAPCCs
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• The draft SAPCC for the State of Maharashtra includes six specific district level adaptation action plans that have been prepared in consultation with key stakeholders; these plans can be considered under the CCIP for implementation by facilitating access to necessary finance and providing the required technical support.</li> </ul>

<b>Stakeholders to be targeted</b>	Line agencies of the departments at the district level
<b>Expected outcomes</b>	Improved coping capacity at local level

#### 7.1.4 Developing/refining State-specific M&E frameworks for SAPCC activities (Chhattisgarh, Kerala, Maharashtra, Odisha)

<b>Relevance</b>	Monitoring and evaluation (M&E) of SAPCC actions is important to ensure continuous improvements in the process. The focus of the M&E framework is to assess the implementation process with respect to the targets envisioned, financial resources used and strategies accomplished. Especially in the context of climate change ‘mainstreaming’, M&E on the project level is insufficient and a more strategic approach is essential. Further, measurable, reportable, and verifiable (MRV) frameworks for monitoring adaptation are increasingly gaining importance in the emerging international regime on climate finance (it is for example an integral element in the design of the Green Climate Fund). M&E of adaptation is therefore an important aspect of climate finance and climate finance readiness.
<b>Link with CCIP/SAPCC goals</b>	A key CCIP output is to strengthen institutional structure for planning, implementation and monitoring of SAPCC.
<b>About the activity</b>	Of the 6 States, Odisha has developed a sector specific M&E framework wherein it has identified the targets which need to be monitored, programs that are to be evaluated, along with the frequency at which it needs to be done. Similar frameworks need to be developed for other States as well.
<b>Stakeholders to be targeted</b>	Nodal Departments identified in the SAPCCs for implementation of strategies – technical experts as well as head of the departments at the level of Secretary / Principal Secretary
<b>Expected outcomes</b>	An effective feedback mechanism on successes as well as failures of the SAPCC actions on the ground, which will contribute to the refinement of the Plan priorities and implementation strategies.

## 7.2 Activities in the immediate time frame (first 4 to 6 months), for all States

### 7.2.1 Sensitizing policymakers on climate change risks and strategies

<b>Relevance</b>	High level political commitment helps promote cross- sector policy development and is possibly one of the principal reasons behind its successful diffusion to lower levels of governance (Sud et al, 2014 <sup>13</sup> )
<b>Link with CCIP/SAPCC goals</b>	This directly fits into the overall mandate of CCIP on facilitating integration of climate change into public and private sector policies and investments

<sup>13</sup>Sud, R., A. Mishra, N. Verma and S. Bhadwal (2014), Adaptation policy and practice in densely populated glacier-fed river basins of South Asia: a systematic review, CARIIAA Background Paper, IDRC, Canada.

<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Half-day focused sensitization programme for State legislators (on an annual basis) following the CoP meetings at the international level</li> <li>• Development of policy briefs, programme briefs and knowledge material on climate change drivers and impacts, ensuring limited use of technical jargon</li> <li>• Building case studies on demonstration projects and updating legislators' knowledge with new study findings</li> <li>• Facilitating participation of pro-active legislators in high-level international conferences/symposia on climate change (including CoP events)</li> </ul>
<b>Stakeholders to be targeted</b>	State Legislators
<b>Expected outcomes</b>	Improved political leadership on action on climate change at the State level

### 7.2.2 Creating convergence across Government Departments

<b>Relevance</b>	Efficient coordination among various government agencies is a prerequisite for effective SAPCC implementation and would help avoiding duplication of efforts
<b>Link with CCIP/SAPCC goals</b>	Building state capacity for effective coordination comes under the CCIP's scope of strengthening skills and systems to assess and tackle climate change
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Strengthening the technical and management skills in the nodal (environment) department's CC cell</li> <li>• Building capacity in people and systems across all nodal departments for coordinated implementation of diverse set of adaptation and mitigation projects</li> <li>• Enhancing skills in State Planning Boards for better integration of climate change actions in existing cross-sector development programmes</li> </ul>
<b>Key Stakeholders to be targeted</b>	<ul style="list-style-type: none"> <li>• CC Cell in the environment department</li> <li>• Nodal Departments identified in the SAPCCs for implementation of strategies – head of the departments at the level of Secretary / Principal Secretary</li> <li>• State Planning Board</li> </ul>
<b>Expected outcomes</b>	Resource optimization in achieving SAPCC goals; move towards a more holistic policy approach to addressing cross-sector challenges

### 7.2.3 Developing capacity for raising and allocation of funds required for implementation of SAPCC strategies

<b>Relevance</b>	For the SAPCC actions that would be integrated with existing policies and programs, financing is expected through usual budgetary outlays.
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	<p>However for additional actions, added resources will be required to bear the incremental costs. How will these be arranged; what will be the different instruments and delivery mechanisms for mobilizing this finance are important questions that need to be addressed for effective implementation. Amongst the six States only Odisha has identified the sources of finance which include central assistance, state government allocations, external funding, support from donor agencies, etc.</p>
<b>Link with CCIP/SAPCC goals</b>	<p>The capacity needs fits into the direct focus of CCIP's technical assistance for facilitating accessing necessary finance</p>
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Orientation workshops on 'climate budgeting' for allocation/ rearrangement of available State budgetary resources to address SAPCC priorities</li> <li>• Training on proposal development for accessing funds from international and national sources that provide financial assistance for adaptation and mitigation projects/programmes</li> <li>• Providing opportunities for networking with potential funders from corporate sector, multi-lateral and bi-lateral sources, UNFCCC mechanisms, and so on.</li> </ul>
<b>Stakeholders to be targeted</b>	<ul style="list-style-type: none"> <li>• State Planning Board; Heads of Departments identified in SAPCC for implementation</li> <li>• Nodal officers (technical experts) from Departments identified in the SAPCCs for implementation of strategies</li> </ul>
<b>Expected outcomes</b>	<ul style="list-style-type: none"> <li>• Strengthening the state's knowledge and capacity to exploit available central funds</li> <li>• Making project proposals competitive enough to withstand critical review process in international financing mechanisms established under the UNFCCC</li> <li>• Making the state prepared to attract large funding which are to be announced further</li> </ul>

#### 7.2.4 Undertaking policy reviews in key sectors to identify opportunities for 'mainstreaming'

<b>Relevance</b>	<p>It would be crucial to review existing policies across different key sectors and identifying opportunities for mainstreaming climate change concerns in development planning henceforth. Planning of specific adaptation and mitigation efforts with interdepartmental convergence would be important. This will maximize utility of available financial resources.</p>
<b>Link with CCIP/SAPCC goals</b>	<ul style="list-style-type: none"> <li>• This links to CCIP's objective to facilitate integration of climate change into public and private sector policies and investments.</li> <li>• The SAPCCs have also identified this need for specific sectors. The Odisha SAPCC for instance specifically states the need for revising and integrating climate change concerns in the State Agricultural Policy, Disaster Management Policy, Health Policy, Mineral Policy, and Transport Policy.</li> </ul>

<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Annual workshops for inter-departmental planning and coordination</li> <li>• Allocation of budgetary provision for collaborative projects/programme that encompass priority focus across departments</li> <li>• Collaborative planning for social and physical infrastructure, making the access equitable and climate resilient</li> </ul>
<b>Stakeholders to be targeted</b>	Members of high level Steering Committee Nodal officers from number of departments
<b>Expected outcomes</b>	Climate resilient planning and implementation of development projects; Targeting policy and institutional reforms, to match up with new approaches that encompass climate change concern

#### 7.2.5 Establishing State Knowledge Network on Climate Change<sup>14</sup>

<b>Relevance</b>	The Indian Network for Climate Change Assessment (INCCA) established by Government of India in 2009 brings together over 120 institutions from across the country to undertake scientific assessments of different aspects of climate change; devise decision support systems; and build capacity towards management of climate change related risks and opportunities. INCCA has been visualized as a mechanism to evolve institutions as well as engage other agencies already working in the area of climate change (INCAA 2010 <sup>15</sup> ). A similar knowledge network can be established within States, having linkages with INCAA.
<b>Link with CCIP/SAPCC goals</b>	This links to CCIP's specific output goal for creation of knowledge products, sharing mechanisms and platforms
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Creating a database of institutions located within the State and identifying research leads for specific climate change issues</li> <li>• Supporting annual science-policy symposia in the State for network members</li> </ul>
<b>Stakeholders to be targeted</b>	University departments / centres of excellence within the States, national institutes in the State, and relevant government resource centres (including the proposed agencies /resource centres on climate change)
<b>Expected outcomes</b>	<ul style="list-style-type: none"> <li>• Pooling of knowledge and expertise available in the States</li> <li>• Greater science-policy interface at the State level</li> </ul>

<sup>14</sup> An illustration of a State Knowledge Network on Climate Change for Kerala is presented in Annexure 2.

<sup>15</sup>INCAA 2010

## 7.3 Activities in the short-run time frame (first 8 to 12 months), for all States

### 7.3.1 *Creating State-specific knowledge base on climate change risks to development*

<b>Relevance</b>	All States are in clear need of creating/ updating the existing knowledge base on impacts of climate change risks across multiple sectors.
<b>Link with CCIP/SAPCC goals</b>	Building states' capacity in this direction would fit CCIP/SAPCC goals that focus on technical assistance- for strengthening skills and systems to assess and tackle climate change
<b>About the activity</b>	State-level capabilities related to inventorization and assessments can be strengthened in areas related to: <ul style="list-style-type: none"> <li>• Preparation of ecosystem and biodiversity accounts (Natural Resource Accounting)</li> <li>• Impact and vulnerability assessments at the species level to climate change risks (specifically in forestry, agriculture, livestock, and fishery sectors)</li> <li>• Vulnerability assessments of socio-economic systems at local scale</li> </ul>
<b>Stakeholders to be targeted</b>	<ul style="list-style-type: none"> <li>• Technical experts from all departments associated with SAPCC preparation and responsible for implementation</li> <li>• University departments / centres of excellence within the State, national institutes in the State, and relevant government resource centres (including the proposed agencies /resource centres on climate change)</li> </ul>
<b>Expected outcomes</b>	<ul style="list-style-type: none"> <li>• Increased access to assessment tools and techniques</li> <li>• Enhanced capacity to make informed policy decisions</li> <li>• Increased Departmental convergence with information about cross-sector impacts</li> </ul>

### 7.3.2 *Development of a toolkit for climate change vulnerability assessment at the State-level*

<b>Relevance</b>	<p>Planning for climate resilient planning is largely dependent on correct projections of changing climate. It would be essential to assess the risks and uncertainties imposed by the changing climate. Building accurate future models on climate change scenarios would help in planning for the climate resilient approaches.</p> <p>The states needs to develop infrastructural bases for collection of observation data on climate statistics, and would require capacity enhancement for future projections of climate risks, using robust modeling techniques.</p>
<b>Link with CCIP/SAPCC goals</b>	This links to CCIP's specific output goal for creation of knowledge products. It will also contribute to the development of a decision support system (or prioritization tool) on adaptation, which is one of the focus areas of technical assistance under CCIP.
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Building of infrastructure for recording climate data and statistics, through automated weather stations</li> </ul>



	<ul style="list-style-type: none"> <li>• Establishing network of automated weather stations</li> <li>• Training of persons on techniques of recording climate statistics, climate change risks assessments and climate modeling</li> <li>• Assessment of sectoral vulnerability and climate change risk profiling for different sectors</li> </ul>
<b>Stakeholders to be targeted</b>	<p>Technical persons from different department</p> <p>New cadres of technical manpower trained in weather science could be appointed under each key department</p>
<b>Expected outcomes</b>	<ul style="list-style-type: none"> <li>• Increased access to assessment tools and techniques</li> <li>• Enhanced capacity to make informed policy decisions</li> <li>• Increased Departmental convergence with sharing of information about climate change impacts</li> </ul>

### 7.3.3 Developing State-level GHG emissions inventory

<b>Relevance</b>	Low carbon development pathways for the States require an understanding of sources of emissions, and an assessment of change in the inventory over time.
<b>Link with CCIP/SAPCC goals</b>	The emissions inventory can be linked to a decision support system (or prioritization tool) on mitigation, which is one of the focus areas of technical assistance under CCIP.
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• State-level workshops on emissions inventorization</li> <li>• Carbon footprinting studies for specific economic sectors and assessment of mitigation potential of specific technologies for these sectors (e.g. fisheries sector in Kerala<sup>16</sup>, major industrial clusters<sup>17</sup>)</li> </ul>
<b>Stakeholders to be targeted</b>	<ul style="list-style-type: none"> <li>• Technical experts from all departments associated with SAPCC preparation and responsible for implementation</li> <li>• University departments / centres of excellence within the State, national institutes in the State, and relevant government resource centres (including the proposed agencies /resource centres on climate change)</li> </ul>
<b>Expected outcomes</b>	Low carbon development planning for the State

<sup>16</sup> In the Kerala stakeholders workshop, it was pointed out that around 3.7 tons of CO<sub>2</sub> is released while harvesting 1 ton of fishes. It was suggested that pilot projects on new clean technology could be undertaken with an objective to reduce the carbon footprint of the sector and making the sector less CO<sub>2</sub> emitting. LNG driven fishing ports/transport was highlighted as a priority as it has co-benefits for the fishery sector given that the coolant can be used for storing fish on boats/ports for more number of days. A draft plan is already in place which could be looked at afresh.

<sup>17</sup>Odisha SAPCC



### 7.3.4 Developing strategic management plans / standard operating procedures / guidelines

<b>Relevance</b>	Natural resource management (water, forests, etc) in the context of climate change would require developing sustainable management plans and appropriate standard operating procedures (SOPs).
<b>Link with CCIP</b>	This would contribute towards strengthening the institutional arrangement in the States for effective SAPCC implementation.
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Development of integrated approach to flood and river erosion management (especially Assam, Bihar)</li> <li>• Adaptation plans for wildlife parks, sanctuaries, etc (all States)</li> <li>• Sustainable management plans for wetland ecosystems (all States)</li> <li>• Development of model CDPs (city development plans) which look into considerations of municipal waste management, deployment of renewable energy, green buildings, urban mobility planning, rainwater harvesting amongst other things (all States)</li> </ul>
<b>Stakeholders to be targeted</b>	All departments associated with SAPCC preparation and responsible for implementation
<b>Expected outcomes</b>	<ul style="list-style-type: none"> <li>• Prescriptive operating procedures would help standardize different activities planned across and within departments</li> <li>• It will be easier to follow specific expectations while planning for new initiatives</li> </ul>

### 7.3.5 Developing ToT (Training of Trainers) resource kits on community adaptation to be delivered through State training institutes

<b>Relevance</b>	Training kits for trainers would be essential to enhance technical competence of trainers mandated to impart training on community adaptation to climate risks. State training institutes would require to appropriately orient trainers who would deliver on rural communication on climate risks & uncertainty, participatory assessment, micro-planning, participatory monitoring & evaluation and leadership building.
<b>Link with CCIP</b>	The resource kits are knowledge products and such technical assistance will be contributing towards strengthening skills and systems to assess and tackle climate change.
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Training of government extension officers</li> <li>• Special emphasis on women Self Help Groups</li> <li>• Augmenting the activities of CAPART and NABARD</li> </ul>
<b>Stakeholders to be targeted</b>	<ul style="list-style-type: none"> <li>• Frontline government officials of departments associated with implementation of adaptation actions identified in the SAPCC (especially for agriculture, water resources, health, disaster management, and livelihoods)</li> <li>• Technical personnel from reputed NGOs in the State</li> </ul>
<b>Expected outcomes</b>	Capacity enhancing modules for building community level aptitude for promoting participatory and self reliant actions

7.3.6 *Developing long-term innovations-oriented research programmes relevant to the State context to be carried out in Universities within the State*

<b>Relevance</b>	Developing long term research programmes, undertaking detailed studies at the regional as well as local level and generating a consolidated knowledge base areas is a priority area in institutional capacity building that has been identified in the relevant literature.
<b>Link with CCIP</b>	It directly links up to the objective of enhancing knowledge base, by strengthening skills and systems to assess and tackle climate change risks
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Lead institutions may be identified within each State to provide training to improve the research capabilities at local and regional levels on climate change impacts assessment and management strategies. These lead institutions would have the responsibility of identifying the research priorities according to the State’s vulnerability to climate change.</li> <li>• It is proposed that lead institutions of the knowledge network would conduct high-quality annual Research Schools<sup>18</sup> for training regional scientists and researchers on new concepts and methods and provide seed funding to innovative proposals of high practical relevance.</li> </ul>
<b>Stakeholders to be targeted</b>	University departments / centres of excellence within the States, national institutes in the State, and relevant government resource centres (including the proposed agencies /resource centres on climate change)
<b>Expected outcomes</b>	<ul style="list-style-type: none"> <li>• Systematic efforts will be directed to build evidences on climate change impacts, as being felt by the states.</li> <li>• State planning and implementation could be reorganized, considering research based advocacies</li> </ul>

