

**WATER RESOURCES MANAGEMENT FOR CLIMATE  
CHANGE ADAPTATION (CCA) AND DISASTER RISK  
REDUCTION (DRR)**

**Review of National and State Plans and Programmes on  
Water Resources Management to Mainstream Climate  
Change Adaptation (CCA) and Disaster Risk Reduction  
(DRR) in India**

*A Scoping Study*

**UNDP  
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## ABBREVIATIONS

AUSAID	Australian Agency for International Development
BRGF	Backward Regions Grant Fund. Programme
CADA	Command area development authority
CADM	Command Area Development and Management
CADWM	Command Area Development & Water Management
CADWM	Command Area Development and Water Management
CCA	Climate Change Adaptation
CCAC	Climate Change Adaptation Committees
CDA	Clean Development Agency
CIG	Common Interest Groups
CRP	Community Resource Persons
CWC	Centre Water Commission
DAP	District Agriculture Plan
DDMA	District Disaster Management Authority
DDP	Desert Development Programme
DFID	Department for International Development
DPAP	Drought Prone Area Programme
DRM	Disaster Risk Management
DRR	Disaster Risks Reduction
EPCO	Environmental Planning and Coordination Organisation
GIDR	Gujarat Institute of Development Research
GIM	National Mission for a Green India
GOI	Government of India
ICT	Information and Communication Technology
IEC	Information Education Communication
IFS	Integrated Farming System
IPCC	Intergovernmental Panel on Climate Change
IWDP	Integrated Watershed Development Programme
IWMP	Integrated Watershed Management Programme
IWRM	Integrated Water Resources Management
MDG	Millennium Development Goals
MGNREGA	Mahatma Gandhi National Rural Employment Guarantee Act
MMI	Major and Minor Irrigation
MOA	Ministry of Agriculture
MODW	Ministry of Drinking Water and Sanitation
MoEF	Ministry of Environment and Forest
MoH	Ministry of Home Affairs
MORD	Ministry of Rural Development
MP	Madhya Pradesh
MP SAPCC	Madhyapradesh State Action plan on Climate Change
NADP	National Agriculture Development Programme-
NADP	National Afforestation Development Proramme
NAPCC	National Action plan on Climate Change

NDMA	National Disaster Management Authority
NFSM	National Food Security Mission
NGO	Non-Government Organisation
NHM	National Horticulture Mission
NICRA	National Initiative on Climate Resilient Agriculture
NMEEE	National Mission for Enhanced Energy Efficiency
NMSA	National Mission for Sustainable Agriculture
NMSH	National Mission on Sustainable Habitat
NMSHE	National Mission for Sustaining the Himalayan Ecosystem
NMSKCC	National Mission on Strategic Knowledge for Climate Change
NRDWSP	National Rural Drinking Water Supply Programme
NRLM	National Rural Livelihood Mission
NRM	Natural Resources Management
NSM	National Solar Mission
NWM	National Water Mission
NWSPRA	National Watershed Development Programme For Rainfed Areas
OECD	The Organisation for Economic Co-operation and Development
OPP	Orissa Pani Panchayat
OSDMA	Orissa State Disaster Management Authority
OWP	Orissa's State Water Policy
OWPO	Orissa Water Planning Organization
PCM	Participatory Climate Monitoring
PIA	Project Implementing Agency
POA	Programme of Action
PRI	Panchayat Raj Institutions
PSC	Project Steering Committee
PVA	Participatory Vulnerability Assessment
RADP	Rainfed Area Development Programme
RGDWM	Rajiv Gandhi Drinking Water Mission
RGMWM	Rajiv Gandhi Mission for Watershed Management
RKVY	Rashtriya Krishi Vikas Yojana
RVP	River Valley Projects
RWH	Rain water harvesting
SGSY	Swarnajayanti Gram Swarajgar Yojana
SPACC	Strategic Pilot on Adaptation to Climate Change
UNDP	United Nation Development Programme
UNFCCC	United Nations Framework Convention on Climate Change
WALMI	Water and Land Management Institute
WASH	Water Sanitation and Health
WASSAN	Watershed Support Services and Activities Network
WHS	Water Harvesting Structures
WORLP	Western Orissa Rural Livelihoods Project

## Executive Summary

This report deals with the scope for and issues in mainstreaming of Climate Change Adaptation (CCA) and Disaster Risks Reduction (DRR) in Government programmes related to Water Resources Management in India with specific reference to two states viz. Madhyapradesh and Odisha.

It is well recognized that climate change is a reality and mainstreaming of climate change adaptation into development planning is essential to respond effectively to climate change and related disasters for sustainable development. As water is the medium through which climate change impacts the society mainly, water related development programmes need focused attention. With this understanding , the following government programmes are taken up for the review:

Watershed Development Programmes

Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)

National Rural Drinking Water Supply Programme (Rajiv Gandhi Drinking Water Mission )

National Agriculture Development Programme-Rashtriya Krishi Vikas Yojana (RKVY)

Disaster Management programmes related to Drought and Floods

In addition the study covered the Action Plans for Climate change and Water Policies both at the national and state levels with special reference to Madhyapradesh and Odisha.

*The study shows that overall there is a good scope and potential for Climate Change Adaptation (CCA) and Disaster Risks Reduction(DRR) in the existing Government programmes, plans and policies taken up for review. Better implementation of these programmes itself will contribute significantly to CCA and DRR. All these programmes have well framed Guidelines for implementation and most of these were updated which need to be followed for effective outcomes. However these programmes and related Guidelines need to be modified suitably to better mainstream CCA and DRR in these programmes as dicussed below.* (Programme wise summary of Findings, Recommendations/ Action points both at the national level and for two states is given in Annexure –I)

### **Watershed Development Programmes:**

Watersheds assume considerable importance as it is the main programme for the development of rain-fed agriculture which is intensely affected by climate change upon which majority of farmers livelihoods depend. The Watershed projects have contributed significantly for development of rain fed area in terms of conservation of soil and water resources, increasing cropping intensity and productivity in both the states resulting increased income and poverty reduction in many areas. The existing watersheds do not have CCA specific interventions to monitor weather conditions , provision of agro-met service to farmers and adaption of cropping pattern to suit changing weather and water supply conditions. More over both officials and farmers lack awareness about CCA. In order to remove these inadequacies, it is necessary to modify the Watershed Common Guidelines 2008 (revised edition 2011) especially paras 19d on IEC and 26 on Training. There are some civil society initiatives already undertaken for CCA in Watersheds which provide lessons for modifying government programmes on watersheds.

### **Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA):**

MGNREGA interventions in Madhyapradesh and Odisha have generated multiple environmental benefits, leading to improved water availability, soil fertility and increased crop production. Overall these works have contributed for improving the adaptive capacity of rural people and reducing their vulnerability to climate risks. However it is noted that the quality of works undertaken under MGNREGA especially in Odisha requires improvement in terms of PRI involvement in implementation and monitoring and the technical soundness of the design of works. Like watershed programmes, there is a requirement for building CCA elements in to the programme as these works are also related to natural resources management (NRM) which are directly related to climate change adaptation. Hence proper modification of MGNREGA Guidelines (2013) is required to include works related to CCA. MGNREGA needs to concentrate more on IEC activities for generating awareness among the people about the benefits of NREGA works related to Climate Change Aspects.

### **National Rural Drinking Water Supply Programme**

Climate change poses a serious problem to the realisation of the rights to Water and Sanitation(Watsan) as already provision of safe drinking water continues to be an issue even after specific mission is there since 1986. Depleting ground water table and deteriorating ground water quality are the major issues in the sustainability of rural water supply in many parts of India including MP and Odisha. Hence pilot projects were launched with the objective of achieving drinking water security mainly through convergence with MNREGS. Watsan is a generally treated as a cross cutting issue in CCA context. Hence there is a need for detailed studies about the impact of climate change on water and sanitation in India.

### **Rashtriya Krishi Vikas Yojana (RKVY)**

RKVY is a centrally sponsored programme which provides flexibility and opportunities to the states for taking up any work, including those related to CCA/DRR in agriculture sector. The climate aspect is in built in the programme itself as it requires the states to prepare agriculture plans based on local agro-climatic conditions. However agriculture extension is the weakest link noted in both the states which should be improved. Even though RKVY is a flexible programme, RKVY Guidelines (2007) can be modified suitably to include IEC and agriculture extension work specifically related to CCA.

### **National Disaster Management Plans-Drought and Floods**

National disaster Management Authority (NDMA) has issued guidelines on Drought(2010) and Floods(2008). However these Guidelines are not comprehensive enough to deal with CCA/DRR. National Water Mission under NAPCC has dealt with the issues of floods and droughts under climate change scenario which can be considered for revision of these guidelines. As the states' Disaster Management programmes are based on these Guidelines, suitable modifications in these would help in revising the state policies and programmes especially related to Floods and Drought.

### **National and State Action Plans on Climate Change :**

It is generally noted that the mission documents are quite elaborate but lack focus, targets and road map for achieving the objectives under each mission. Hence it is suggested that each mission under NAPCC is split in to smaller missions for the purpose of fixing targets and monitoring.

Madhyapradesh State Action plan on Climate Change (MP SAPCC) is quite comprehensive to address various challenges related to Climate Change as the preparation of the plan was aided by a number of external studies and support from international agencies including UNDP. In Odisha though the Action Plan was prepared in 2010 it was not yet approved by MoEF. This needs to be given more importance as the delay in getting approval will affect the fund allocation and work for CCA activities .

There is a need for creation of a dedicated specialized independent agency to oversee the implementation of state action plans with adequate finance and powers. In MP this is already established ,however in Odisha such an institutional agency is not in place. As the CCA works involve departmental coordination and higher level of decision making it is felt by many that Climate Change programme /agency should be managed/monitored by a higher authority in the states in the rank of Chief Secretary.

Given that huge resources are required for implementation of Action Plans both by the centre and states, there is a need for mobilization of adequate funding .Financially weaker states like Odisha are not in a position to leverage such funds from its plans .Conventional budgetary allocation by Centre may be an option for this. Additionally external funding sources are important on this. The water resources department in Odisha has already taken an initiative and prepared a proposal for funding from AusAid for some pilot works on CCA in water sector. The option of sourcing from funding agencies like ADB and World Bank etc may be adopted by Centre and state governments. In fact the Union Planning Commission has already suggested this as an option given the huge funding requirements for CCA activities in India and the constraints from existing plan sources.

### **Convergence of programmes for effective CCA/DRR works under existing programmes:**

Generally development programmes are implemented in isolation from each other .Hence convergence of programmes is suggested to bring in synergies among different programmes so that optimal impact of the programme interventions can be realized. MGNREGA is opted for Convergence as it has wide scope for undertaking almost all works required for CCA like watershed development in rain-fed area, command area development in irrigated areas- with adequate provision for funds and legal backup with rights based approach under it. Though there are convergence guidelines issued by MORD for dovetailing of funds from different departments/schemes in an area under MGNREGA , it is noted that implementation is lacking at the field level. Hence convergence needs strengthening through monitoring of MGNREGA programme to make good impact on CCA/DRR activities .