7.3.7 *Strengthening observations network*

<b>Relevance</b>	Strengthening states’ infrastructure base for climate and environmental observation centre would be essential for further analytical studies. Building network of observation centres, would help in generating data for weather forecasting, air-pollution modeling and environmental impact assessments. Many states including Bihar are already having number of automated weather stations functioning in the states. It would be important to strengthen this further.
<b>Link with CCIP/SAPCC goals</b>	Generating data on environmental statistics would be pre-requisite for enhancing climate change knowledge base. Technical assistance provided by the programme would help building this essential key

18 An example is R&T workshops of the South Asia Network for Development and Environmental Economics; at the international level we have the example of IIASA’s programme for doctoral students

	information sets
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Observation centres need to be equipped to observe all atmospheric, land and ocean systems.</li> <li>• This would account for the full range of elements that describe the climate system</li> </ul>
<b>Stakeholders to be targeted</b>	<ul style="list-style-type: none"> <li>• Technical persons from Department of Forests and other key departments</li> <li>• Technical persons from state institutes working with climate statistics</li> </ul>
<b>Expected outcomes</b>	<ul style="list-style-type: none"> <li>• Strengthening observation network would boost generation of useful weather and other environmental statistics</li> <li>• Collection of data would help in conducting much required studies in climate change risks and impact assessments</li> </ul>

## 7.4 Activities in the short-run time frame (first 12 to 18 months), for all States

### 7.4.1 Developing ToRs for pilots and demonstration projects, with corporate sector involvement under CSR

<b>Relevance</b>	Demonstration projects across sectors that can successfully establish climate considerations into sectoral management planning and activities are needed for all the States. Also, given the fact that adaptation needs are location specific, a preferred mode for creating implementation capabilities among the extension agents is through action research projects that involve these agents for piloting adaptation actions (the ‘ <b>learning by doing</b> ’ mode).
<b>Link with CCIP/SAPCC goals</b>	This will enhance practical knowledge base for successful management of climate concerns.
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Development of pilot projects for international financing mechanisms like CDM and REDD plus</li> <li>• New satellite cities are coming up (for example Hajipur neighbouring Patna, Naya Raipur, etc) in all the study States - pilot projects on regional sub-urban planning or agglomeration planning can be undertaken.</li> <li>• Degraded forest areas could be converted to and managed as grazing lands; this would be an ideal Forest – Agriculture – Animal Husbandry cross-department and cross-sector project.</li> <li>• Waste to energy projects</li> <li>• Shelterbelts along coasts</li> </ul>
<b>Stakeholders to be targeted</b>	<ul style="list-style-type: none"> <li>• Frontline government officials of departments associated with implementation of adaptation actions identified in the SAPCC (especially for agriculture, water resources, health, disaster management, and livelihoods)</li> <li>• Technical personnel from reputed NGOs in the State</li> <li>• Experts in universities/academic or research institutions</li> </ul>
<b>Expected outcomes</b>	Greater policy uptake of research; experiential learning opportunities

	for stakeholders
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#### 7.4.2 Sensitization program for representatives of Panchayats and Urban Local Bodies (ULBs)

<b>Relevance</b>	Effective SAPCC implementation requires strong participation of the local government bodies; however, they have at best been most inadequately engaged in the preparation of the SAPCCs. There is very little awareness in Panchayats and Municipal bodies regarding the implications of climate change and the emerging policy level at national and State levels.
<b>Link with CCIP</b>	This will strengthen skills and systems to assess and tackle climate change in an appropriate manner.
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Awareness generating workshops for members of local self-government institutions</li> <li>• Creation of knowledge and experience sharing forums at district or zonal level</li> </ul>
<b>Stakeholders to be targeted</b>	Political representatives of Panchayats and Urban Local Bodies (ULBs) in the State
<b>Expected outcomes</b>	<ul style="list-style-type: none"> <li>• Sensitization of local governments about climate change concerns</li> <li>• Participatory approach in programme planning, designing and implementation by the local governments, considering climate change threats as are felt locally</li> </ul>

#### 7.4.3 Developing communication strategy for public awareness on climate change

<b>Relevance</b>	Climate change demands interdisciplinary engagement and discussion. Researchers have drawn attention to the inadequate construction of climate change narratives in the public sphere and the resulting impact on policy making and public opinion.
<b>Link with CCIP/SAPCC goals</b>	This will contribute in creation of knowledge products, sharing of mechanism and platforms that effectively address climate change issues.
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Capacity building for preparation of effective outreach materials geared toward public awareness</li> <li>• Research to identify policy ‘nudges’ that can help in changing human behavior</li> <li>• Innovative communication messages, by deploying platforms such mobile technology, community radio, etc.</li> <li>• Educational content development for integration in school and college curricula</li> <li>• Workshops on ‘climate change communication’ for representatives of mass media (print and electronic) in the State</li> </ul>
<b>Stakeholders to be targeted</b>	<ul style="list-style-type: none"> <li>• University departments / centres of excellence within the States, national institutes in the State, and relevant government resource</li> </ul>

	<p>centres (including the proposed agencies /resource centres on climate change)</p> <ul style="list-style-type: none"> <li>• Representatives of NGOs and mass media</li> </ul>
<b>Expected outcomes</b>	<ul style="list-style-type: none"> <li>• Communication materials of various kinds, including products prepared in vernacular languages</li> <li>• Effective communication on anthropological determinants of climate change will have potential for changing human behavior</li> <li>• Outreach on adaptation to climate risks would help in enhancing community resilience</li> </ul>

#### 7.4.4 Developing State-specific compendia of best practices on adaptation and mitigation

<b>Relevance</b>	Compendia of best practices would set bench marks for appropriate practices for the states. It would be important for comparison of initiatives over spatial and temporal scales
<b>Link with CCIP/SAPCC goals</b>	This links to CCIP's specific output goal for creation of knowledge products, sharing mechanisms and platforms
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Adaptation and mitigation projects that has demonstrated success in certain manner, should be evaluated and documented properly</li> <li>• Effective communication made on successful project implementation processes and practices</li> </ul>
<b>Stakeholders to be targeted</b>	<ul style="list-style-type: none"> <li>• University departments / centres of excellence within the States, national institutes in the State, and relevant government resource centres (including the proposed agencies /resource centres on climate change)</li> <li>• All departments associated with SAPCC preparation and responsible for implementation</li> </ul>
<b>Expected outcomes</b>	<ul style="list-style-type: none"> <li>• Setting up of state specific benchmarks on adaptation and mitigation options</li> <li>• Adoption of similar courses for scaling up options</li> <li>• Imbibing approaches that worked</li> </ul>

#### 7.4.5 Generating satellite accounts for ecosystems and ecosystem services, biodiversity, and sectors such as tourism

<b>Relevance</b>	To assess stocks and flows of natural resources, one would need present accounting. Strengthening system for satellite accounts for ecosystems and ecosystem services, biodiversity and tourism sector would help in maintaining inventories.
<b>Link with CCIP/SAPCC goals</b>	This links to CCIP's specific output goal for creation of knowledge products, sharing mechanisms and platforms. Also contributes in the long run towards the strengthening of institutional arrangements for planning and monitoring.
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Technical support can be provided to government agencies for developing pilot/experimental accounts using established methodology</li> <li>• Conduct of sensitization workshops</li> </ul>
<b>Stakeholders to be targeted</b>	Key stakeholders from Department of Forests, Department of Water Resources, Tourism and other departments relevant to the process.
<b>Expected outcomes</b>	Better planning and monitoring of the natural capital base of the States

#### 7.4.6 Documentation of traditional indigenous knowledge on natural resources management, sustainable farm practices, and coping strategies in the face of natural disasters

<b>Relevance</b>	Local level knowledge systems are recognized as repositories of traditional knowledge and effective management practices <sup>19</sup>
<b>Link with CCIP/SAPCC goals</b>	This links to CCIP's specific output goal for creation of knowledge products, sharing mechanisms and platforms.
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Creation of an inventory system for traditional knowledge, along with a validation mechanism based on scientific criteria</li> <li>• Annual State level '<b>knowledge fairs</b><sup>20</sup>' to attract exhibitions of traditional knowledge/expertise on natural resources management, biodiversity conservation, sustainable farm practices, building and habitat design, resource efficient technology applications, disaster risk reduction, etc.</li> </ul>

<sup>19</sup> In Chhattisgarh, for example, the large indigenous knowledge base existing in the State needs to be tapped, aligned with the aims set in by the Nagoya Declaration (Japan 2010) on protection of biodiversity and healthy ecosystem for achieving the Millennium Development Goals, particularly poverty eradication. Bio-cultural protocol as is developed for the Baiga tribe residing in Tatidhar village, Marwahi Forest Division in Bilaspur district, could be scaled up for involving all particularly vulnerable tribal groups (PTGs) in the State.

<sup>20</sup> As an example, TERI had organized a three-day exhibition cum conference in 2011 in Mumbai entitled "Krishi-Dhan, 2011". The exhibition was based on themes dealing with integration of innovative and renewable energy technologies into mainstream agriculture. The conference also focused on the theme of climate change and agriculture which created a platform for all the stakeholders and especially the farming community to share their understandings and experiences pertaining to the phenomenon of climate change and its impacts on their livelihoods. The conference received overwhelming response from all the stakeholders. The success stories helped the participants to take back lessons which they could implement.

<b>Stakeholders to be targeted</b>	<ul style="list-style-type: none"> <li>• University departments / centres of excellence within the States, national institutes in the State, and relevant government resource centres (including the proposed agencies /resource centres on climate change)</li> <li>• Representatives of NGOs and community organizations such as JFMCs, WUAs, etc</li> <li>• Panchayat representatives</li> </ul>
<b>Expected outcomes</b>	Utilization of indigenous knowledge base through participatory approaches towards conservation of natural resources and biodiversity in the State

## 7.5 Activities in the medium-run time frame (3<sup>rd</sup> year of the program), for all States

### 7.5.1 Developing adaptation pathways for the States

<b>Relevance</b>	An adaptation pathway is a response strategy to adaptation <i>turning points</i> , and can be defined as a sequence of policy actions to achieve targets under changing climate conditions <sup>21</sup> . An adaptation turning point defines the moment in time when current policies and management practices are no longer able to meet their objectives and alternative strategies will have to be considered. The assessment of adaptation turning points allows for a meaningful dialogue between stakeholders and researchers about the amount of change that is acceptable, when conditions could be reached that are unacceptable or more favourable, how likely these conditions are and what adaptation pathways to consider <sup>22</sup> .
<b>Link with CCIP/SAPCC goals</b>	This will help design innovative implementation mechanisms including some pilots, that act as alternative adaptation pathways for the states
<b>About the activity</b>	To inform the design of sustainable and evidence-based adaptation pathways, a set of diversified and representative research and pilot intervention sites is essential. These study sites will act as: <ul style="list-style-type: none"> <li>• research sites for generating knowledge (e.g. on biophysical impacts of climate change, socioeconomic drivers of vulnerability, gender-differentiated coping capacities, etc.).</li> <li>• pilot intervention sites for experimentation (e.g. randomized</li> </ul>

<sup>21</sup>Haasnoot et al., 2013

<sup>22</sup>Werners et al., 2012

	<p>control trials on measures to improve resilience) and action research (e.g. community monitoring of water resources, autonomous adaptation innovations), which will contribute to up-scaling and out-scaling of sustainable adaptation policies and best practices.</p> <p>These sites will guide in the definition of critical moments, adaptation turning points and adequate response strategies (adaptation pathways).</p>
<b>Stakeholders to be targeted</b>	University departments / centres of excellence within the States, national institutes in the State, and relevant government resource centres (including the proposed agencies /resource centres on climate change)
<b>Expected outcomes</b>	A dynamic policy framework in the State to deal with risks of future climate change and build resilient coping mechanisms.

#### 7.5.2 Building capacity on climate budgeting and innovative financing

<b>Relevance</b>	All activities that would support adaptation and mitigation initiatives against climate change require certain budgetary allocation. States will need to meet these additional demands through re-appropriation of present finance and also raising additional grants.
<b>Link with CCIP/SAPCC goals</b>	This will help in realising implementation of strategies planned under SAPCC to make the development pathways climate resilient
<b>About the activity</b>	<ul style="list-style-type: none"> <li>Helping out the states draw finance for said activities from local, national or transnational sources, involving private, public and alternative sources of</li> </ul>
<b>Stakeholders to be targeted</b>	Nodal officers from each departments involved in SAPCC implementation. Also members of climate change cell existing at the states
<b>Expected outcomes</b>	Suitable capacity built among key stakeholders from the states, who would be able to identify and tap on opportunity for climate financing.

#### 7.5.3 Developing documentaries on adaptation and mitigation activities happening in the State

<b>Relevance</b>	Establishing a compendium of adaptation and mitigation activities that are ongoing in the state would provide a wide knowledge base. These activities hence could be evaluated for their impacts and disseminated across larger groups.
<b>Link with CCIP/SAPCC goals</b>	This would help in building essential knowledge base, through sharing of experiences across different platforms
<b>About the activity</b>	<ul style="list-style-type: none"> <li>Generating capacity for mass communication of lessons learnt,</li> </ul>



	through innovative audio visual media, short films highlighting best practices and learning from other regions, gearing towards inducing behavioral change
<b>Stakeholders to be targeted</b>	<ul style="list-style-type: none"> <li>• Members of climate change cell</li> <li>• Key stakeholders from different government departments involved in implementation of SAPCC</li> <li>• Members of academia, non-governmental NGOs, those who are engaged in implementation and evaluation of initiatives</li> </ul>
<b>Expected outcomes</b>	Establishment of wider knowledge base relevant to the State context

## 7.6 Activities in the long-run time frame (final 2 years of the program), for all States

### 7.6.1 Scaling up of the pilot activities

<b>Relevance</b>	Pilot adaptation and mitigation projects that could serve as the benchmarks of demonstrated success against climate change risks would be needed to scale up further. These tried and tested mechanisms would yield widespread benefits.
<b>Link with CCIP/SAPCC goals</b>	These innovations tested through pilot projects would enhance state knowledge base on 'what works'. Dissemination of knowledge and best practices hence would create sharing mechanism and platforms for improved practices
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Impact evaluation of programme successes</li> <li>• Designing effective scaling up options for similar contextual scenarios</li> </ul>
<b>Stakeholders to be targeted</b>	All departments associated with SAPCC preparation and responsible for implementation
<b>Expected outcomes</b>	Larger benefits acquired from scaling up successful pilots, across the states

### 7.6.2 Developing Decision Support Systems for district level administrators

<b>Relevance</b>	While ongoing programmes need to be evaluated for defining additionalities for risk management, new programmes / schemes would require developing appropriate risk screening mechanisms. It is
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	felt that computer-based Decision Support Systems can help planners and implementers in this regard. An example of knowledge based non- structural approach to disaster risk reduction is basin-scale flood risk maps - such GIS-based, interactive maps may utilize historical data analysis as well as modelling approaches and can be linked to an online database and flood warning system (Gaurav et al. 2011)
<b>Link with CCIP/SAPCC goals</b>	This would help in strengthening skills and systems to assess and tackle climate change concerns as felt by the states. By developing decision making tools for prioritization of plans
<b>About the activity</b>	<ul style="list-style-type: none"> <li>It is proposed to have a dedicated project to develop a computer-based state-of-art Decision Support System for Climate Risk Assessment at District-level (DSS-CRAD) that would enable district level administrators and development planners to make informed policy decisions on adaptation and mitigation.</li> </ul>
<b>Stakeholders to be targeted</b>	<ul style="list-style-type: none"> <li>District level administrators and development planners</li> <li>Key technical persons from NGOs</li> <li>Scholars and experts working with relevant tools and techniques, in academic institutions/ universities within the state</li> </ul>
<b>Expected outcomes</b>	<ul style="list-style-type: none"> <li>Establishing decision support system for district level administrators and development planners</li> <li>Creation of required capacities among key personnel within the states, for handing different decision making tools</li> </ul>