## CHAPTER 1. INTRODUCTION

### 1.1 Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR)- Conceptual Issues

#### a) Definition, Similarities and Differences between CCA and DRR

United Nations Framework Convention on Climate Change (UNFCCC) defines climate change as “a change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is in addition to natural climate variability observed over comparable time periods.”<sup>1</sup> However the Intergovernmental Panel on Climate Change (IPCC) has defined Climate Change as any change in climate over time, whether due to natural variability or as a result of human activity. “Climate change in IPCC usage refers to a change in the state of the climate that can be identified (e.g. using statistical tests) by changes in the mean and/or the variability of its properties, and that persists for an extended period, typically decades or longer.”<sup>2</sup>

**Climate Change Adaptation (CCA)** is defined as ‘spontaneous or organised processes by which human beings and society adjust to changes in climate by making changes in production systems and social and economic organisation in order to reduce vulnerability to changing climatic conditions’ (FAO,2009) It is also defined as adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to changes in processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change. (IPCC TAR, 2001;). Thus there are variations in the definitions adopted by different organisations though all of them agree to basic things as adjustments to climate change.

**Disaster Risk Reduction (DRR):** There is also no uniform definition of ‘Disaster’. It is defined ‘ as a temporary event triggered by natural hazards that overwhelm local response capacity and seriously affect social and economic development of the region’ (Anderson,1992). According to UNISDR, a disaster is a serious disruption of the functioning of a society or community which causes widespread human, material or environmental loss which exceeds the capacity of the affected society to cope without external intervention.<sup>3</sup> Risk is the probability of harmful consequences or loss resulting from the interaction between natural hazards and vulnerability of the society . In the context of Climate change it refers to extreme climate events such as floods, drought, and cyclones.

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<sup>1</sup> [http://unfccc.int/essential\\_background/convention/background/items/2536.php](http://unfccc.int/essential_background/convention/background/items/2536.php)

<sup>2</sup> [http://www.ipcc.ch/publications\\_and\\_data/ar4/syr/en/mains1.html](http://www.ipcc.ch/publications_and_data/ar4/syr/en/mains1.html)

<sup>3</sup> <http://www.unisdr.org/we/inform/terminology>

## **Similarities and Differences between CCA and DRR:**

There are a number of similarities and difference between CCA and DRR which should be understood for better development planning .While CCA aims to address long-term adjustments to changing climate conditions, DRR is concerned with a variety of potential extreme events. (Mitchell and Van Aalst, 2008).DRR deals with all hazards while CCA deals exclusively with climate related hazards associated with changes in the mean climate conditions. However both CCA and DRR aim to reduce the impact of hydro-meteorological hazards, but on different timeframes .CCA aims to help communities undertake long-term adjustment to changing average climate conditions whereas DRR focuses on dealing with short-term occurrences. As DRR thinking and practice has been in existence longer than CCA, there are a large number of DRR tools to implement its programmes in comparison with the relatively small number of CCA tools. (Mitchell and Van Aalst, 2008 quoted in Katie Harris and Aditya Bahadur, IDS).

### **b)Water Resources Management, CCA and DRR - Linkages**

It is widely acknowledged that that climate change will increase the frequency and intensity of hydro-meteorological disasters which pose new challenges for disaster managers .Unpredictable variability in rainfall and extreme temperatures will negatively impact crop yields leading to increasing vulnerability of community especially poor. Climate change will negatively impact traditional coping strategies, eroding people’s ability to recover. There will be a greater need for adaptive social protection measures as climate change increases the frequency of disasters – disasters risk managers will be required to help adapt conventional coping strategies to deal with the dynamic climatic context .Increased pressure on natural resources will add new dimensions and dynamics to conflict . The ‘business as usual’ approach to DRM is no longer sufficient. Disaster Risk Management (DRM) needs to ‘significantly shift its approach to risk calculation and intervention design to incorporate climate modeling and its associated uncertainty’ (Katie Harris and Aditya Bahadur).

Weather and climate related disasters account for over two-thirds of all disaster events and their significance is likely to increase with global warming. A majority of climate change impacts will happen through intense climate variability, with changes such as heavy rainfall, reduced precipitation, more frequent cyclonic depressions or shifting of snow lines with direct implication for water resources management. This may also add to the degradation of natural resources, damage to infrastructure and food shortages upon which livelihoods are based. All of these impact the longer-term resilience of communities against disasters<sup>4</sup>

Disaster risk reduction (DRR) is becoming an important policy agenda of many developing countries .The Millennium Development Goals (MDGs) have stressed the need for closer interaction between disaster risk reduction and sustainable development to speed up the attainment of poverty eradication and the creation of sustainable environment. Hence it is essential to integrate Disaster Risk Reduction, Climate Change Adaptation into our development priorities in order to reduce vulnerability to natural disasters, the impacts of which are being

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<sup>4</sup>[www.undp.org/content/india/en/home/library/environment\\_energy/guidance\\_notes\\_onrecoveryclimatechange/](http://www.undp.org/content/india/en/home/library/environment_energy/guidance_notes_onrecoveryclimatechange/)

increasingly accentuated by climate change<sup>5</sup>. Effectiveness of DRR strategy in water resources development programs is dependent on integrated approach to disaster management the impact of which is accentuated by climate change.

### **Mainstreaming of CCA and DRR and Development planning –Basic principles**

Mainstreaming adaptation into development planning has been promoted as an effective way to respond to climate change and related disasters. “The expected benefits include avoided policy conflicts, reduced risks and vulnerability, greater efficiency compared with managing adaptation separately, and leveraging the much larger financial flows in sectors affected by climate risks than the amounts available for financing adaptation separately.”<sup>6</sup> There is a growing need for policy-makers, particularly in the ministries related to development such as in finance or planning, to better understand how climate change adaptation can be addressed in national and sub-national planning processes, and through fiscal and investment decisions. For example, when making decisions on long-lived infrastructure, it may be more cost-effective to take adaptation needs into account earlier rather than later (ibid).

The Organisation for Economic Co-operation and Development (OECD) has developed a Policy Guidance on integrating climate change adaptation into development planning. It suggests identifying appropriate levels of interventions (national to project level) and selecting appropriate entry points (along the policy or project cycle). Depending on the level of analysis intended, it outlines how to apply a ‘climate lens’ to a policy, strategy, regulation, plan, or programme to improve its general direction and priorities. There are four general steps suggested by OECD for adaptation of CCA /DDR in different settings

- assess vulnerability;
- identify possible adaptation measures;
- select adaptation measures;
- develop monitoring and evaluation framework for selected adaptation measures.

After prioritizing options, the adaptation measures chosen should be integrated in to policies, processes, plans, and programmes.<sup>7</sup>

This framework is considered to be comprehensive and oriented towards improving national policy and plans. Under the framework the “whole of government” approach which requires the involvement of key stakeholders, the improvement of coordination, and the implementation of related multilateral and regional environmental agreements is suggested. Accordingly relevant regulations and standards are reviewed and adjusted to reflect the impacts of climate change.(ibid).The OECD study has identified many basic issues which are very relevant from CCA and DRR perspectives .

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<sup>5</sup>.UNDP-Solution Exchange May 2010

<sup>6</sup>Louis Lebel<sup>1</sup> et al (2012) Mainstreaming climate change adaptation into development planning,

<sup>7</sup> Adaptation to Climate Change with a Focus on Rural Areas and India, GIZ(undated)

It has observed that national development plans (five to ten years range ) could be key strategy documents in which to incorporate adaptation concerns. Sector wise plan is considered important for CCA as vulnerability and potential responses are often highly sector-specific. This is also a challenge for governance, as decision support tools are required to be tailored to each sector.

Water Resources and Disaster Management are two important sectors identified for CCA as noted earlier water is the medium through which Climate change impacts the society more than others. Moreover water resource planners often have substantial experience in dealing with climate-related variability in water and risks associated with that . Integrated water resources management (IWRM) has been touted as the solution for dealing with the complex problem of multiple water uses and users (Molle, 2008). Experiences with IWRM could be valuable in developing adaptation strategies in the water sector for several reasons. First, by acknowledging multi-sector issues, it provides a foundation for considering the potential impacts of climate change induced shortages (Lebel, Manuta and Garden, 2011). Second, by considering links between land and water use, it opens up the possibility of considering landscape approaches and building resilience rather than in-stream infrastructure modifications (Lebel, Foran *et al.*, 2009). Third, by introducing basin-level hierarchies,organisations are gaining experience in coordination between different levels and across administrative hierarchies, an important governance issue in building adaptive capacity (Adger, Arnell and Tompkins, 2005; Thomas, 2006). However in practice, the outcomes of IWRM reforms have often been disappointing both abroad (Biswas, Varis and Tortajada, 2005; Gyawali and Dixit, 2001; Molle, 2008; Thomas, 2006) and India (Rajagopal,2005).In our review we tried to adopt the OECD framework which seems to be more relevant for the review of government plans and programmes.

## **1.2.About the UNDP-AusAid project and the present Study**

The Australian Agency for International Development (AUSAID) and UNDP entered into a partnership agreement in 2011 to enhance climate change induced risk management capacities (adaptation, disaster mitigation and risk reduction) in one district each of flood-prone areas of Orissa and drought-prone areas of Madhya Pradesh. This project is dovetailed with the on-going Government of India-UNDP Disaster Risk Reduction (DRR) Programme that aims to strengthen the institutional structures to undertake disaster risk reduction activities at various levels, as stipulated in the National Disaster Management Act (2005).The AusAID-UNDP Climate Change Adaptation project aims to incorporate methods to reduce vulnerabilities to climate change and disaster risk through integrated water management. This has been one of the key recommendations from national and state action plans on climate change but not been implemented. Lessons from this project will feed into action plans on climate change..

The Project is supporting interventions at two levels:

- 1) Support the development of local strategies and the demonstration of adaptive water management measures on the ground in pilot sites in two districts in two different ecosystems.
- 2) Use the experience and lessons gained from its support at local level to inform and influence development planning process and policy-making at district and state levels

particularly related to State Level Action Plans on Climate Change and the State Disaster Management Plans. The project will help link development, adaptation, and disaster risk management in an integrated way, and to promote cross-sectoral and coordinated responses to address the risks of climate change.

As a part of the project , the present study is undertaken basically to review the existing National and State Level Plans and Programmes to identify the scope to mainstream CCA and DRR concerns in Madhya Pradesh and Odisha.(For more details about the objectives, methodology and data sources of the study see appendix -1).In the following we discuss in detail the results of study.

## **CHAPTER 2**

### **REVIEW OF NATIONAL LEVEL DEVELOPMENT PLANS AND PROGRAMMES**

#### **2.1. Details of Union Government Plans/ Programmes covered by the study and their importance in the context of CCA and DRR**

##### **2.1.1 National plans and programmes -Review of 12<sup>th</sup> plan**

The study covered a number of National level programmes related to Water and Agriculture sectors which are important from the point of CCA and DRR.

Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA)

National Rural Drinking Water Programme (Rajiv Gandhi Drinking Water Mission )  
Rashtriya Krishi Vikas Yojana (RKVY)

Water Resources Development programme ( including Command Area Development )

Most of these programmes are Centrally Sponsored Schemes funded by the Union Government but are implemented by State governments. The total expenditure on these schemes by the Central Government during the Eleventh Plan period (2007-12) is 268,195 crores (about 40 percent) of total expenditure Rs. 700,000 crore. As expected the success of implementation of these programmes varies across states. It is also noted that there has been a proliferation of Centrally Sponsored Schemes over a period of years which has led to poor implementation, duplication, lack of convergence<sup>8</sup>. (GOI,2011). The Approach to 12<sup>th</sup> plan proposed that the major flagship programmes in the Eleventh Plan should continue in the Twelfth Plan. But it maintains that there is a need to focus on issues of implementation and governance to improve their effectiveness.<sup>9</sup>

#### **12<sup>th</sup> plan on Water and Climate change**

Eight national missions were launched in the Eleventh Plan (2008) under National Action plan on Climate Change (NAPCC) covering the areas of agriculture, water, Himalayan ecosystems, forestry , solar energy, energy efficiency, habitat and strategic knowledge. The Mission documents have been finalized by the Prime Minister's Council on Climate Change and are at various stages of implementation. The preliminary estimates indicated a sum of Rs. 2,30,000 crore may be needed to fulfill the Mission objectives and it is noted by the planning commission that funds of this magnitude cannot be mobilized through budgetary resources alone (GOI,2011)

The Planning Commission in its 12<sup>th</sup> plan approach has underlined the importance of adapting agricultural practices to climatic conditions, and also managing water resources in a more comprehensive and efficient manner. It also urged for developing agro-climatic zone specific water management to enable rural communities to withstand the effects of climate change. Similarly, genetic improvement of agricultural crops to adapt to climate variability to withstand effects of drought and flash floods is also noted to be an important area of research in the Twelfth Plan. (GOI,2011).