### 7.6.3 Enhancing institutional capabilities in disaster risk reduction (forecasting and early warning)

<b>Relevance</b>	Sustainable, long term capacity to cope with environmental disasters necessitates more than technologies and physical infrastructure. Crucially, they demand a concerted focus on building effective disaster management agencies, supported by laws, norms, rules, and procedures that enable them to take flexible and adaptive action. Recent research on environment disasters indicates that this entails at least three key attributes. First, such agencies must be equipped to think in interdisciplinary ways, capable of analytically integrating ecological and natural processes with human social, economic, and cultural dynamics. Second, they must comprehend uncertainty and complexity, and understand how to approach building high reliability in systems that have such attributes (which encompasses virtually all environmental disasters). Thirdly, they must be able to creatively engage and draw synergistically upon a wide variety of stakeholders, including 'not-expert' civic and community entities. (AJEDM 2009) <sup>23</sup> .
<b>Link with CCIP/SAPCC goals</b>	This would help strengthening resilience against climate change risks, contributing to effective planning and designing of alternative

<sup>23</sup>AJEDM 2009: *Asian Journal of Environment and Disaster Management (AJEDM)* Focusing on Pro-active Risk Reduction in Asia. See Volume 1, Issue 1, 2009.

	strategies.
<b>About the activity</b>	<ul style="list-style-type: none"> <li>Developing Standard Operating Procedures (SOPs) for emergency situations should be developed and placed in the website. Odisha has done it for the first time in health sector.</li> <li>For management of post-disaster situation it will be important that all departments are able to coordinate their actions.</li> <li>Designing community managed early warning system that augment government disaster management mechanism at district and State level</li> </ul>
<b>Stakeholders to be targeted</b>	Key state departments which are involved in preparation and implementation of SAPCC
<b>Expected outcomes</b>	<ul style="list-style-type: none"> <li>Utmost preparedness among state departments to tackle emergency situations</li> <li>Planning and coordination of activities, by building collaborations across different departments</li> </ul>

7.6.4 Enhancing institutional capabilities to provide a range of easily accessible 'climate services' to different stakeholders (especially farmers)<sup>24, 25</sup>

<b>Relevance</b>	Farmers require seasonal climate information on parameters such as onset intra-seasonal variation, spatial and temporal rainfall variability, duration and frequency of drought and floods, availability of irrigation, changes in groundwater level, soil transformations, crop-pest interaction and submergence of coastal land due to sea level rise. However there are a number of critical research and knowledge gaps that need to be addressed on a priority basis if we are to achieve the goal of building climate resilience among farming communities through 'smart' climate services.
<b>Link with CCIP/SAPCC goals</b>	This will contribute in building resilience against climate risks and uncertainty at the grass root level.
<b>About the activity</b>	<ul style="list-style-type: none"> <li>Developing a framework for 'Climate Services based Adaptation to Extreme Vulnerabilities' with the help of existing meteorological and disaster management agencies at national as</li> </ul>

<sup>24</sup> Some *Krishi Vikas Kendras* in the State of Maharashtra are already using community radio for disease forecasting, but this needs to be made more interactive, timely, and customized to individual farmers' crops and lands. In a pilot project, Tata Consultancy Services has developed a mobile-based platform for disease forecasting and advisory services. It connects farmers with agricultural experts who can study photos of crop diseases and recommend suitable measures. This pilot project demonstrates the potential scope for private enterprise. Expand the pilots to more regions and more crops to gain experience and demonstrate benefits to farmers.

<sup>25</sup> The Adapting to Climate Change in Asia (ACCA) project funded by the Australian Centre for International Agricultural Research (ACIAR) of Australia has followed an integrated approach to developing the adaptive capacities of the rainfed farmers in the state of Andhra Pradesh. The project has piloted seven activities that are related to each other and provide farmers with a package of recommendations that would help reduce the climate related risk.

	well as State level and drawing on international experience in this field.
<b>Stakeholders to be targeted</b>	All departments associated with SAPCC preparation and responsible for implementation
<b>Expected outcomes</b>	Greater resilience of agriculture to extreme events, thereby contributing to enhanced food security at the local and regional levels.

#### 7.6.5 Inter-State data exchange and information management system, especially on flood and droughts

<b>Relevance</b>	Dealing with major extreme events requires anticipation and planning at the regional scale, calling for substantial information sharing across States. In case of floods, for instance, enhanced cooperation among the co-riparian States will strengthen the knowledge and data base required for better flood forecasting and issuance of early warnings which can considerably bring down the losses to life and economy.
<b>Link with CCIP/SAPCC goals</b>	It will help in sharing knowledge base across the states, and would strengthen institutional structure for planning, implementation and monitoring mechanism.
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Developing networking and convergence between state level and regional level water management authorities (especially in case of Assam, Bihar and Odisha)</li> <li>•</li> </ul>
<b>Stakeholders to be targeted</b>	Key stakeholder departments across the states, those have been involved with planning and implementation of SAPCC
<b>Expected outcomes</b>	<ul style="list-style-type: none"> <li>• Establishing regional knowledge sharing mechanism on climate change risks and impacts</li> <li>• Maximizing scopes for evidence based planning</li> </ul>

#### 7.6.6 Revisiting the SAPCCs

<b>Relevance</b>	The SAPCCs are acknowledged to be dynamic – with improved learning from implementation experience and new knowledge, there will arise a need to revisit and modify the plan document.
<b>Link with CCIP/SAPCC goals</b>	<ul style="list-style-type: none"> <li>• One of the key outputs under CCIP is support for refinement of SAPCC</li> <li>• Also, the SAPCC themselves have 5-year time frames</li> </ul>
<b>About the activity</b>	<ul style="list-style-type: none"> <li>• Identifying the key lessons learnt from SAPCC implementation experience – successes as well as failures</li> <li>• Situation analysis of national and international policy environment, and the state of scientific understanding of risks associated with climate change that has a relevance to the concerned State</li> <li>• Consultation workshops for visioning, goal setting, and prioritization exercises</li> </ul>

	<ul style="list-style-type: none"> <li>• Technical support on Plan document preparation for the next 5 years</li> </ul>
<b>Stakeholders to be targeted</b>	<ul style="list-style-type: none"> <li>• Key stakeholders from departments involved in preparation and implementation of SAPCC</li> <li>• Technical persons across different government institutions</li> </ul>
<b>Expected outcomes</b>	<ul style="list-style-type: none"> <li>• Consolidation of knowledge acquired from implementation of activities under SAPCC</li> <li>• Addressing failures and gaps emerged from present implementation paradigms and designing alternative approaches</li> </ul>

## 8. Ongoing programmes / resources in the States as ‘enablers’

The activities identified in the previous section can be implemented by engaging the already existing programmes of the State governments and the available research centres within each State towards knowledge and capacity building. This section lists out some of the important ‘enablers’ in this regard for each of the study State.

### 8.1 Assam

- An important resource centre for the State is the Assam Science, Technology & Environment Council (ASTEC), which was constituted in 1986-87 as an autonomous Council of the Department of Science Technology & Environment, Govt. of Assam for implementation of some of the major programmes in the sectors of science & technology, remote sensing, energy (non-conventional & renewable sources) and environment. Its role is to design policies, schemes and build capacity for science, technology and environment which are of relevance to the SAPCC. ASTEC also took the initiative in the State to prepare the first draft SAPCC based on extensive stakeholders consultations and with the involvement of Universities in the State.
- The Assam State Disaster Management Authority (ASDMA) under the Assam State Disaster Management Policy, 2010 has been entrusted to design policies and plans for disaster management in the state, recommend the provision of funds for mitigation and preparedness measures, review the development plans of different departments of the state and ensure that the prevention and mitigation measures are integrated therein and issue guidelines as and when necessary (Assam State Disaster Management Policy, 2010). The institutional framework includes District Disaster Management Authorities (DDMAs) under the District Commissioners (DCs) and also local authorities like Panchayat Raj Institutions, Municipalities, etc.
- In order to mitigate the flood devastation and help the communities reduce the losses, Assam State Disaster Management Authority (ASDMA) has been working towards developing a Flood Early Warning System in collaboration with the North East Space Application Centre (NESAC) as the lead institute. The warning system has been tried on a pilot basis for 5 districts i.e. Lakhimpur, Dhemaji, Nalbari, Barpeta and Baksa during 2010 flood season. Flood warning through this system is issued to all concerned administrative agencies 24 hours in advance through email and SMS (ASDMA, Annual Report, 2010). In the pilot study, 90 percent success rate was observed in Dhemaji district (as informed in discussion between TERI with team in ASDMA while preparing the SAPCC). The ASDMA in collaboration with National Remote Sensing Centre (NRSC) and ISRO is working towards developing a tool for effective emergency response system for field personnel where distress messages, emergency messages, first information report and summary reports from the field can be communicated. A prototype of a National Database for Emergency Management (NDEM) has been prepared in 2010.
- Another pilot study under the GoI-UNDP Disaster Risk Reduction Program, for Hazard risk and Vulnerability assessment has been initiated by ASDMA with collaboration with NESAC for

Dhemaji district, Guwahati city and Silchar towns. An initiative for mapping the embankment breaches using remote sensing has been taken up by the ASDMA and preparation of a Flood Hazard Atlas is under preparation (as informed in discussion with team in ASDMA). The department is also setting on an integrated plan involving stakeholders like Central Water Commission (CWC), Water Resource Department and India Metrological Department (IMD) to revisit the danger levels of the major rivers of Assam as the river beds have risen due to aggradation.

- In order to create capacity for disaster response beyond the district level ASDMA has also set up a Revenue Circle level Disaster Information and Response Centre on a pilot basis in 5 districts i.e. Kamrup, Kamrup metro, Lakhimpur, Dhemaji and Dibrugarh. Under the Gol-UNDP Disaster Risk Management programme, Disaster Management Teams (DMT) were formed at the village level where women are included as master trainers. For health concerns during disasters, a pilot project of Social Health Activists was initiated in Nagaon district where the volunteers were links between the villagers and the public health centres. Such volunteers were part of the DMTs and were treated as change agents by the project as they shared a rapport with their individual communities.
- The Flood and River Erosion Management Agency of Assam (FREMAA) has been set up to act as a vehicle for implementation of the Asian Development Bank (ADB) funded “The Assam Integrated Flood and Riverbank Erosion Risk Management Investment Program (AIFRERIP)” under the Water Resource Department of Govt. of Assam. The Asian Development Bank project aims at generating outputs that will consist of Flood and Riverbank Erosion Risk Management (FREFM) planning, institutional and knowledge base, comprehensive flood and riverbank erosion risk management (FREFM) systems in the three subproject areas namely Dibrugarh, Kaziranga & Palasbari, and a multidisciplinary project management system. The investment has been categorised into two projects, firstly the structural comprising the short term providing immediate investments on the three existing embankment systems, secondly, the non-structural comprising of awareness campaign, improved warning, strengthened relief and hazard maps (Asian Development Bank, 2010).
- The Jawaharlal Nehru National Urban Renewal Mission has been launched by the Ministry of Urban Development, Government of India in 63 mission states with Assam being one of the mission states (Assam Development Perspective, 2011). Under the mission, various strategies have been undertaken by the Guwahati Development Department to address emerging issues of waste management and public transport in the city of Guwahati. One of the many steps is the Solid Waste Management Project, where the Department has taken steps not only for the scientific disposal of solid waste but also in the use of the garbage as raw materials to produce organic fertilizers and generate electricity.
- On the energy front, the Assam Energy Development Agency (AEDA) has the responsibility of coordinating all activities relating to the promotion of renewable energy, specifically for industrial, domestic and rural areas that cannot be connected to the grid. The Agency has

already made installations in a number of locations in the State of renewable energy based projects relating to solar PV, small hydro and biomass gasification. These decentralized technologies have great potential to help address the rural electrification challenge in Assam (such as providing 400 Solar Home Systems in homes of Bodo tribal women). Raising the necessary capital has been identified as one of the main barriers towards low-carbon technology implementation in the State.

- Conservation efforts in the State should be planned and implemented in convergence with relevant departments, and participation sought from academia and civil society representatives. The Kaziranga wild-life conservation has been one of pioneering projects from State government side in which both Department of Forest and Department of Tourism have worked with significant convergence of activities.
- There is a need to work with and develop the capacity of Autonomous Councils in the State, namely the North Cachar Hills Autonomous Council, the Karbi Anglong Autonomous Council and the Bodoland Territorial Council, to ensure adequate protection of the forests located in these ecologically fragile and sensitive areas. A possibility worth exploring is whether, through these Councils it is possible to enable local communities' participation in REDD plus (Reduced Emissions from Deforestation and Degradation) initiatives.
- The National Rural Employment Guarantee Scheme has the potential to ensure wetland restoration, as well as the development and rejuvenation of traditional water harvesting systems.
- To strengthen the science-policy interface in the State, building field based partnerships with institutes like the Jorhat based Rain-forest research institute has been suggested. The Regional Research Laboratory (RRL) at Jorhat is a constituent establishment of CSIR having a multidisciplinary laboratory contributing to research areas like Drugs & pharmaceuticals, Natural products chemistry, Plant sciences & ecology, Geoscience, Petroleum & natural gas, Biochemistry, Applied civil engineering, Chemical engineering, Cellulose pulp & paper, Material science, etc. The laboratory has its branch laboratory at Itanagar, Arunachal Pradesh and field stations at Imphal (Manipur) and Yaongyimsen (Nagaland).

## 8.2 Bihar

- The State government has constituted a Cabinet Committee on Agriculture to create a Roadmap for 2022. This document will be an important resource for CCIP to understand the vision and perspective plan of the State for this important sector. Similarly, for the water resources sector there is the State's Strategic Plan on Watershed Development 2011-2027.
- Since climate change is expected to pose risks to agricultural yields, the State government's programmes like the *Kisan Pathshala*, a massive farmer training programme, and *Kisan Vikash*



*Shibir*, a programme for interaction between agricultural scientists and farmers, is likely to be helpful in appropriate knowledge and technology transfer.

- The Water Resources Department in Bihar has a major role to play in the climate change context considering that a major portion of the State falls in the Gangetic basin, which is prone to flooding. With climate change likely to increase the occurrence of floods, it becomes imperative for the State Government to effectively tackle the perils of floods. The Department has set up a Flood Management Information Centre with a comprehensive Flood Mitigation Information System (FMIS), which provides 72 hours early flood forecast to the people (as stated in draft Bihar SAPCC).
- Additionally, the Water Resources Department is also entrusted with the Command Area Development and Water Management Programme which broadly covers the areas of soil conservation, land consolidation and development of underground water. The Water Resources Department also plays a key role in Major and Medium Irrigation Sector, which is equally important in the wake of increased drought risks. These various activities point to the need for convergence not only across government departments, but also within a department across various sectors.
- Priorities of the State government with respect to the issue of drought in South Bihar, mitigation of the flood devastation in North Bihar, improvement in the drainage of water, providing canal irrigation for attaining a cropping intensity – according to the draft SAPCC, action is being taken by respective departments towards preparing DPRs. In both North and South Bihar, schemes of water transfer were recognized through interlinking of rivers; accordingly, DPRs for fifteen schemes are being prepared by National Water Development Agency (NWDA) and other consulting agencies (as stated in draft Bihar SAPCC).
- The Bihar Agricultural Management & Extension Training Institute (BAMETI) can serve as a resource centre in the area of Agricultural Extension Management.
- The Water and Land Management Institute (WALMI) can contribute as a training centre for building capacities among Water User Associations (WUA) who are expected to take charge of minor irrigation project management.
- The government has set up an independent Department of Disaster Management and has also taken steps to strengthen the State Disaster Management Authority (SDMA) as per the guidelines of National Disaster Management Act, 2005. Standard Operating Procedures (SOP) have been formulated by the Department of Disaster Management for preparedness, early response, relief and rehabilitation during flood and other kind of disasters; SOP has also been formulated to combat drinking water crisis, caused by irregular monsoon and receding of ground water level in some areas of the State. The Disaster Management Department has also developed a comprehensive Draft State Disaster Management Plan, including detailed sections on perspective, disaster prevention, and mitigation, preparedness and capacity building, crisis

management, roles and responsibilities and guidelines for various government departments, and role of other stakeholders. The Plan has been prepared by the Prof. G. P. Sinha Centre for Disaster Management & Rural Development, Patna.

- The Bihar Renewable Energy Development Agency (BREDA) is responsible for development of projects using non-conventional energy sources in the State. The enabling legislation in this area is the Bihar Policy for Promotion of New and Renewable Energy Sources 2011. According to the draft SAPCC, wind measurement studies at Simultala (Jamui), Adhora (Kaimur) and Lalganj (Vaishali) are near completion and those at Bodhgaya, Raxual and Munger are on-going to ascertain the potential of tapping wind energy in the State. The involvement of private sector in this field deserves mention to stimulate experience sharing. Husk Power Private Limited has installed 20 biomass gassifiers with generation capacity of about 576 KW in the districts of East Champaran and West Champaran. Similarly, Desi Power Private Limited (Araria) is installing gasifiers with generation capacity of 400 KW. A report on 'Renewable Energy Potential Assessment and Renewable Energy Action Plan' for Bihar has been prepared by the World Institute of Sustainable Energy (WISE), (Pune), supported by DFID.
- The SAPCC mentions that Bihar State Energy Conservation Fund has been constituted for the promotion of efficient use of energy and conservation. The state has three types of projects for consideration: Grid connected renewable energy projects based on biomass; Co-generation of renewable energy through bagasse in sugar mills and rice husk in rice mills; Off-Grid renewable energy distributing projects based on biomass. The investment of the private sector and cooperative sector is very important in the field. Given the significance of energy conservation, the State government will be prioritizing this activity.
- The activities of the Science and Technology Department, Government of Bihar can help in data inventorization in aspects relating to survey, gauging forest resources and also in flood forecasting. Such initiatives can help bridge knowledge gaps.
- The National Ganga River Basin Authority (NGRBA) is mandated with the task of improving facilities like sewerage and solid waste management in 21 towns along the river Ganga. An additional challenge would be to check the menace of vector-borne diseases whose incidence rate is set to see a rise in the wake of climate change. The CCIP can facilitate its activities through appropriate knowledge and technology transfer.
- The State has set up the Bihar Urban Infrastructure Development Corporation (BUIDCo) with a view to accelerate infrastructure development activities across all ULBs, with the role of management of urban infrastructure projects. The Bihar SAPCC identifies this agency to incorporate climate concerns into all aspects of urban infrastructure planning and implementation in Bihar. Only two cities of Patna and Bodh Gaya from Bihar are selected under the central government supported JNNUR Mission. However, in the remaining towns, state government schemes like Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT) and Integrated Housing and Slum Development Programme (IHSDP) have

been taken up. The objective of IHSDP programme is to provide housing and other basic infrastructure like roads, drainage, community buildings, community toilets, and bathrooms to the poor residing in the slum areas.

- *Indira Awaas Yojana* scheme is being implemented by the Rural Development Department with assistance from the Central Government to provide housing for the rural poor. With incidence rate of natural disasters and extreme events set to see a rise in the wake of climate change, providing climate resilient housing to the vulnerable communities might help in adapting to climate change in part and hence supporting the state's need to address these issues.
- Providing clean drinking water and proper sanitation is important and in the wake of climate change its importance increases manifold. The centrally sponsored scheme - *Nirmal Bharat Abhiyan* - that is being managed by the Public Health Engineering Department aims at providing this and hence can bridge capacity needs in this sector.

### 8.3 Chhattisgarh

- According to the SAPCC of Chhattisgarh, a State Centre for Climate Change will be established and will be mandated to act as the nodal body in the State for coordinating and overseeing all operational aspects of the CSAPCC implementation.
- Strengthening the activities under CC cell in the nodal environment department would be important to encourage convergence across departments. Certain convergence activities are already underway – for instance, many programmes of agriculture department have dovetailed into forestry sector policies; convergence in the tourism sector for promotion of eco-tourism is another example (the single window system in the Dhamtari model is a good example of convergence). As another example, dealing with cross-cutting subjects like urban transport and risks to human health would require collaboration and convergence of activities between Department of Health and Department of Transport.
- Baseline inventory creation is particularly important for the State. Certain baseline inventories are created for the State already, such as vegetation carbon pool assessment, using remote sensing, which has taken care of terrestrial vegetation biomass, using ground sampling and satellite remote sensing data. Similar initiatives are required for the State in other areas of natural resource assessment.
- Considering the State's richness in biodiversity, there is a need for wide-scale conservation of several endangered and vulnerable ecological species. According to the SAPCC, the State is committed to revive the strengths of the State Biodiversity Management Committee (BMC) for natural resource management, bio-diversity conservation and protection of the critical tiger-elephant corridors of the state. Further, as initiated by Department of Forests, the State has

taken up assignments in bio-diversity inventORIZATION, along with Zoological Survey of India and Botanical Survey of India. The State has clear cut plans to incorporate traditional taxonomic experts in the above process and a Folklore Taxonomy Project has been linked to the BSI-ZSI study in which local taxonomists are being trained.

- Management of forest resources through REDD+ strategy need to be developed with a focus on primitive tribal groups. Overall agro forestry could be developed as an important sub-project, similar to the initiatives led by the Department of Forest in Bastar and Kondagaon. Similar potential needs to be tapped in the area of medicinal plants cultivation. The Chhattisgarh State Medicinal Plants Board (CSMPB) undertakes activities for medicinal plants cultivation, including the protection, promotion, sustainable extraction, processing, marketing of medicinal plants and co- ordination with various departments/institutions.
- In order to protect habitat fragmentation issues in wild-life sector especially due to mining activities that involve increasing habitat losses and reduction in patch area, the idea of development of corridors could be considered. This could be implemented for tiger reserves. Similar work is underway with advent of the Green India Mission. The landscape approach identified in the SAPCC will address this issue, it needs to exploit better aspects of existing legislative measures (like the FRA) such as community controlled and managed areas – this can help regeneration and give more rights to people in need of it.
- Key institutions where capacity building can happen are SIRD, Academy of Administration, the various training institutions of the Line Departments. Dedicated agencies like KVK centres for agriculture sector are expected to be more effective as training centres for local extension officials.
- Development of solar and wind villages and LED villages could be further extended, leveraging on the reputation of Chhattisgarh as a potential model State in the field of renewable energy activities. The Chhattisgarh Renewable Energy Development Authority (CREDA) is the dedicated agency set up to look into a large number of alternative power producing potentials operated through government and private collaboration initiatives. CREDA pursues a core component of reaching out to the remote rural locations with electricity is generated through alternative sources. Already a large number of rural un-electrified villages and hamlets have been connected through solar photovoltaic (SPV). CREDA looks after important projects undergoing in Raipur and Bilaspur identified under Solar City Project of MNRE, to reduce energy consumption through promotion of LED lights, and other mechanism related to renewable energy and energy efficiency. CREDA will also act as the nodal agency for promotion of the Wind Energy Policy of the State.
- The large scale presence of metallurgic industries in Chhattisgarh would require recovery of waste heat across the plants, this needs to be backed by appropriate policies and proper incentives. The Chhattisgarh Environment Conservation Board (CECB) can play a key recommendatory and regulatory role in this regard. Similarly, large scale switch in the use of

bio-mass energy in the State, especially among traditional groups or who lives in poor economic conditions, would require prior assessment of alternatives. In the urban development area, appropriate studies are due which are capable of identifying what incentives will work for emerging cities like Naya Raipur, to change population behavior to take up low-carbon alternatives in transport sector, which also need to include promoting public-transport usage.

## 8.4 Kerala

- The Kerala State Action Plan identifies the following institutions as important under the Kerala State Council for Science and Technology, working on various aspects of climate change: Centre for Earth Science Studies; Centre for Water Resource Development and Management; Kerala Forest Research Institute; National Transportation Planning and Research Centre.
- The Centre for Earth Science Studies (CESS) has been identified as the nodal institution for organizing the monitoring network and research on climate change. The nodal institution, *CESS*, will work on development of a dedicated unit for climate change for allocation and coordination of research, monitoring and modeling for projections of impacts.
- The technical expertise available in the Centre for Water Resources Development and Management (CWRDM) can be put to use for State-wide capacity building on watershed development, crop water management, and rainwater harvesting. This becomes more relevant in regions that have been listed as “climate change hotspots” in the Kerala SAPCC. The SAPCC ranks “identification of regions vulnerable to water availability” as a high priority task, which can be carried out by CWRDM.
- The Central Marine Fisheries Research Institute (CMFRI), Kochi is a national level resource centre on knowledge pertaining to coastal marine environment and fisheries. The Institute can be engaged as a centre for capacity building of all concerned stakeholders on adaptation to climate change impacts on the fisheries sector.
- Additionally, the State Fisheries Resource Management Society (FIRMA) can coordinate with CMFRI over relevant knowledge transfer which is required for planning and development of fisheries. Similarly, the Central Institute of Fisheries Nautical and Engineering Training (CIFNET) can help educate fishermen about climate change and its impact on fishing productivity.
- The resources of Agency for Non-conventional Energy and Rural Technology (ANERT), which is already playing a role in knowledge dissemination of non-conventional energy sources, can be used by the Fisheries Department to employ renewable energy based drying and process. (SAPCC ranks this as a high priority task). ANERT can act as a co-ordinating agency for all the tasks that have been mentioned in Energy Sector, Section 3 of the SAPCC.

- The expertise of IIM-Kozhikode in Strategic Management can be utilized by ANERT, Energy Management Centre (EMC) and the Power Department for solar deployment across the State. The work of Energy Management Centre (EMC) in energy conservation and small-hydro promotion can be used by the State extensively.
- The Nansen Environmental Research Centre (India) can help in knowledge dissemination in areas such as: impacts of climate change on monsoon and coastal zone management.
- The role that Kerala Agricultural University can play is immense. Research on new and better adapted crop varieties will help the farmers and also ensure food security in a changing climate. Kerala Agricultural University can act as a resource centre for training of officials involved in agri-extension services. The state has identified the *Kerala Agricultural Training Institute* as an important resource centre to strengthen the micro level agricultural activities.
- The role of Kerala Agricultural University in tackling the risks of climate change can be augmented by Cochin University of Science and Technology (CUSAT). The research activities it carries out in Monsoon Meteorology, Crop-Weather modelling and Land-Sea interaction can help fill in knowledge voids in these areas.
- The research being carried out at Central Plantation Crops Research Institute (CPCRI) can benefit niche areas such as developing climate change resilient crops. The Coconut Development Board (CDB), Kochi can help support the coconut cultivators in increasing their yield in the wake of climate change.
- The activities at Jawaharlal Nehru Tropical Botanic Garden and Research Institute (JNTBGRI) can help conserve critically endangered flora which might be more vulnerable to climate change.
- The Kerala State Remote Sensing and Environment Centre (KSREC) can help in building data relating to land use land cover changes, inventorization of natural wetlands and irrigation potential of projects, all of which are ongoing research projects at KSREC.

## 8.5 Maharashtra

- The Indian Institute of Tropical Meteorology (IITM), Pune is a national resource centre for high resolution regional climate model projections which can be linked to impacts and vulnerability assessments at the regional level. Similarly, the India Meteorological Department (IMD), Pune is another resource centre of national relevance. A flagship project of IMD is “Integrated Agromet Advisory Services in India” in which the weather forecast information is disseminated to the farmers on their mobiles as an “Agro Advisory Bulletin”. Accurate plant disease forecast, measures to reduce the use of pesticides, location specific agromet advisories and other such initiatives of the institution are of great relevance to farmers.

- National Bureau of Soil Statistics and Land Use Pattern (NBSSLUP) at Nagpur is another national level resource centre and a major data repository. Also, the Fishery Survey for India and the Central Marine Fisheries Research Institute (CMFRI).
- Important State agencies that can act as resource centres for capacity building and knowledge generation are the Maharashtra Remote Sensing Applications Centre (MRSAC), Nagpur and the Groundwater Surveys & Development Agency (GSDA), Pune.
- NABARD has a wide range of activities in the areas of rural development and agriculture, including soil conservation and watershed management projects in many parts of Maharashtra. There are initiatives on agro advisory services in collaboration with IMD and implemented with the help of Krishi Vigyan Kendras.
- Maharashtra has a number of watershed development programmes that can be vehicles for mainstreaming 'climate smart' strategies. Apart from the Integrated Watershed Management Programme (IWMP), which is a Govt. of India scheme, the State has programmes on farm pond development, repair / renovation of water bodies in Eastern Vidarbha, construction of check dams under the RKVY. There are special watershed missions for Vidarbha and Marathwada. An innovation is the award scheme to villages for adoption of in-situ moisture conservation practices.
- Although a non-government entity, Jain Irrigation Systems Ltd. deserves mention as an important resource centre because of the company's initiatives towards sustainable agricultural development, food security, grass root level training, and demonstration provided to poor farmers. The company provides technology/services that include integrated watershed development, water resource development, water supply networks, micro irrigation systems such as drip and sprinkler irrigation, bio-fertilizers, tissue culture plants that are disease free, hydroponics, greenhouses, shade houses, hybrid seeds, planting material, contract farming, and purchase of produce directly from the farmers for value-additions. All these are highly relevant services in the context of adaptation.

## 8.6 Odisha

- Institutional arrangements in Odisha are getting remodelled to adjust to newer initiatives under the SAPCC to be implemented; this include, for instance, nomination from Department of Water Resources for CE, OWPO as the Nodal Officer, CCAP for implementation of the action plan and to coordinate among intra and inter departmental activities. Monitoring and evaluation of the activities are being taken up at dept. and state level from time to time for effective implementation. At the State level, the high level Monitoring and Advisory Committee is an important institutional arrangement in this regard.

- A number of departments are launching new initiatives for strengthening evidences base, efficient logistic mechanism and raising human resource potential. An example is the Dept. of Water Resources that has established a Hydrometry wing for effective collection, validation and management of data at the departmental level. It has started collecting data from different sources such as SRC, CWC, IMD and other stakeholder departments, for conducting robust river basin level studies.
- The most important example is however that of the Orissa State Disaster Management Agency (OSDMA) which is doing pioneering work for understanding climatic impacts on disasters and to build capacity of communities to adapt, manage and mitigate the impacts of disasters. Recent evidence of managing post-disaster situation bears a successful imprint of the same. According to the SAPCC, Odisha is committed to strengthen institutional mechanism through OSDMA operations to fight against extreme climate events in coastal areas. As nodal agency of disaster management in the state, OSDMA undertakes management of continuum of activities relating to risk-reduction, relief, restoration, reconstruction and other measures. The body coordinates with the number of line departments for drawing support in dealing with various aspects of disaster management. The experience and expertise available in OSDMA will be a significant resource for other States.
- However, for management of post-disaster situation it will be important that all departments are able to integrate their knowledge and participation. Development of single-window system would require additional capacity building. All the departments related to eleven priority sectors identified under SAPCC, and other important organization such as OREDA, Space Application Centre, Department of Panchayati Raj would require to converge for this purpose.
- Orissa Renewable Energy Development Agency (OREDA) is a key part of institutional development for the energy department. Increasing the capacity for generation of solar and wind based power in the State is a priority of OREDA. Other mitigation priorities include development of energy efficiency plan for buildings, and piloting Green Buildings in one city.
- A suggestion from the stakeholders workshop in the State is that provision of alternative source of electricity with sufficient reliability, that will facilitate crucial functions taking place in hospitals/health centres, could be taken up as priority projects. Realignment of State department budgets could be taken as an option to install solar lightings in health centres, especially in labour rooms. The Koraput district pilot project on energizing labor rooms for efficient functioning can be taken up as a model elsewhere for scaling up. A demonstration project at Kandamal district, which is functioning with 20- kwt mini-grid system supporting households, schools, district public community centre, and other establishments, could be taken as an exemplary. Involvement of key stakeholders i.e., Panchayat, or State Gender Resource Centres which is essential for successful intervention of similar kinds.
- OTPC is making use of CSR to invest in setting up micro-grid, through which deprived communities could access energy through renewable energy sources. With the setting up of a



Green Energy Development Corporation (Gedcorp) in the State, there is growing getting acceptance for generation of green energy, and the State needs to effectively tap the potential of public-private partnership projects in this area.

- The problems of large ignorance in the case of common property resources management require further serious relook into the role and capabilities of Joint Forest Management Committees, Watershed Development Committees, Pani Panchayats etc. Stakeholders from the Department of Forest would need to be able to identify these groups and make them capable for their mandated activities. The model which is being run in Chhindwara, MP, by TERI, trying to develop community institutions by enhancing their technical knowledge and foresters carbon accounting capability, could be taken up for replication.
- The Orissa Watershed Development Mission (OWDM) is among several of the initiatives underway in the State to promote livelihood and improve quality of living standards. According to the SAPCC, there are plans for continued investment in integrated watershed development programs in climate sensitive areas; around 3000 micro watersheds have been planned for treatment, over the coming five years.
- An important resource centre in the State that is of national importance is the Central Rice Research Institute (CRRI), Cuttack that has ongoing research activities important in the wake of climate change impacts on crop yield. The Orissa University for Agriculture and Technology (OUAT) can be enabled to act as a nodal agency, dealing with knowledge dissemination relating to the agricultural sector.
- Similarly, the research being carried out at the Water and Land Management Institute, Cuttack in the areas of Water Resource Management and Integrated Watershed Management are very helpful for the state as the vulnerability assessment for the State predicts an increase in drought conditions owing to climate change.
- The State Department of Education should play a major role in utilizing opportunities provided by CCIP in order to enhance the level of awareness about climate change, its drivers and consequences. So far the Department of Education has not been involved in the entire process. It however, would require further understanding of how education on sustainability can help in changing human behavior.