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<sup>8</sup> GOI,2011 Approach to 12<sup>th</sup> plan

<sup>9</sup> ibid

As for Water Resources management, the Twelfth Plan proposes a fundamental change in the principles, approach and strategies of water management in India. It is noted that” this paradigm shift was the outcome of a new and inclusive process of plan formulation, which saw the coming together of practitioners and professionals from government, academia, industry and civil society to draft the Plan “(Mihir Shah,2013). The 12<sup>th</sup> plan document calls for a move away from a narrowly engineering construction centric approach to a more multidisciplinary, participatory management approach to our major and medium irrigation projects, with central emphasis on command area development with the main purpose of .increasing water use efficiency. 12 th Plan proposes a 60percent outlay earmarked to complete the huge backlog of ongoing MMI ( major minor irrigation) projects. 15percent funds are earmarked to reduce the gap between irrigation potential created and irrigation potential utilized by focusing on command area development and management (CAD).<sup>10</sup> It is expected that this will increase the storage capacity and better utilization of irrigation potential created thus paving way for addressing the CC concerns in water sector.

## **2.2 National Action plan on Climate Change (NAPCC)**

It is now well recognized that climate change is a reality and it has vast development implications on all aspects of life systems. The Intergovernmental Panel on Climate Change (IPCC) has conclusively established that the impact of human activities on climate is unequivocal (IPCC, 2007). The debate is about the extent of its impact . Realising this many developing countries have prepared blueprints-action plans for addressing the problem especially in adapting to the changing climate change situations. India after an elaborate consultations have come out with a plan viz. National Action plan on Climate Change (NAPCC) in 2008, the main features of which are discussed below with focus on water resources sector.

NAPCC has identified eight sectors and taken up them under eight missions for addressing the climate change related issues. These missions are as follows:

- 1.National Mission for Sustainable Agriculture(NMSA);
2. National Mission for Enhanced Energy Efficiency(NMEEE);
3. National Mission for a Green India (GIM);
4. National Mission on Sustainable Habitat (NMSH);
5. National Mission for Sustaining the Himalayan Ecosystem (NMSHE);
6. National Mission on Strategic Knowledge for Climate Change (NMSKCC).
7. National Solar Mission (NSM); and
8. National Water Mission (NWM).

Sujatha Bhyravan and Chella Rajan (2012) have undertaken a comprehensive evaluation of the NAPCC of its eight missions based on a set of criteria about the design and implementation of the missions. The evaluation has noted that the design of the missions do not have a long term plan and targets for addressing the CCA issues. Another issue noted by them is integration

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<sup>10</sup> <http://planningcommission.nic.in/hackathon/waterSummary.pdf>

among the missions is missing. Lack of focus and cross cutting approach by each mission is another concern. The review says the mission document is like ‘as usual plan document’ and little attempt has been made to take on seriously some of the deeply embedded challenges like removing environmentally destructive subsidies for chemical fertilizers.(ibid)

Discussion with the authors brought out the following points related to water and agriculture sectors: Integrated Water Resources Management (IWRM) will be a major requirement and also a challenge in the water sector to address CCA issue. The agriculture sector is faced with many challenges of adaptation as extension service which was a basic requirement for dissemination of knowledge to farmers is very much lacking now. Hence it will be difficult to implement many of the sustainable agriculture practices prescribed for CCA in the sector.. The conclusion of the evaluation which needs serious attention is as follows: “ The multi-dimensionality of climate impacts makes it vital that India adopts a completely new approach that is interdisciplinary in its character, breaks traditional ministerial boundaries, and learns rapidly from successes and failures. Unless the country is able to do these things, our goals and aspirations for ‘climate-proof ’ development will not be attained.(Ibid,2012).The suggestion that each mission under NAPCC is split in to smaller missions for the purpose of fixing targets and monitoring also needs greater attention ..

### **National Water Mission on Climate Change**

**Objective :** The National Water Mission (NWM) is one of the eight missions constituted under the National Action Plan for Climate Change (NAPCC). The overall objective of the NWM, as per the mission document is "conservation of water, minimizing wastage and ensuring its more equitable distribution both across and within States through integrated water resources development and management”.(GOI,2009) .It is envisaged that long term sustained efforts are required with identified activities, policies and legislations .

### **Strategies**

Following are the strategies proposed by the mission for achieving its objective:

National Water policy

IWRM

Participation of the stakeholders

Convergence between various water resources programmes

Water resources planning with reliable data base

**Thrust Areas:** Some of the important thrust areas of the Mission are:

-Research studies on different aspects related to impact of climate change on water resources including quality aspects

-Expeditious implementation of water resources projects particularly the multipurpose projects with carry over storages;

-Promotion of traditional water conservation;

-Intensive programme for ground water recharge in over-exploited areas;

-Incentives for recycling of water including wastewater;

-Intensive capacity building and awareness programme including those for Panchayati Raj Institutions



-Sensitization of elected representatives of over exploited area on dimensions of the problem and to orient investment planning under NREGA towards water conservation.