## 9. Some important non-government initiatives in the States (for creating synergies under the CCIP)

Project / programme	Status	Beneficiaries	Scope
<b>Asian Cities Climate Change Resilience Network (ACCCRN) project in Assam</b>	Ongoing	The residents of Jorhat (Assam) and Saharsa (Bihar) with a population of 153,429 and 155,175 respectively	The project aims at preparing an urban climate change resilience strategy by collaborating with local municipalities
<b>Samajik Shaikshaniik Vikas Kendra (SSVK)</b> Activities in Bihar	Ongoing & certain parts of the initiative have been completed	Lakhnaur Block of Madhubani district (Population of ~134,121) and Rohtas, Darbhanga and Madhubani districts  Certain projects are pan-Bihar. Reclamation of traditional tanks is in place in Jhanjharpur <sup>26</sup>	Water and Sanitation: Installation of low cost sanitary toilets and Hand Pumps  Natural Resources: Awareness generation on optimal resource utilization, and addressing Bihar floods, among various other activities
<b>Watershed Organization Trust</b>	Ongoing	65 villages in Maharashtra, Madhya Pradesh and Andhra Pradesh covering an area of 40,734 ha, benefitting 63,282 people	Watershed development in the region and implementation of agro-meteorology for tracking weather patterns at village level leading to advisories to farmers
<b>Reuters Market Light</b> (for profit business)	Ongoing	Activities are pan-India covering a total of 17 states and roughly 1.3 million beneficiary farmers	Disseminating local weather information to subscribers
<b>M S Swaminathan Foundation</b>	Ongoing	Initiatives spread across many states including Orissa, Kerala and Maharashtra	Addressing food security, coastal system research and biodiversity management

<sup>26</sup> 947 acres of land and 52 acres ponds of 197 acres have been distributed and claimed by the poor and marginal people in the Kamla and Kosi region; 1215 acres of land is in the process of possession.

<b>BAIF Development Research Foundation</b>	Ongoing	<u>Maharashtra</u> No. of micro watersheds - 144 Cum. Area - 57715 ha No. of Villages - 442 Cum. benefitted families - 36367 <u>Bihar</u> No. of micro watersheds - 5 Cum. Area - 5623 ha No. of Villages - 41 Cum. benefitted families - 8316 <u>Chhattisgarh</u> No. of micro watersheds - 4 Cum. Area - 3862 ha No. of Villages - 36 Cum. benefitted families - 347	To make best use of the available water resources for consumption of human, livestock and crop production; For promotion of sustainable agriculture under the National Agriculture Innovation Programme  The integrated farm development model comprising of improved agriculture and water resource development practices increased the crop intensity by 49%, benefiting 5546 families
<b>Dahanu Taluka Environment Welfare Association</b>	Ongoing	Dahanu Taluk, Thane, Maharashtra	Training Tribal youth to set up an innovative non-conventional power unit and utilizing Warli folk art to create awareness on climate change
<b>Sambandh Activities in Orissa</b>  <b><i>Arogyam, Abhipsa, Asha, Aranyani</i></b>	Ongoing	Villages covered - 3300 Total plantations in acres: 1323.5 Households covered: 1846 Over 2000 households covered under this initiative Biomass-gasifier established in Bhaliaguda village of Jahsipur block of Mayurbhanj District which caters to the need of 137 households Implemented integrated watershed in 4 watersheds covering an area of 2455.61 ha in Mayurbhanj	Revival and promotion of Indian medical heritage systems and practices as well as wider; To achieve "climate-friendly" landscapes to minimize greenhouse emissions and maximize the sequestration of carbon in soils and vegetation; Promoting alternate sources of energy; Sustainable livelihood through integrated watershed approach to natural resource management with greater access and control by women.
<b>Accord</b>  Activities in Assam	Ongoing	People of Bojali subdivision	Water and land management

<b>Nav Jagriti</b> Activities in Bihar	Ongoing	The Musahars community in North Bihar	Demonstration of solar applications and alternative livelihoods through sustainable land management practices
<b>Mahatma Phule Samaj Seva Mandal</b> Activities in Maharashtra	Ongoing	NA	Respectable livelihood to the De-Notified and Dalit families through conservation of biodiversity and restoration of degraded and waste land
<b>Nabjagaran Sanstha</b> Activities in Assam	Ongoing	NA	Biodiversity protection, utilization & cultivation of indigenous medicinal plants
<b>Sangatan Sahabhagi Gramin Vikas Sansthan</b> Activities in Chhattisgarh	Ongoing	Inhabitants of Surguja district	Conserving wild biodiversity through community participation
<b>The Serve India Trust</b>	Ongoing	Tribal population of Western Ghats	Biodiversity conservation through apiculture for sustainable livelihoods
<b>The Climate Change Adaptation Project - NABARD <sup>27</sup></b>	Ongoing	23,245 families of Ahmednagar district	To develop knowledge strategies, approaches, measures and processes that would enable vulnerable communities to cope with climate change and adapt to impending impacts
<b>National Initiative on Climate Resilient Agriculture</b>	Ongoing	One lakh farm families across 100 districts pan-India	To enhance the resilience of Indian agriculture and to demonstrate site specific technology packages on farmers' fields for adapting to climate change risks

<sup>27</sup> NABARD is also the National Implementing Entity (NIE) of the Adaptation Fund

## 10. Cross sectoral holistic thinking and evidences of climate planning linkages with development planning and budgeting in the study States

### 10.1 Cross sectoral holistic thinking

There is an interesting variation among the six SAPCCs under study in terms of their treatment of cross-sector issues linked to climate change. One can identify three broad categories in this regard - a) SAPCCs that have specifically identified strategies to deal with cross-sector issues, b) SAPCCs that have exclusively focused on identifying sectoral strategies, and c) SAPCCs that have followed a thematic approach. However, none of the SAPCCs really present a systems-thinking based holistic approach to identifying the policy response.

The Odisha SAPCC would belong to the first category with its clear delineation between sectoral and cross-sectoral actions. The process of drafting the SAPCC (Working Groups, with members drawn from different departments) as well the emerging institutional arrangement for implementation (discussed below) also points to a 'fairly strong' consideration of a cross sectoral approach. The SAPCCs of Kerala, Bihar and Chhattisgarh may be grouped in the second category, which is similar to what is largely conventional in public policy design in India. The capacity of the nodal department to engage across sectors/departments seems to have been a critical factor in these States. The remaining two States of Maharashtra and Assam are yet to finalize their SAPCCs. There is however a common approach in terms of identifying thematic areas for identifying climate actions (especially in case of the draft SAPCC of Assam). Thus, for instance, there is an attempt to identify cross-sector strategies to promote sustainable livelihoods, deal with migration resulting from climate change impacts, and so on.

Among the three States with approved SAPCCs – Odisha, Chhattisgarh, Kerala – the State of Odisha seems to have already initiated a process to institutionalize SAPCC implementation that explicitly recognizes the cross-sector issues arising out of climate change. The Climate Change Action Plan Cell (CCAP Cell) constituted under the administrative control of Forest & Environment Department is mandated to co-ordinate with the Nodal Officers of the line departments, formulate Annual Action Plan in consultation with the implementing departments, and report to a Monitoring and Advisory Committee. Under the existing arrangement, the Monitoring and Advisory Committee meets periodically to review performance and set targets for the line Departments identified in the SAPCC for implementation of actions. In the absence of central government assistance the approach has been to pool resources from existing schemes and programmes to scale up activities as identified in the SAPCC.<sup>28</sup>

The Gazette notification<sup>29</sup> on the setting up of the CCAP Cell has a couple of items in the terms of reference that provide an understanding of the linkage with development planning and budgeting as envisaged from the State Government side.

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<sup>28</sup> [http://articles.economictimes.indiatimes.com/2013-12-12/news/45123289\\_1\\_energy-secretary-climate-change-action-plan-energy-department](http://articles.economictimes.indiatimes.com/2013-12-12/news/45123289_1_energy-secretary-climate-change-action-plan-energy-department)

<sup>29</sup> <http://orissa.gov.in/govtpress/pdf/2011/2699.pdf>

The high-level Monitoring and Advisory Committee set up under the chairpersonship of the Chief Secretary in Odisha is an institutional mechanism that certainly has the potential to provide holistic approach to climate action at the State level, and this can be adopted (with variations of course) by other States. Additionally, in order to bring in the linkage with the political leadership in a State, there may be a State Council on Climate Change as has been formed in the State of Maharashtra. The Maharashtra State Council on Climate Change is chaired by the Chief Minister, and includes the ministers from environment, agriculture, water resources, industries and other key-sectors.

## **10.2 Linkages with development planning and budgeting**

It goes without saying that the existing development planning processes in the States need to incorporate the planning on climate change. All the six study States follow more or less a uniform development planning process that is usually coordinated by the State Department of Planning (variably named in different States). The high level State Planning Board constituted under the Department of Planning, and headed by Chief Minister of the State, bears overall responsibility for development planning, coordination and implementation in short and medium terms.

The following suggestions on better integration of SAPCCs in the States' overall development planning may be considered:

- a. First, it is essential to build appropriate capacities among personnel in key line departments, so that the distinction between climate actions and the development related actions are correctly made.
- b. Second, the proper costing of climate actions at the level of implementing Departments remains a major concern, with current estimates largely based on undefined assumptions on climate change impacts and inadequate understanding of the range of available options (technology as well as policy).
- c. Third, the coordinating Department/agency in the State would need to have the ability to provide guidance (checklists, criteria for distinguishing between climate and development actions, budgeting formats, unit costs, etc) to line departments on the preparation of cost estimates for climate actions.
- d. Fourth, the overarching steering / monitoring mechanisms (such as the Monitoring and Advisory Committee of Odisha or the State Council on Climate Change in Maharashtra) would require expert advice on sources of finance and financing mechanisms to inform the review and approval of the cost estimates prepared by implementing departments.
- e. Finally, the State Planning Department would be required to have its own in-house capacity for conducting due evaluation of the estimates prepared by the line departments. In fact, it would be expected of the Planning Department to act as a nodal department for carrying out sensitization and training programmes on climate finance and budgeting for line departments.

## 11. Iterative learning and accountability – suggested institutional arrangement

### 11.1 Promoting iterative learning

Climate change challenges the continuation of one-way top-down model of knowledge generation and dissemination. There is an undeniable need of guidance of science for better quality of policy interventions, but equally important are the lessons from practice for its acceptability in localities.

The concept of 'Anticipatory Governance' seems to be appropriate for the design of an institutional arrangement at the State level that will promote iterative learning and ensure accountability in the implementation of climate strategies among a range of stakeholders. Anticipatory governance demands attention to building contingent, conceptual, and ethnographic expertise:

- a. **Contingent expertise:** This refers to the administration's preparedness to respond immediately and effectively to a potential hazard, and is concerned with the conscious adaptive mechanisms and institutions built by governments prior to extreme events.
- b. **Conceptual expertise:** This refers to the capacity to understand and analyse challenges by taking into consideration the complexity of the entire socio-ecological system. An example is flood management, which often has policy makers misdiagnosing the causes, and thereby exacerbating the problem long term.
- c. **Ethnographic expertise:** Such expertise refers to an ability to gain a contextual and grounded understanding and to act on the basis of such experience. It also refers to an ability to negotiate, build consensus, and ensure participation amongst a wide range of stake-holders<sup>30</sup>.

The challenge is how best to mobilise expertise for anticipatory governance. First is to look at current adaptation practice at subnational level, which is largely driven by government agencies mostly designed as project activities and without proper documentation of the implementation experience. Such practice at local scale raises major challenges for up scaling; hence the need for institutionalizing appropriate feedback processes to nodal agencies. An example of institutionalized feedback mechanisms in practice is the structured evaluation of community adaptation projects in Bangladesh as part of their M&E, which feeds into decisions on replication or up-scaling.<sup>31</sup>

The SAPCCs in the study States are observed to have understood the need for feedback mechanisms in their proposed arrangements for monitoring and evaluation of actions. As a core component of the implementation plan, the Odisha SAPCC identifies a regular feedback loop to inform monitoring and evaluation activities – this, however, is yet to be put in practice. The Chhattisgarh SAPCC proposes district level Coordination Committees functioning under District Collectors and, additionally, third party evaluation expert-teams. A quarterly reporting system is expected to help in continuous evaluation of climate action plan performance. Kerala's SAPCC has a commendable proposal to involve local self-

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<sup>30</sup> Newell B and Wasson R. 2002: 'Social System or Solar System, Why Policy Makers Need History,' *UNESCO Document SC.2002/WS/53*. pp. 3-17.

<sup>31</sup> <http://www.fao.org/climatechange/laccproject/en/>

government institutions in the SAPCC implementation; however, these institutions would require significant attention for building capacity to monitor, verify, document and report the experiential learning from climate actions as they get implemented.

Second, there is a need for **overarching institutional mechanisms** at regional levels for effectively addressing climate change in a coordinated manner and promoting dialogue among and between government agencies for better convergence in activities. Setting up of inter-State forums for knowledge and experience sharing would be a right step in this direction<sup>32</sup>. Engagement of top administrators ensures cross sector coordination for policy development and synergistic efforts by different ministries and departments while they work on resolving issues where there is conflict of interest.

Third, it is well recognized that garnering **high level political support** is a vital pre-requisite for driving climate action and is one of the principal reasons behind its successful diffusion to lower levels of governance. Among the study States, Odisha seems to have benefitted from such political support.

## 11.2 Accountability of stakeholders

Accountability is one of the core principles defining good governance and depends on the extent to which there is **transparency of decision-making and implementation** in institutions and processes. There are several examples of IT-enabled e-governance initiatives in India<sup>33</sup> that have been lauded for bringing transparency in government functioning, facilitating public access to information, and enhancing the interface between service providers and citizens. A similar concept may be tried out for the processes linked to the implementation of SAPCCs.

## 12. Synthesis and Conclusion

The roadmap for capacity building suggested in this report is largely a common programme of action for the six study States. While there is undoubtedly great diversity among the States, at a basic level the capacity needs are common and mostly relate to evidence building, prioritization, and co-ordination – all of which require technical as well as managerial support. The on-going initiatives in each State to address these capacity needs have potentially a lot to offer in terms of learning that can be facilitated through experience sharing mechanisms under the CCIP. Most importantly, there is an uneven

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<sup>32</sup> An example is the forum for State electricity regulators.

<sup>33</sup> Some of the successful initiatives under e-governance in Indian context are: Gyandoot, e-seva, SETU and SUDA. The IT initiative of Karnataka aims to provide direct citizen interface, improve human resources and connectivity and improve the efficiency of government officials. The Gramsat Pilot project initiated by the Government of Orissa is a significant step in good governance. It addresses issues of transparency, accountability, responsiveness, reduction of corruption, training and skills development, peoples participation, project planning and monitoring, disaster warning etc. The Friends Project in Kerala is another example where an IT enabled service, Friends (Fast, Reliable, Efficient, Network for Disbursement of Services) to provide a host of popular public services to the general public.



endowment with respect to knowledge and training centres; it therefore seems sensible to suggest that the available expertise is pooled through common platforms and delivery mechanisms under the CCIP.

Among all the concerned stakeholders, the political representatives are yet to be adequately sensitized and engaged on issues related to climate change. This deserves utmost priority and the focus of CCIP should be to create “champions” of meaningful climate action from the political class. Related to this is ensuring that the capacity of local media at the State level is adequately created to correctly report on climate change.

Access to finance and technology remains a key motivation for most government stakeholders while taking decisions on climate change action. For a successful uptake of the interventions under CCIP, it would be essential to address this expectation quite early in the delivery of the programme. A necessary step in this direction would be to ensure that the States adopt a framework for climate budgeting for priority sectors.

Convergence of activities across government departments has been repeatedly stressed by the stakeholders in all the six study States. This would require appropriate State-specific institutional mechanisms to be identified as per the governance system and culture, but there are undoubtedly initiatives being tried out in several states which call for focus on experience sharing and shared learning of best practices.

The technical infrastructure and human skills base for data generation, compilation and analysis remain the weakest area of strategic planning and management in our country. This is also the area in which innovative approaches to data and knowledge gathering is required. Well designed, participatory ICT infrastructure can potentially play a facilitating role in this regard. To begin with, synergy should be sought with initiatives such as National Knowledge Network. There are also initiatives underway in each State related to use of GIS and these need to properly converge and synergies explored.

Finally, it needs to be pointed out that capacity needs are most likely to evolve and change as the States proceed with implementation of the SAPCCs. It is imperative that this study be revisited after a couple of years so that the support under the CCIP stays relevant and focused.

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## **Annexure 1: Pre-workshop meetings and Stakeholder Workshops**

### **Assam**

#### **Stakeholder Workshop on draft Assam State Action Plan on Climate Change**

**Date:** 3rd June, 2014  
**Workshop Venue:** Secretariat, Dispur

#### **Discussion points:**

1. Expectation built around the stakeholder workshop was to guide thoughts on appropriate pathways of Assam's development. This to a large extent is disillusioned at present by several opinion, emphatic discussion and activism surrounding environmental protection issues, in the pre-text the state's vulnerability to climate change. The need for increasing people's participation was stressed to achieve success for integrated development
2. Description of CCIP project detailing on its purpose came out to be very useful. Wherein, it was mentioned that the project will be run for five years to help the state government designing appropriate development plans, successful implementation of SAPCC strategic plans and evaluation. The core funding of CCIP is coming from International Climate Fund of UK, brought in under strict guidelines of national steering committees that overseeing the entire climate change guideline within India. CCIP would provide guidance against management and implementation supports. It hence will help the states to plan for correct adaptation and mitigation priorities, for protecting people and natural resources from the threats on climate change. The support will be implemented through managing agents chosen across International, National and State level resource persons, who would be in place soon. National technical support unit will provide hand holding support for remote areas, for management of risks among vulnerable population. CCIP can help- in prioritization, basic assessment/ generating evidences for CC for informed decision making, designing project ideas on how best the state can support, developing decision making tools, implementation mechanisms, participatory design making, seeking for climate funding and dissemination of generated knowledge. The approach will be based on SAPCC strategies, building on that where there is scope of improvement, not starting from scratch, it could be stand alone climate programme, but also could be cross cutting themes, depending on how a state prioritize on its sectoral plans. CCIP will be flexible to allow state's innovation.
3. Several crucial observations on changing climate such as, unseasonal rainfall, storms, floods, becoming more common for states establish Assam's vulnerability to climate change. However, there needs to be strengthened efforts for assessing vulnerability, carried out by the state agencies. Assam is the bio-diversity hotspots, huge forest lands- tropical forests however is getting seriously threatened or sometimes even vanished at certain places. In spite of current conservation mechanism, it is unable to affect extinction to the extent it will be required. With changes in rainfall pattern, temperature variation, deforestation, forest land encroachment, there is huge loss of medicinal plants, tropical forests, wetlands, wildlife conservation, are

witnessed to get severely affected leading towards a loss for biodiversity. Inter departmental convergence for implementation of integrated planning was called for.

4. It was mentioned that Assam's greatest vulnerability to frequent floods often are due to melting of glaciers in China, which remains beyond control of Assam. However internal issues like-deforestation, failure in conservation of wetlands, encroachments in forest land, also stand out to be important threats for increased flood incidences.
5. Pollution level of Assam is of late is seen on an increasing scale, hence, control of pollution for a city like Guwahati becomes crucial. Further understandings on urban development, management of wastes, issues on ground water over-extraction and contamination, need special focus.
6. Certain priority areas related to climate change adaptation and mitigation efforts came into the forefront, which could be taken as significant indications on SAPCC strategic plans for the state. The details on the areas are presented in the main report.
7. It was mentioned that Assam has been experiencing extension of winter season, and erratic rainfall pattern over the past few decades. This sometimes has also made dents on amount of river discharge, however more frequently given rise to flood situations, utterly clogging normal way of life. Assam hence would require a complete safe-guard against floods that jeopardize the state often.
8. Development projects that are built on high risk seismic zones needs to be well planned
9. The document on State Action Plan to Climate Change further would require to be updated based on the latest information and evidences, many of which might not have been reflected in the present version since the document has becomes little dated.
10. This would also provide opportunity to the state for a fresh look into the sectoral budgets, identifying priority areas and to ask specific helps from CCIP for strategic implementation
11. Further important tasks for the State would be hence-
  - a. To update SAPCC document to incorporate latest information based on current progress and on the state of the six key sectors as have been emphasized in the documents.
  - b. To work out budget requirement based on different activities planned under the SAPCC document.
  - c. To recognize important project plans that involves – management of flood risks, control over rapid urbanization processes (extension of habitation over flood lands, seismic zones, deforestation etc), pollution control in urban locations of Guwahati, would demand utmost.
  - d. To involvement of indigenous groups for biodiversity inventories
  - e. To explore financing mechanism for implementation of state action plans

## Bihar

Dated: 4<sup>th</sup> April, 2014, Patna

Pre-workshop consultation meeting with Nodal Officer CC, Bihar, Department of Environment and Forests

Discussion points-

1. Bihar SAPCC was initiated in 2010/11, directly coordinated by the UNDP, New Delhi. However the draft still remains to be finalized incorporating necessary up date of information, contextualization as per the state relevance, for figuring out possible implementation mechanisms and working out budgetary requirement
2. The draft hence was shared with all 15 departments under Bihar Govt, as all of these were identified as stakeholders of state actions for CC, who therefore were required to give their necessary inputs
3. However, almost no inputs came from the departments as was required, till the beginning of 2014
4. Reasons were multiple, i.e., department officials did not receive enough orientation on tasks that they were to perform, there was a lack of consistent support from UNDP, the first draft of the document was shared among different department, without an adequate dissemination workshop
5. Consequently, the draft did not move forward over the last one and half years, since its first version as was prepared by the UNDP, though there have been constant dialogues between UNDP and the Dept. of Forests and Environment, Bihar.
6. The department asked for support from UNDP in order to accomplish all tasks that were expected in the draft for finalization. The requirement of local support from UNDP was clearly emphasized by the department, which as expected could have meant large support for different departments to do their part.
7. Meeting with MoEF suggested modification in the draft in terms of bringing in state specific relevance on sector-wise climate risk profiling and alignment of strategies in accordance to these risks, such as impacts on rice or wheat production.
8. Several key institutions have been involved now in the process of assessing risks, providing inputs for sectoral planning, viz., ICAR, CGWV, CWC, Central University of Patna, etc.
9. Initially, during 2011, the cabinet power for state approval of the SAPCC document was transferred to the Steering Committee, which is comprised of Chief Secretary as the Head, PS of 15/16 different department of GOB as members and representatives from Academia and NGOs as other important members
10. It is decided that once the draft is finalized a coordination cell will be constituted. As proposed the cell will be headed by PS DoEF, and will be membered by the senior level persons from each department. The cell will mandated to look into the matter of implementation of SAPCC strategic plans

11. Challenges are often multiple since senior officials given the charge of the document are on rotation and hence do not find useful successor who could be entrusted with the unfinished tasks

### **Stakeholder Workshop on Bihar State Action Plan on Climate Change**

*Venue: Hotel Maurya, Patna*

*Date: Tuesday, 29<sup>th</sup> April 2014*

The workshop was attended by twelve officials representing Departments in the Government of Bihar, representatives from EPCO and TERI/TERI University research team. The group of participants engaged in discussion to develop sectors directly and indirectly vulnerable to impacts of climate change. The workshop was co-ordinated by Mr. B A Khan, the Principal Chief Conservator of Forest, Bihar. Apart from discussion on the various actions proposed in the SAPCC document, additional concerns and problems were identified by representatives from the Agricultural, Health, Animal Husbandry, Disaster Management, Environment and Forestry and Mines and Geology Departments. Innovative and context specific interventions were identified by some of the participants and overall, the group realized the need for further strengthening the existing gaps in the SAPCC. For example, the nature of natural disasters like flood and its consequences differ across the state and therefore there is a need to design intervention plan to mitigate floods according to regional needs. Overall, the discussions have led to important inclusions in our review of Bihar SAPCC and identification of existing gaps and framing policy initiatives.

	<b>Name</b>	<b>Designation</b>	<b>Organization</b>
1	Bharat Jyoti	Director, Ecology & Environment	Department of Ecology & Environment
2	B A Khan	Principal CCF Bihar	Department of Environment & Forests
3	S K Karn	Advisor, Forests	Department of Environment & Forests
4	A P Sinha	Deputy Director	Mines and Geology
5	Dr. Pradhan Partha Sarathi	Associate Prof.	Central University of Bihar
6	Dr. D K Gupta	OSD	Health Department, GoB
7	B N Jha	Deputy Director	Urban Development & Housing Department
8	Ashok Kumar	OSD	Disaster Management Department
9	Piyush Prasad	Deputy Director	BAMETI, Dept. of Agriculture
10	Dr. S P Singh	I/C Director	Animal Husbandry Department
11	Dr. C S Singh	L.R.O	Animal Husbandry Department
12	Prateek Barapatre	Sector Expert	EPCO
13	Dr. R P Singh	Sr. Consultant/ Forestry	EPCO
14	Dr. Arabinda Mishra	Professor	TERI University
15	Neha Pahuja	Associate Fellow	TERI
16	Dr. Subir Sen	Assistant Prof.	TERI University

## Discussion points-

1. Bihar still needs to finalize the SAPCC document based on the feedbacks provided by the ten line departments, involved in the preparation of SAPCC. The action planning process was initiated in June 2011 with the formation of NSC and a workshop, drawing necessary supports from UNDP. The process of document finalization needs to be expedited.
2. About four districts of the states pursue activities related to mining, wherein no new mining lease has been issued by the Supreme Court's order. The state seems to face difficulties with imports of stones for construction works from other neighbouring states like UP and Jharkhand, and is hence forced to incur costs towards transportation and other services. It will be important to conduct studies on carbon foot prints of construction sector or stone quarrying for understanding implications and to imbibe an appropriate energy intensive policy for the state.
3. The state has initiated number of automated weather stations and had successful made available climate projections at 50X50 resolutions, which has been used in the studies commissioned in agriculture and water sectors.
4. Need was felt for dissemination of climate change related information to the common people. Some innovative initiatives are being planned involved local communities, NGOs, and also seeking involvement of women living in the community
5. There remain requirements for building capacity at the state to use climate data and conduct impact assessments. Mass communication model needs to be strengthened so that the climate information is made available at different levels
6. Special attention for assessment of climate risks and related impacts on biophysical resources for south Bihar would be needed. Several of key activities were identified by the participants for working out this plans, this involved planning for model CDP, involving latest technologies in information gather and decision making, which can provide opportunities for making the development projects climate resilient.
7. It will be needed to study the role of climate change on health, including effects exerted by natural disasters. Support could be drawn from latest technologies like early-warning of pandemics/reporting of cases. Cross sectoral studies, as suggested would be beneficial for identification of the linkages of health to climate change, indoor air pollution, water quality and sanitation
8. Disaster Management activities ideally gains success if only it receives supports from different departments. The key concern about the state disaster scenario emerges from the floods. There is an urgent need for standard operating procedure by the state governments which pertains to responsibilities to be followed by all the departments, as and when disasters occur. Capacity building at the local level for disaster preparedness stands out as a crucial need.
9. As has been felt, it would be important to strengthening of early warning system and involving communities that are rich in indigenous knowledge on traditional coping and communication of disaster risks.

10. There are a number of initiatives which are being operational in the agriculture sector, including setting up of the weather alert system, which is capable to provide two-day forecasts.
11. Research is underway on new varieties of seeds/crops, to suit flood and drought conditions. Biofertilisers (cow dung, urine, neem) have been used to overcome the pests that have increased.
12. Data is being collected at the block level, new tablets and GPRS has been introduced to facilitate the same.
13. It was suggested that studies should be planned to assess livestock health and productivity, and exploring possibilities for new hybrids varieties
14. Overall assessment studies on climate change impacts across different sectors need to be targeted. Along with documentation of traditional knowledge as it may help in adapting to cc
15. Development of projects for international mechanisms like CDM and RDD plus

## Chhattisgarh

### Stakeholder Workshop on Chhattisgarh State Action Plan on Climate Change

*Venue: Hotel VW Canyon, Raipur*

*Date: Tuesday, 6<sup>th</sup> May 2014*

There were around fifty participants in the consultative workshop with representatives from all Departments of the Government of Chhattisgarh, DFID, EPCO and TERI University. Mr Amitabh Jain, IAS shared his concerns regarding the impacts of climate change. Dr. Boaz, PCCF spearheaded the discussions after introductory remarks by Prof. Mishra, TERI University and Mr. Alope Barnwal, DFID. The workshop was successful in getting feedbacks and views on the Chhattisgarh State Action Plan on Climate Change from very senior officials in respective Departments. The workshop focused on sectors ranging from agriculture, industries and mining, forests to urban planning and transportation, human health to animal husbandry, among others. Initiatives from the State Planning Commission to implement suggestions made in the Action Plan were also discussed and participants could discuss few issues currently not being given importance in the Action Plan document. Necessary interventions thus currently not being considered could be identified for inclusion in the action plan at a later stage. It was highlighted that Chhattisgarh being a rich state in terms of natural endowments and forest resources, industrial activities would increase pressure on existing urban areas and promoting demand for better facilities and new urban areas to develop at the cost of environment. Therefore, good practices should be identified at an early stage of development so that climate-friendly sustainable growth could be achieved.

	Name	Designation	Organization
1	Dr M L Naik	Ex. Prof. Life Sciences	Pt. Ravishankar Shukla University
2	L Y Okhade	IFS (Retd.)	Forests Department

3	Devashish Banerjee	DCF	Chhattisgarh Rajya Van Vikas Nigam
4	Aloke Barnwal	Advisor	DFID, New Delhi
5	Haimanti Poddar	Sr. Reg. Advisor	BDHC, Kolkata
6	Anita Nandy	CCF-National Bamboo Mission	Forests Department
7	K Subramanian	Addl. PCCF	Forests Department
8	A K Dwivedi	APCCF	Forests Department
9	K Weake	Suptd. Engg. (D)	CEMRP, Water Resources Department
10	NareshTripathi	Asstt. Engg. (D)	O/O CE, MRP, Water Resources Department
11	G K Nirman	Jt. Director	Department of Agriculture
12	O P Mishra	Asstt. Engg.	Water Resources Department
13	Sekhar Govind Shesh	Asstt. Engg.	Water Resources Department
14	Mahesh Kr. Garhewal	Jt. Director	SAMETI
15	S C Rahatgaonkar	IFS	Chhattisgarh Rajya Van Vikas Nigam
16	A K Singh	PCCF	Forests Department
17	Dr B P Nonhare	CCF-Ecotourism	Forests Department
18	A K Bhat	CCF-Wildlife	Forests Department
19	Anurag Diwan	Jt. Director	Mining
20	A Pandey	IFS, CF Kanker	Forests Department
21	Dr A S R A S Sastri	Professor	IGKV, Raipur - Agriculture
22	N Manikandan	Asst. Prof.	IGKV, Raipur - Agriculture
23	Dr A K Singh	Deputy Secretary	Finance Department
24	Dr J K Upadhyay	APCCF	Forests Department
25	S S Bajaj	VC, NDRA	Housing and Environment
26	M K Tyagi	Member Secretary	State Planning Commission
27	H K Verma	EE	Chhattisgarh Housing Board
28	R P S Tyagi	Jt. Secretary	Health and Family Welfare Department
29	Sanjay Shukla	CCF Secretary	Housing and Environment
30	P C Mishra	APCCF & Director	Admin. Academy, Chhattisgarh
31	Shalini Raina	DFO	Forests Department
32	M K Rathore	Addl. Transport Comm.	Transport Department
33	Anil Kr Sahu	Secretary	Forests Department
34	Umesh Dhalendra	OSD	Urban Development Department.
35	Alok Tiwari	Addl. DFO	Forests Department
36	Rakesh Chaturvedi	CF D/P	Forests Department
37	A K Srivastava	DFO	Forests Department
38	K C Bewarta	APCCF	Forests Department
39	R K Tiwari		Forests Department
40	B P Sinha		Forests Department
41	D R Wadhvani	Jt. Director	Department of Industries



42	Prateek Barapatre	Sector Expert	EPCO, Bhopal
43	Dr R P Singh	Sr. Consultant/ Forestry	EPCO, Bhopal
44	Amitabh Jain	IAS, Principal Secretary	Forests Department
45	Mudit Kr. Singh	APCCF (Land Management)	Forests Department
46	Dr P K Shinde	VAS	Directorate of Veterinary. Services
47	DrRaiv Guide	VAS	Directorate of Veterinary. Services
48	DrKamlesh Jain	Nodal Officer for NCD/ ECSP	Health and Family Welfare Department
49	J L Choudhary	Scientist	IGKV, Raipur - Agriculture
50	V K Chaturvedi	DDH	Directorate of Horticulture
51	Dr. A A Boaz	PCCF and Managing Director	Chhattisgarh Rajya Van Vikas Nigam
52	Dr. Arabinda Mishra	Professor	TERI University
53	Dr. PapiyaMazumdar	Assistant Prof.	TERI University
54	Dr. Subir Sen	Assistant Prof.	TERI University