**Action plan :** The following action plan was identified by the mission for implementation

- Comprehensive assessment of the impact of climate change on water resources by March,2012  
Development of water resources information system and bringing all information in public domain except the data of classified and sensitive nature by March 2012.
- Reassessment of basin wise water situation by March 2011.  
Promotion of citizen and state actions for water conservation, augmentation and preservation  
Expeditious formulation of river interlinking projects by March 2012.
- Focused attention to over-exploited areas
- Intensive rainwater harvesting and groundwater recharge programme to cover 1120 over-exploited, critical and semi-critical blocks during XI Plan and rest to be covered in XII Plan and 30percent of the urban areas by March 2012.
- Intensive rainwater harvesting and groundwater recharge programme to cover all the blocks by March 2017.
- Increasing water use efficiency at least by 20percent
- Development of guidelines for incentivizing for recycling of water including wastewater by March 2011.
- Development of guidelines for incentives for water-neutral and water-positive technologies by March 2011.
- Development of guidelines for improving efficiency of urban water supply system by March 2011.
- Preparation of guidelines and manuals for mandatory water audit including those for drinking water purpose by March 2011.
- Review of financing policy and allocations by March 2010.
- Undertake Pilot studies in collaboration with States by March 2012.
- Promotion of basin level integrated water resources management
- Guidelines for different uses of water e.g., irrigation, drinking, industrial etc particularly in context of basin wise situations by March 2011.
- Review of National Water Policy and adoption of revised Policy by March 2013.

#### **Discussion with |Water Mission Secretariat:**

The following points emerged from the discussion with members of water mission secretariat: It is felt that the progress in undertaking the work related to the mission was constrained by lack of adequate funding. In fact there is a delay in setting of the secretariat itself and hence many other institutional arrangements for undertaking the mission work will be further delayed. One of the important positive developments is setting up of Bureau of Water Use Efficiency by the mission. However, the mission does not have specific plan with targets for achieving 20 percent water use efficiency as per one of the objectives of the mission. Given vast difference across regions in

water availability, technology development for its use , institutional efficiency it is difficult to use this criteria uniformly. The mission is planning to take up a country-wide programme on Aquifer Mapping which will help for Ground Water Recharge Programmes. Another important development is related to setting up of River Basin Authorities for implementing IWRM. A forum of State Water Ministers was formed recently and the first meeting was conducted in June 2013 which is a breakthrough in addressing inter -state water issues through dialogues. Based on this experience a new legislation is planned to be brought up for forming of River Basin Organisations and already River Basin Guidelines have been worked out. IEC materials is an important part of creating awareness about climate change and water use efficiency related work .It is felt that UDNP can help in Capacity Building of the mission based on its expertise in this area.

### **National Mission on Sustainable Agriculture**

**Objective:** The National Mission for Sustainable Agriculture (NMSA), under National Action Plan on Climate Change (NAPCC) seeks to address issues regarding ‘Sustainable Agriculture’ in the context of risks associated with climate change by devising appropriate adaptation and mitigation strategies for ensuring food security, equitable access to food resources, enhancing livelihood opportunities and contributing to economic stability at the national level. The objective of the mission is to transform agriculture into an ecologically sustainable climate resilient production system while at the same time, exploiting its fullest potential and thereby ensuring food security, equitable access to food resources, enhancing livelihood opportunities and contributing to economic stability at the national level(GOI,2010)

**Thrust areas:** The mission has identified ten key areas for promoting the sustainable agricultural practices by implementing a programme of action (POA) covering both adaptation and mitigation measures .

- Improved crop seeds, livestock and fish cultures
- Water Use Efficiency
- Pest Management
- Improved Farm Practices
- Nutrient Management
- Agricultural insurance
- Credit support
- Markets
- Access to Information

The POA would be operationalised by mainstreaming adaptation and mitigation strategies in ongoing research and development programmes especially in its flagship schemes like Rashtriya Krishi Vikas Yojna (RKVY), National Horticulture Mission (NHM), National Food Security Mission (NFSM) by introduction of new programmatic interventions and up scaling of best practices already established.”NMSA would also seek convergence with other National Missions and collaborations with key Ministries/Departments for institutionalizing linkages for addressing cross-sectoral issues.”.It is estimated that the cost of implementation of NMSA upto the end of XII Five Year Plan would be Rs.1, 08, 000 crore (GOI,2010).As the

NMSA is not a stand-alone mission, the nodal agency Department of Agriculture and Cooperation does not feel the need to set up a Mission Directorate, at least for the time being.

The Indian Council of Agricultural Research is undertaking a National Initiative on Climate Resilient Agriculture (NICRA) to scale up outputs both through Krishi Vigyan Kendras and the NMSA for wider adoption by farmers. However independent review of the mission has noted that as the mission is technology-driven questions remain on who will control these technologies and whether they will be affordable by all farmers. “There is little analysis of the appropriateness of the technologies and a lack of emphasis on farmer-to-farmer learning. The technologies recommended are likely to intensify the use of chemicals and increase greenhouse gas emissions. New regulatory frameworks to address climate change are missing, and capacity is lacking in key positions and in institutions responsible for implementing agricultural policy.” (Sujatha and Sudhir,2013)

### **Summary of Discussion points with NRM/Climate Change Division, Ministry of Agriculture :**

Better implementation of existing schemes itself will take care of most of the CCA issues in agriculture. There are several sub-missions formed part of sustainable agriculture mission and hence it is envisaged that there is no need for separate mission secretariat. The mission is concentrating on developing seed varieties which are flood and drought resistant under NICRA programme. In addition importance is given for programmes related to soil and water conservation and developing Integrated Farming System (IFS) model with focus on rain fed agriculture. The new sub-mission called National Extension Mission is to take care of extension activities related to new technologies including climate change related activities. In order to disseminate the knowledge about the climate change the extension mission will be utilized. Another important area identified under CCA is improving the water use efficiency through National Horticulture Mission by utilizing micro irrigation technologies like drip and sprinkler irrigation. The existing activities under watershed programme by the ministry will be intensified for CCA purpose. The existing climate change knowledge networks funded by GIZ on a pilot basis in three states (Odisha, Jarkhand and Maharastra) will be used for supplementing NMSA work. As RKVY programme is the flexible one various CCA activities can be planned by the state government under this programme. It is felt that UNDP can also help the Ministry in under taking capacity building of the programme wherever possible.