#### Discussion points:

- Biological impacts of CC important, but very little information in the State context; need to identify impact indicators; Pollution and Habitat fragmentation a big problem in the State (especially due to mining); Habitat fragmentation: work is happening under the Green India Mission; the landscape approach identified in the SAPCC will address this issue; need to exploit better aspects of existing legislative measures (like the FRA) such as community controlled and managed areas – this can help regeneration and give more rights to people
- Indira Gandhi Agricultural University doing research on climate change impacts in the State context; Inter-district variations observed; Extreme events are already being experienced; October rainfall has decreased and this is affecting agriculture; Farmers are already adapting knowingly or unknowingly; Onset of monsoon has shifted by 7 days (10 June to 17 June); Indigenous plant species vanishing and the wheat zone has shifted north; Impact on agriculture is being analysed; productivity improvements are a priority
- Identifying sub-projects is required - Agro-forestry can be an important sub-project; A Green India Mission sub-project is going to be initiated Sub-projects need to address social needs as well (since the emphasis is on inclusion)
- Disaster Management Plan of the state can be an important source of information
- Baseline analysis important; Vegetation carbon pool assessment has been done
- Severe impacts are already being observed on NTFPs; shift in species distribution across regions and extinction of species at local level already being observed
- State Agro Forestry Plan needs to be implemented; large areas available in the state for agro forestry; Forest Dept has initiated in Bastar and Kondagaon Khamar plantations (?)
- Wetlands in the state need attention (fishery potential can be assessed)
- Animal breeding can contribute to mitigation

- Other priorities for agriculture: changing crop pattern, introducing new crops, research in new crop varieties
- State Agri Univ conducting research on aerobic rice
- Range management is a priority
- Degraded forest areas can be converted to and managed as grazing lands; this would be an ideal Forest – Agriculture – Animal Husbandry cross-department and cross-sector project
- Parthenium weed invasion is a big problem and needs a solution
- Convergence across programmes / departments will need high-level platform with policy-backing
- Convergence already happening; many programmes of agriculture dept dovetailed into forestry sector policies; convergence at the level of JFMs; convergence in the tourism sector for promotion of eco-tourism
- Many examples of convergence exist; for SAPCC implementation convergence modalities would need to be defined drawing on the examples
- Single-window system in the Dhamtari (?) model a good example of convergence
- Linkage among the CC cells across different departments: forum will be provided by the State CC Centre ; details like frequency of meetings for such a forum can be defined for institutionalization
- Participation of non-state stakeholders happens in the Dist Coordination Committee, which has an open design for co-opting stakeholder representatives from a wide spectrum of society
- Key institutions where capacity building can happen: SIRD, Academy of Administration, Training Institutions of the Line Departments, etc
- Dedicated agencies like KVK centres for agriculture sector are more effective as resource centres
- Two important end points where sensitization and capacity building required are the policy makers and the grass-root communities
- Also important is to develop extension programs and training material in local vernacular languages
- Various conservation technologies have relevance to Chhattisgarh; current emphasis on 'anicuts' not justified; Need to link water conservation interventions with proper geological studies in the state
- Measuring devices for groundwater recharge need to be deployed
- Detailed survey of flora and fauna happening under CAMPA by BSI and ZSI (3 year project covering all districts); will lead to publication of database on species in the state
- Encroachment of water bodies a big problem and inventorization required
- Expertise on taxonomy needs to be built in the State Universities and the Biodiversity Board
- A Folklore Taxonomy Project initiated in the State, linked to the BSI-ZSI study; local taxonomists are being trained
- Incentives for behavioural change; promote eco-friendly vehicles and mobility support in Naya Raipur
- Source apportionment study done for Raipur
- Communication for life style changes a must; policy regulating vehicle ownership
- JNNURM can be an effective vehicle for strengthening MRT system

- Mostly metallurgical industries in the State, so waste heat recovery projects can be identified and incentivized for getting carbon credits
- A lot of pilots and demonstration projects needed in the state
- A REDD+ strategy and pilot can be developed for the State, especially with a focus on primitive tribal groups
- Sustainable transport can be promoted by involving Mayors of the big cities (Raipur, Bilaspur, etc) and facilitating their exposure to the sustainable transport congress at the global level
- Large indigenous knowledge in the state: under the Nagoya Declaration, bio-cultural protocol developed for the Baiga tribe; such protocols can be developed for all PTGs in the State
- Habitat fragmentation issue – development of corridors can be considered (especially for the tiger reserves)
- Developing sensitization programme for policymakers is a priority (can draw from existing DFID programme for parliamentarians)
- Developing solar and wind villages
- Promotion of walkways and cycle pathways in Raipur and Bilaspur

## Odisha

### Stakeholder Workshop on Odisha State Action Plan on Climate Change

Venue: Mayfair Lagoon, Bhubaneswar

Date: Monday, 12<sup>th</sup> May 2014

With over forty participants, this was one of the most representative workshops with active participation of officials from Government departments and academia. The workshop began with introductory remarks by Prof. Arabinda Mishra, TERI University followed by a session chaired by Mr. Suresh Pant, O/O PCCF. The discussions ranged from the possible impact of climate change on agricultural sector to power and energy sectors in Odisha. The participants from the academia critically reviewed the progress in implementing the policies prescribed in the State Action Plan on Climate Change. Few participants also highlighted the need for policy intervention in protecting sensitive ecosystems such as the world famous Chilika lake in the state. Water sector needs to be highlighted as a priority given that the state faces drought as well as floods every year. The use of GIS to streamline region specific climate change studies and predictions was also shared. Many key areas were identified where intervention and capacity building measures need to be undertaken on a case to case basis.

	Name	Designation	Organisation
1	Amitav Swain	VP	IRADA, Bhubaneswar
2	Manoranjan Kar	Manager	OFDC Ltd.
3	Abhay Kr. Mohanty	CE(OWPO)	CE, WR Dept.
4	Nihar Ranjan Sahoo	SEE	State Pollution Control Board
5	Dr. Supriya Pattanayak	State Rep	DFIDI, Odisha
6	Suresh Pant	CE(Planning), O/O PCCF	Forests & Environment Department
7	Sunanda Kr. Mohapatra	ADD(OWPO)	WR Dept
8	G Rajesh	Addl. C Ex	Chilika Development Authority
9	B K Sahoo	Project Director	Odisha Water Supply & Swerage Board
10	S K Rath	Director, HR	Odisha Power Transmission Corp. Ltd.
11	G K Panda	Professor	Utkal University
12	H K Bisht	CCF	O/O PCCF (WC)
13	Dr. Dilip Ray	Dy. Director	Directorate of Economics and Statistics
14	P K Prusty	Sr. Sc.	Forests & Environment Department
15	S B Samant	Director	Forests & Environment Department
16	Dr. Rabi N Patra	Dy. Director	Gopabandhu Academy of Administration
17	Dr. S K Sahoo	Jr. Sc.	Forests & Environment Department
18	U K Mohanty	Jt. Director	Fisheries Department
19	Sarita Kanungo	Dy. Project Coordinator	CMGI, Odisha
20	Dr. N D Mohanty	Scientist	ORSAC
21	Dr. Bala Sahoo	RD	FARD
22	Dr. N R Mahapatra	Dy. Director	FARD

23	Madhumita Swain	Manager, HRD	OPTCL
24	Niranjan Sahu	Manager, GIS	Watershed Mission
25	Priyambada Pattanaik	Jr. Sc.	GOO
26	Pinaki R Mohanty	Proj. Co.	ORTPSA
27	Dhananjay Hembram	Jt. Sec. Nodal Off.	Fisheries & ARD
28	Nataraj Singh Sardar	Consultant	CTRAN Consulting Ltd.
29	Debabrata Mallick	OSD	AR Cell, G.A. Dept.
30	N K Sethi	OAS (SAG) Addl. Sec.	HRMS
31	S K Rout	Director, Ports & IWT	Directorate of Ports & Inland Water Transport
32	Dr. Prameela Baral	Dy. DHS (IDSP)	DHS
33	Sasmita Mallick	State Microbiologist	State Surveillance Unit, DHS
34	Prateek Barapatre	Sector Expert	EPCO, Bhopal
35	Dr. R P Singh	Sr. Consultant/ Forestry	EPCO, Bhopal
36	S K Tripathy	DGM	GEDCAL
37	Parimita Mohanty	Fellow	TERI
38	Joy Daniel Pradhan	State Co.	TERI
39	Dr. Arabinda Mishra	Professor	TERI University
40	Dr. Papiya Mazumdar	Assistant Prof.	TERI University
41	Dr. Subir Sen	Assistant Prof.	TERI University

#### Discussion points:

1. Emphasis was put forth on the anthropogenic drivers that are causing climate change concerns, mostly emerging due to growing base of population and unsustainable ways of living. The expectation from the workshop was to clarify on various doubts, needs, perceptions on climate change determinants, and consequences
2. The need for maintaining coherence between national and state level priorities was stressed upon, which as believed would be facilitated with appropriate policy backing. National policies could act as enabler for the states to make appropriate planning and implementation pathway
3. Lack of basic infrastructure such as, supply of electricity for hospitals and other health centres were considered important crisis for the states. Emphasize was laid on exploring alternative energy supply through solar and other sources. Certain ongoing pilot projects, as are being run by TERI in different backward districts of Odisha, could be taken as further scaled up option to meet the growing demands for energy. Hence the mini-grid system which is already deployed in the state across, households, schools, district public community centre, and other establishments, could be exemplary demonstration projects.
4. A concern raised as entirety for the state reflected lack of visibility for the State's ongoing actions against climate change risks, across academic, policy, or governance domains. It was mentioned that inspite of some sporadic success demonstrated by the certain sectors, there is a

clear need for stabilizing state-wise data base generation activities, to appropriately configure state planning on mitigation and adaptation processes

5. Several of the ongoing initiatives both including adaptation and mitigation efforts were however cited by the state nodal officers, in response to the raised concern. The efforts as mentioned sometimes crosscut sectoral boundaries, going along the expected pathways
6. The concern for stalking forestry stocks in the state, inspite of persistent efforts in afforestation was explained through poverty lens. It was emphasized unless cleaner fuels are made accessible to large base of people in the state, hardly any change would possibly be noted in the state forest cover
7. OTPC's initiatives from CSR that target to set up micro-grid for deprived communities for accessing energy through renewable energy, was made a mention about. Inadequacies in power supply as emphasized could be largely overcome through green energy getting acceptance in the state
8. The need for studying normalized vegetation index along with similar stock taking for Water, and Mining sector has been stressed upon. The data on land-use and land-cover as are made available by NRSO could be used for comparison. There is a need for understanding changes in forest cover, over the past 4 decades, and their relationship with temperature and rainfall pattern
9. Further there remains need for assessment studies specific to - basin level , environmental forecasting, global surplus model, increased water users efficiency, integrated water resource management, and similar
10. Need was felt for integrated planning, with inter-departmental collaboration. Wherein, surface water and ground water management strategies need to be given priority
11. Specific knowledge based planning processes are due to typical communities, including Ganjam-Chilika- fishing community or in Kalahandi district. Better development plans could be targeted through integration of different departments and by creating a cadre of CC volunteers, strengthening mechanisms for extension services.
12. Large scale innovations are needed to be brought under highly sensitive sectors like health. There remains a need for strengthening standard operating procedure to efficiently deal with post-disaster crisis situations.
13. Need for involving Panchayats and Department of Education for generating awareness and implementation of different projects were recommended
14. The CC cell set up at the state however is mandated for collection, assessing and dissemination of information for implementation of strategy
15. Odisha would require to have certain technology transfer to use large scale potential of generation and use of methane/bio gas from livestock and agriculture sectors

16. Common property resources are being largely ignored. It would be hence important to target community committees (viz ,JFM, Water shed committees, Pani Panchayat) being recognized for certain important role plays
17. Some baseline information is so far being available for the state on water shed management. However, weather based crop insurance for incentivizing farmers for lost of crop due to CC, long term research need to be undertaken.
18. Certain ongoing assessment studies include- carbon foot-print studies for the sectors- waste, industry, water, forests and transport. Additionally, a multidisciplinary study is underway for coastal disaster management. Compilation of information is however the responsibility of climate change cell
19. Considering there is a huge need for mass awareness generation in issues of climate change, shortage of have so far restricted such efforts .This could be overcome by securing funding from external sources
20. The state needs to work out an appropriate development pathways to attack on widespread poverty situation, which at the same time needs to be climate resilient. The decision at this front should essentially target benefits for the last mile people.

## **Kerala**

Dated: 21<sup>st</sup> March, 2014, Thiruvananthapuram

Pre-workshop consultation meeting with:

1. Addl. Chief Secretary, Department of Environment, Govt. of Kerala
2. Director, Dept. of Environment and Forests, Nodal Officer Climate Change
3. Consultant, UNDP

Discussion points:

1. The urgent need for building understanding of on issues of climate change, among the various department officials in Kerala was emphasized. As perceived by Hon. Addl chief Secretary that not much has been done in Kerala related to Climate Change. General awareness about these issues are largely absent, which has caused almost no action in the recent past. However, the state is believed to have number of expertise internally. Though it would be important to orient officials across departments and to impart mass-awareness about such scientific research results.
2. However, some assessment of state-specific climate change risks has been conducted recently, which have been primarily funded by the Dept. of Environment and Forests. One of which is the recent assessment of climate risks of different ecological zones in Kerala, conducted by NANL, which costed the State approximately worth of Rs. 60 lacs, without receiving any central. Recently, another institute based in Chennai also has taken up similar assessment assignment. The state along with

different research institutes as stated is taking up various original scientific research on High-tide, Changing climatic pattern, Creation of awareness about climate change issues.

3. The need of the hour for the state is to acquire proper guidance on the alternative approaches for planning and implementation of development strategies.
4. For successful implementation of strategic plans worked out under SAPCC the state would require assistance to exploring newer funding sources.
5. Recently, the Institute of Climate Change has been set up Kottayam which mandated to impart training on related issues, hold research studies and provide useful advocacies for the Govt. Departments. These activities would require proper technical, non-technical and financial assistance from different national and international expert groups.
6. Certain priority needs for the state include-
  - a. Strengthening knowledge and services of agricultural extension officers
  - b. Generation of mass awareness on mitigation options including proper waste disposal mechanism
  - c. Expanding economic opportunities based on forest produces, which so far has largely been unchartered
  - d. Preparation on disaster risks management
  - e. Assessment of specific risks in the context of broad physical division of the state, viz, hills, plains and sea

Risk management strategies need to be developed for ground water level, fisher men communities and management of marine resources

### **Stakeholder Workshop on Kerala State Action Plan on Climate Change**

*Venue: The South Park, Trivandrum*

*Date: Tuesday, 17<sup>th</sup> June 2014*

The workshop was attended by thirty officers from various departments of the Government of Kerala. Mr. P K Mohanty, IAS briefed the main concerns and suggested actions in the State Action Plan on Climate Change. He also shared his concerns regarding our limited understanding of the causes and impact of climate change on the state economy. During the proceedings, it was highlighted that exists a scope to enhance capacity of existing Institutions to promote awareness of the potential impact of climate change on lives and livelihood. Being a coastal state with fisheries a major livelihood activity and population concentrated near the coastline, it was stressed that intervention to protect lives from sea-linked disasters should be prioritized. The workshop saw participation of key Government departments like agriculture, forests and environment, irrigation, ground water, fisheries, soil survey and conservation, atmospheric sciences, climate change, to mention few. Innovative practices for urban waste management and waste disposal and treatment was discussed.

	<b>Name</b>	<b>Designation</b>	<b>Organization</b>
1	Dr. R Krishnakumar	Joint Director	Rubber Research Institute of India, Kottayam
2	H Salim	Deputy Director	Department of Fisheries
3	R Ramesh	Asst. Exe Engg	KSE Board Ltd.