### **2.3 National Water Policy 2012**

Water Policy is one of the instruments used for addressing CCA issues in water sector as noted already under the section on National Water Mission. It is seen that the policy has given adequate emphasis on climate change adaptation issues and a separate section is devoted to this. The policy has identified the following aspects of water resources management for climate change adaptation.

- a)Increasing of existing water storage in soils ,ponds, under ground, small and large reservoirs etc
- b) Water demand management
- c)Enhancing the water use efficiency
- d Planning and management of water resources structures with stakeholder participation
- e)Review of criteria for new water projects integrating CCA aspects

Thus it is observed that the policy is quite comprehensive to encompass many aspects of water resources management and climate change. “Adaptation to climate change and the statement that special attention will be given towards mitigation at micro-level by enhancing the capabilities of community to adopt climate resilient technological options is welcome “(Ramesh,2013)

## 2.4 Watershed Development Programmes

Rainfed area is the most vulnerable to climate change and in India about 60 percentage of cultivated area is rain fed .Hence India’s agriculture and majority of farmers whose livelihoods depends up on agriculture ultimately depends upon managing climate change effects .Traditionally Watershed is the main programme for the development of rain-fed agriculture and many schemes have been under implementation under successive five year plans. It is noted that “By reversing the process of resource degradation, rain-fed area development would mitigate effects of climate change and lead to food and water security locally as well as nationally.” ( [http://www.org.in/files/file/wg\\_migra.pdf](http://www.org.in/files/file/wg_migra.pdf)

Many impact evaluation studies on water shed programmes have shown that watershed based interventions have led to increase in groundwater recharge, increase in number of wells and water bodies, enhancement of cropping intensity, changes in cropping pattern, higher yields of crops reduction in soil losses and overall management of severe drought and floods

A national review by WASSAN(2010)<sup>11</sup> has noted the following benefits from watershed programmes :

- o Soil loss and surface runoff reduced by 52percent and 58percent respectively, in completed watersheds.
- o Area under irrigation increased in almost all watersheds. The extent of this increment ranged from 34percent to 100percent in different watersheds.  
The area under sowing increased. The cropping intensity increased.
- o Productivity/ yields of crops increased and the net returns also increased (up to 63percent).
- o The Benefit Cost Ratio of watershed project interventions was influenced by type of intervention and type of crops grown. However, all studies clearly indicated a positive Benefit Cost Ratio –which ranged from 1.10 to 15.72 (in different parts of the country), depending on the above factors.
- o The availability of drinking water improved in all project villages. The ground water situation also improved in all project villages.

Other benefits such as fodder availability, employment opportunities, and income generation have improved significantly in all villages where watershed projects were implemented

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<sup>11</sup> WASSAN (2010): Future Search for Watershed Development Projects in India – Priorities for Policy and Practice’ Hyderabad

The report by UNDP has also observed that “IWDP projects have led to soil and water conservation, recharge of ground water, increased water availability for irrigation and hence enhanced agricultural productivity and production. The latest common guidelines for the scheme call for a focus on India’s rain-fed areas”<sup>12</sup> (UNDP,2012-p18)

Most of these above interventions are directly or indirectly related to CCA. At present there are many schemes implemented for rainfed area development such as IWMP, RADP,NHM, MGNREGA, Minor Irrigation, NRLM, etc .These programme’s benefits are not optimized as there is no unified implementation of these programmes in an area. It is estimated by the 12<sup>th</sup> plan Working Group that it would take only a dozen years for the development of 150 mha of rainfed areas when the current allocations under various programmes related to rainfed areas are utilized effectively in a unified manner. It is also expected such coordinated and effective implementation of the watershed programmes for rainfed area development would help in addressing the climate change effects paving way for water and food security .(GOI,2012).

Common Guidelines for Watershed Development (2008): New watershed projects are to be implemented in accordance with these Common Guidelines with effect from 1st April 2008.Accordingly the Desert Development Programme (DDP), Drought Prone Areas Programme (DPAP) and the Integrated Watershed Development Programme (IWDP) were merged into the Integrated Watershed Management Programme (IWMP). A cost norm of Rs. 12,000 per ha was adopted for the IWMP in line with the recommendations of the Parthasarathy Committee. For hilly and difficult terrains the norm is Rs.15,000 per ha.is recommended. It is reported that there are some difficulties with the Watershed Common Guidelines 2008. “A reform-oriented document places needless and quite arbitrary restrictions on the choice of the Project Implementing Agency (PIA). Despite it being a well-established fact that voluntary organisations have done some of the best work under the watershed programme, the guidelines mark them out for the harshest conditions, restricting their role in a somewhat capricious manner.”(WASSAN,2010).

The study further observed that “the process of land degradation, desertification is being accelerated due to climate change. Several newer areas are being subjected to moisture distress and unpredictable rain-fall patterns. It is important to realize that old and already treated areas are also unable to sustain the impacts for a longer period, due to the implications of climate change; unsustainable resource use (eg: over exploitation of groundwater). Hence it is becoming increasingly imperative that “adaptation to climate change” has to be core concern of future watershed development projects in the country”.(ibid).Thus it is clear that the existing guidelines have to be modified suitably to take up watershed works with focus on Climate change adaptation to sustain benefits of watersheds and rain fed agriculture.

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<sup>12</sup> Greening Rural Development in India, (Vol-I), UNDP India 2012.