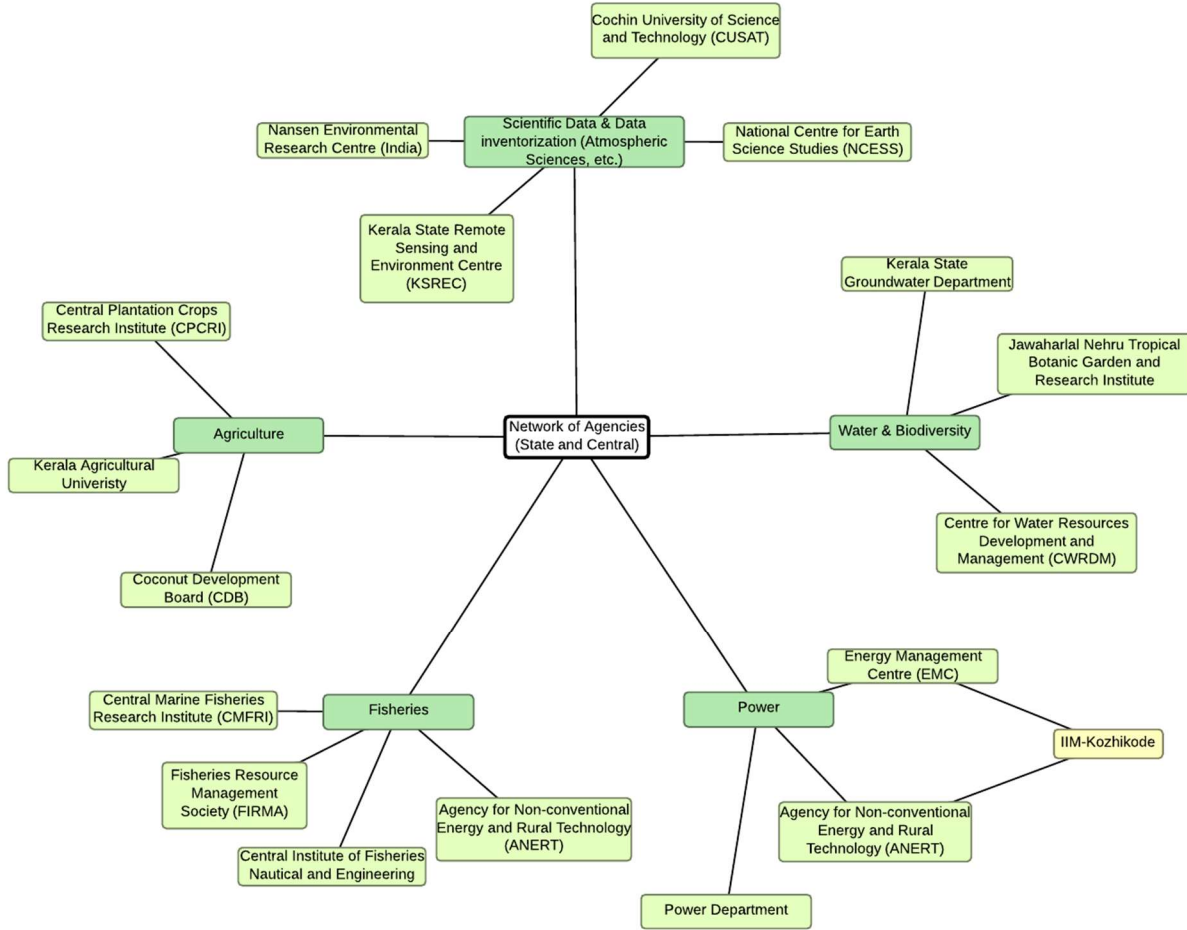
4	Sabu K Damodar	Supdt. Hydrologist	Ground Water Department
5	Nizamudeen A	Deputy Director	Kerala State Land Use Board (KSLUB)
6	Saransh Bajpai	Associate	EPCO
7	V Subhash Chandra Bose	Director	Water Resources Department
8	Dr. P N Premachandran	Director	Soil Survey & Soil Conservation
9	Priyesh R	Asst. Exe Engg	Irrigation Planning, O/o CE, I&A
10	Dr. Sheeja R V	SSA	KSREC, Vikas Bhawan
11	Dr. Keshav Mohan	Director, ILDM	Member - KSDMA
12	Dr. C K Jagadeesan	Asst. DHS	Directorate of Health Services
13	K M DhareesanUnnithan	Director	Energy Management Center
14	Dr. Sreekumar V B	Scientist	Kerala Forest Research Institute
15	V Prakash Tampi	Joint Director	Directorate of Agriculture
16	Jose Issac	Commissioner	KSLUB
17	Dr. V Madhu	Asst. Prof.	Department of Atmospheric Science, Cochin University
18	Sarun S	Tech. Specialist	Department of Environment and Climate Change
19	Dr. Oommen U O	Chairman	Kerala State Biodiversity Board (KSBB)
20	Prof B Madhusoodan	Vice Chancellor	Kerala University of Fisheries and Oceanic Studies
21	P K Mohanty	IAS	
22	Dr. B Jayachandran	Asst. Director	Directorate of Animal Husbandry
23	Prof S Rajendra	Head	Department of Applied Geo Science
24	N N Raman	Director	School of Fisheries & Environment, KUFOS
25	Dr. V K Venkataramani	Head &Aca. Con.	KUFOS
26	Dr. V Ramesh	Senior Scientist	Crop Production, CTCRI
27	B G Sreedevi	Director	NATPAC
28	P Kalaiasrasan	Scientist	NATPAC
29	Dr. Chidambaraiyer J	Under Sec.	Environment Department Secretariat
30	Sobhana KS Rao, IFS	Addl. PCCF	Forest Department
31	Dr. K Vasuki, IAS	ED	SM
32	Dr. Madhusoodanan	Fellow	TERI
33	Dr. Arabinda Mishra	Professor	TERI University
34	Neha Pahuja	Fellow	TERI
35	Dr. Subir Sen	Asst. Prof.	Representing TERI University

#### Discussion points :

1. There was a mention of a good number of training institutes in the State, which could be targeted for enhancing technical capacity related to the issues of climate change. 'Training of the Trainers' could be planned for some of the members who can go for training courses.

2. One of the key sectors in the state is fisheries which requires special emphasis. So far there has been only limited number of studies on the likely future changes in sea-surface temperatures and related impact on the fishery sector and further linkages with the agriculture sector. This is of paramount importance from the livelihood perspective.
3. It is required that further studies on the impact on coastal communities are commissioned, particularly since there has been large reduction in the fishery sector in the recent years.
4. Pilot projects on new clean technology could be undertaken with an objective to reduce the carbon footprint of the sector making in further greened. Post harvesting technology such as cold storage etc. was also thought to be useful.
5. It is encouraging to witness that the State has a unique waste recycling and segregation system in place, along with the presence of several key organizations that work on waste management.
6. Further mitigation efforts initiated include recent researches on certain trees and shrubs which could absorb local pollutants.
7. It was discussed that there is a pilot weather based crop insurance program with 150 weather stations that collect weather parameters and farmers are informed about the same. This could be further scaled up for various other locations and important species for the State e.g., coconut, rubber, coffee, pepper and other spices.
8. Important data gap on livestock sector was highlighted
9. The State having around 1/3<sup>rd</sup> of its geographical area under forests, is undertaking afforestation program under the Green India mission. Use of shelterbelts along the coasts is also being pursued.
10. While, studies on the impacts of climate change on vector borne diseases, airborne diseases and water quality & sanitation associated diseases was considered important, greater emphasis was put on the enhancement of public health infrastructure services. The need for opportune collaboration between academic institutes, panchayat and frontline health workers has been emphasized.
11. Some of the activities that could be undertaken were highlighted. Such as:
  - a. Carbon neutral campus of secretariat (other govt. buildings)
  - b. Use of solar electric vehicles
  - c. LNG driven fishing ports/transport was highlighted as a priority as it has co-benefits for the fishery sector given that the coolant can be used for storing fish on boats/ports for more number of days. A draft plan is already in place which could be looked at afresh Priority needs- Further studies on plantations (social forestry?) in this regard are required.
  - d. Projects/studies that could be undertaken include highway planning, inland waterways, Sustainable urban transportation including mass transport system, pedestrian friendly transport, and comprehensive mobility plans.
  - e. Studies on comparison of waste management technologies along with costs, benefits, and linkages with other sectors like agriculture also could be important.

## Annexure 2: An illustration of a State Knowledge Network on Climate Change for Kerala



## Annexure 3: Capacity needs as identified in the approved SAPCCs of Odisha, Kerala and Chhattisgarh

### Odisha SAPCC

Sector Specific Capacity Needs, as Identified by Odisha SAPCC document:

#### Agriculture

Need	Key Organization Identified
Establishing institutional delivery mechanisms to promote best practices on climate change adaptation	Orissa Watershed Development Mission
Capacity Building on adapting to climate change <ul style="list-style-type: none"> <li>a. Capacity Building and Technical Support to CBOs for better management of land &amp; water to adapt to climatic risks</li> <li>b. Capacity Building of Extension Personnel &amp; Farmers Use of GP training Hubs for dissemination of information on climate change</li> </ul>	Orissa Watershed Development Mission, Dept. of Agriculture, IMAGE/ RITES organizations
Strengthening capacities for development of water-efficient micro irrigation methods and individual/community farm ponds	Dept. of Horticulture
Improving monitoring and surveillance techniques in the context of climate change	Dept. of Agriculture
Strengthening capacities for development of sustainable soil, water and crop management practices	Orissa University of Agriculture & Technology

#### Coasts and Disasters

Need	Key Organization Identified
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	Revenue & Disaster Management, Dept. of Agriculture, Dept. of Fisheries and Animal Resource Development, Odisha State Disaster Management Agency

#### Energy

Need	Key Organization Identified
Institutional development – Functional Reorganization And Capacity Building Of The Energy Department, OERC & OREDA To Have A Coherent Road Map to achieve efficient functioning and implementation of energy efficiency, energy conservation, promotion of renewable energy	Energy Dept.

<b>DSM-</b> For proper energy monitoring, capacity building of energy auditors, strengthening of existing energy conservation Cell supported with manpower and infrastructure.	Energy Department, DISCOMS & ESCO
Capacity building at the State Pollution Control Board for effective fly ash utilization and emission reduction from power plants	State pollution control board

#### Fisheries and Animal Resources

<b>Need</b>	<b>Key Organization Identified</b>
Training on fodder production, fodder conservation, rotational grazing, Rain Water harvest technology, Methane gas harvesting technology, biogas tanks management	Department of Animal Husbandry & Veterinary Services
Capacity building of livestock keepers	Dept. of Fisheries and Animal Resource Development

#### Forests

<b>Need</b>	<b>Key Organization Identified</b>
Working to establish new systems to support for community users	Forests Department
Capacity building of Panchayati Raj institutions/communities/ JFM institutions to adapt to climate change	Forests Department
Strengthening capacities for development of short-interval carbon stock and biodiversity monitoring mechanism	Forests Department

#### Health

<b>Need</b>	<b>Key Organization Identified</b>
<b>Capacity Building</b> of the health sector on climate change on both adaptation and mitigation aspects	Department of Health and Family Welfare/Women and Child Department/Lab. & Employment/ Revenue

#### Industry

<b>Need</b>	<b>Key Organization Identified</b>
Training various stakeholders on climate change issues	Forests & Environment Department
Streamline institutional arrangement and strengthen OSDMA to tackle extreme climate events in coastal area	OSDMA

#### Mining

<b>Need</b>	<b>Key Organization Identified</b>
Imparting training on CDM to the officials of Steel and	Steel & Mines Department

Mines Department, Directorate of Mines, IBM and SPCB	
Training of officials of S&M department, Directorate of Mines, SPCB, IBM etc on various aspects of climate change	Steel & Mines Department
Generate awareness, create capacity and train the mining personnel/ lease holders on benefit of cleaner production	Directorate of Mines, IBM

#### Transport

Need	Key Organization Identified
Ensuring Fuel Efficiency (Drivers Training)	Commerce and Transport Department
Promoting and incentivizing use of non-motorized vehicles	Housing and Urban Development Department and ULBs

#### Urban

Need	Key Organization Identified
To orient and sensitize the stakeholders at all levels of ULBs towards issues related to climate change and capacitate them for carrying out the planning and execution of different activities	Housing and Urban Development Department and State Pollution Control Board
To sensitize city dwellers on non-revenue water loss and orient them towards water conservation measures. To introduce water metering system and ensure Water assessment and audit	Housing and Urban Development Department and Chief Engineer Public Health (Urban)
To orient the city dwellers on energy efficient street lighting and piloting the same through a CDM proposal.	Urban Local Bodies and Private partners

#### Water

Need	Key Organization Identified
Awareness raising with Pani Panchayat through Farmers' Training Programme & creation of Agro-climatic stations	Department of Water Resorce and Depart. Of Agriculture

## Kerala SAPCC

Sector Specific Capacity Needs, as Identified by Kerala SAPCC document:

### Agriculture

Need	Key Organization Identified
Promotion of organic pest control activities towards building integrated pest-management system	Department of Agriculture
Capacities for sustainable land use practices, i.e., contour bunding techniques for hilly and slope fields, moisture conservation pits etc.	Department of Agriculture, Dept. of Soil Survey and Kerala State Land Use Board (KSLUB)
Generation of awareness among farmers about weather information agriculture practices	Department of Agriculture
Strengthening capacities for agricultural engineering to handle farm mechanization	Department of Agriculture / Public Works Department
Building capacities among farmers through generation awareness about environmental impacts of climate change	Department of Agriculture
Building capacities among farmers by providing advise on cropping, water management and nutrient management practices	Department of Agriculture

### Animal Husbandry

Need	Key Organization Identified
Enhancing capacities among farmers for sustainable livelihood , to adapt to climate change impacts	Animal Husbandry Dept.
Targeting enhancement of knowledge among farmers about different control measures by setting up animal health camp	Animal Husbandry Dept.

### Fisheries and Coastal Ecosystem

Need	Key Organization Identified
Strengthening capacities at Kerala University of Fisheries and Ocean Studies, for planning and undertaking climate change related research and other academic activities	Kerala University of Fisheries and Ocean Studies (KUFOS)

### Forest and Bio-diversity

Need	Key Organization Identified
Strengthening capacities for modern fire management facilities at critical areas	Department of Forests
Imparting training to community members particularly in sustainable harvesting practices	Department of Forests
Strengthening existing institutional arrangement at Forest Development Agencies (FDAs), VSSs (Vanasarakshan Samity) and EDs for participatory forest management	Department of Forests
Strengthening institutional mechanism for biodiversity conservation	State Biodiversity Board
Strengthening capacities for biodiversity conservation	State Biodiversity Board and Department

through appropriate information, education and communication	of Environment
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### Health Sector

Need	Key Organization Identified
Enhancing capacities for control of vectors at district control units and state entomology units	Health Department
Generation of awareness on importance of hygiene, at the communities that are vulnerable to extreme weather events and more long-term change in average water availability or average temperatures	Suchita Mission, Local Self Government Department
Improving capacities of healthcare and emergency services in order to address disaster planning and management. This will help identifying suitable strategies for communication of risks and ensuring effective risk mitigation strategies	State Disaster Management Authority, Kerala
Developing skills and capacities for modeling and predicting climate change risks for health sector, to assist effective risk communication measures and public health education	Directorate of Health Education
Strengthening skills and methods required for integrating current and future disease surveillance activities and retrospective disease data sets with weather and climate information	Department of Environment
Developing methods and skills in combining spatial epidemiology with ecological approaches	Department of Health

### Energy

Need	Key Organization Identified
Improving capacities for enhancing efficiency in power generation, including de-siltation of reservoirs for restricting chances of submergence, and putting in strong environmental protection components in the future proposals	Department of Power and Irrigation Department
Enhancement of awareness among users of renewable energy and other users, on energy efficiency measures and renewable energy application	Energy Management Centre
Strengthening awareness campaigns through, training and certification programmes, and development of training modules, tutorials, pamphlets, etc.	Energy Management Centre

### Urban Front

Need	Key Organization Identified
Capacity building for scheme verification and compliance check of designs and schemes, at pre & post construction stage with respect to energy efficiency and application of renewable sources of energy	Department of Power and Irrigation Department



## Tourism

Need	Key Organization Identified
Capacity building for monitoring of important tourist destinations and maintaining high standards of environmental protection	Department of Tourism

## Chhattisgarh SAPCC

The action plan document of Chhattisgarh reiterates the need for knowledge generation and clear understanding of impacts of climate change across key nine-sectors, particularly through enhancement of capacities across and within all departments associated with the priority sectors. The key sectors identified by the Plan document of Chhattisgarh include; Agriculture, Forests and Biodiversity, Water resources, Urban development, Transport, Energy and Human Health. It is emphasized that assessment of climate change impacts for a specific sector be conducted in convergence with related sectors and hence shall target to build integrated impact assessment capacities.

As identified by the plan documents, Health Sector holds further responsibility to build awareness among common mass by building people's awareness of health hazards from climatic change through IEC. Target intervention is planned to roll out initiatives for behavioral change communications for enhancing resilience to climate change impacts. Besides, there remain needs to build capacities among disaster management teams in every district hospital, especially to respond to the effect of extreme events linked with climate change.

An overarching state level capacity building need remains, to enhance capacities at the proposed State Centre for Climate Change for scientific research, building appropriate cooperation and working out roadmap for sector climate change impacts evidence base strengthening and documentation.

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## **Annexure 4: TERI University Study Team**

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