Taking into account these concerns the Watershed Guidelines (section 19D of revised edition 2011 ) can be modified to include provisions for undertaking IEC activities specific to CCA and DRR as such activities are basic to create awareness about these aspects specifically to PIA, Watershed Development Committees, SHGs etc. The guidelines (section 26 of revised edition 2011) provide for appointment of 4 to 7 professional experts at the state level to help state level nodal agency (SLNA). All these experts should be trained in CCA and DRR aspects and where required one of them can be specifically from CCA/DRR specialist. The DPR of the watersheds should contain specific measures related to CCA and DRR as experimented under some watersheds by some NGOs already. (For more details see section on “ Climate Change Adaptation (CCA) and Disaster Risk Reduction DRR – lessons from some Civil Society Initiatives” in Chapter 4 of the report.

## 2.5 MGNREGA

Mahatma Gandhi National Rural Employment Guarantee Act (MGNREGA) was passed in August 2005, which provides for a minimum of 100 days of guaranteed employment to every rural household. The Act came into force initially in 200 of the country’s poorest districts and has later been expanded to another 130 districts. Presently, it has been extended to cover the whole country. MGNREGA has placed a judicially enforceable obligation on the state to provide unskilled, manual work within 15 days of a person making an application, within a radius of 5 kms from the applicant’s residence. Failing this, the state government is to provide an unemployment allowance. Under the provisions of the act, workers are entitled to a statutory minimum wage for their labour, to be paid within seven days after the work is done. Men and women are to be paid equal wages. The Act was prepared through a wide range of consultation with people’s organizations. The Act also provides opportunity for villagers to play an active role in the implementation of employment guarantee schemes through *Gram Sabhas* social audits, participatory planning and other means. This Act is important for rights based development approach for the realization of the right to work. Under NREGA, villages are the basic unit of planning. Panchayats (the village local bodies) are required to prepare project estimates that involve extensive mapping of village resources and making an annual plan every year to identify works that can be taken up for local resource improvement. (Jhilam Roy Chowdhury, 2010)

The MGNREGA marks a paradigm shift from previous wage employment programmes implemented in India’s history. It has an integrated natural resource management and livelihoods generation perspective.<sup>13</sup> Water harvesting, groundwater recharge, drought-proofing, floods control, construction of roads, ponds, drainage system and plantation are important works undertaken. Most of the work on NREGA (about 80 percent) relates to natural resource management like watersheds, rain fed area development etc. which could help in mitigation of climate change risks. Of the 2.7 million works being undertaken in over 600 districts, nearly 80 per cent are water, land and forestry-related. These not only provide local environmental services, they have the potential to yield co-benefits of adaptation and mitigation to global climate change<sup>14</sup>.

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<sup>13</sup> [http://nrega.nic.in/netnrega/writereaddata/Circulars/MGNREGA\\_SAMEEKSHA.pdf](http://nrega.nic.in/netnrega/writereaddata/Circulars/MGNREGA_SAMEEKSHA.pdf)

<sup>14</sup> Rita Sharma, Indian Express, Dec-17, 2009

The MGNREGA has led to the largest employment programme in India. MGNREGA has provided around Rs 1,10,700 crore (66 per cent of the total expenditure of around Rs 1,66,000 crore) as worker wages from 2006 -12<sup>15</sup>. Studies have noted a positive impact of this scheme on household income, monthly per capita expenditure, food security and health of the beneficiaries. Overall, there are several indications of the significant impact of the Scheme and has even potential in terms of poverty alleviation. In many parts of the country where this act has been implemented effectively, has created good impact in terms of environmental benefits. The potential of this act is quite large from the point of CCA as most of the works undertaken under this massive programme relates to drought and floods.

### **NREGA and CCA-linkage**

NREGA links extreme poverty and climate change adaptation through environmental services which are provided by rural households under the programme. As noted earlier, NREGA works can significantly contribute for the protection of environment through rejuvenation of the natural resource base. Water conservation, land development and afforestation works under NREGA can help for ground-water recharge, enhanced soil fertility and increased biomass. These, in turn, can generate global benefits such as adaptation to and mitigation of climate change and biodiversity conservation. A study conducted in five states, Rajasthan, Madhya Pradesh, Andhra Pradesh, Karnataka, Sikkim showed that wherever MGNREGA was implemented effectively has generated multiple environmental benefits, leading to improved water availability, soil fertility and increased crop production. MGNREGA works have also helped to reduce soil erosion and increase area under plantations. Overall the study has concluded that MGNREGA works have contributed for improving the adaptive capacity of rural people and reducing their vulnerability to climate risks. (IISc-Bangalore,2013). A review by UNDP has already noted the positive impact of the programme “MGNREGS works have led to the regeneration of degraded soil, land (farms, forests and pastures) and water resources and the conservation of the assets created. Their green outcomes include reducing soil erosion, improving soil fertility, increasing biodiversity, augmentation of surface and ground water resources for irrigation and household use and increasing carbon sequestration.”(UNDP-2012-p.13)

It is noted that the quality of work undertaken under MGNREGA has to improve much both in terms of PRI involvement and the technical soundness of design. Work priorities in many states tend to follow orders from the state or district level rather than reflecting the needs and aspirations of the community. The required technical input is also inadequate. Part of the problem is the lack of supporting technical staff. A major reason for the poor performance in states where poverty is high, could be the lack of awareness among potential MGNREGA workers regarding their entitlements (GOI,MTA-2011-Chapter 12)

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<sup>15</sup> [http://nrega.nic.in/netnrega/writereaddata/Circulars/MGNREGA\\_SAMEEKSHA.pdf](http://nrega.nic.in/netnrega/writereaddata/Circulars/MGNREGA_SAMEEKSHA.pdf)

**Discussion with MGNREGA Secretariat:** The following points emerged during discussion with MGNREGA Secretariat, Ministry of Rural Development in Delhi

NREGA work should be treated as a climate change adaptation work at the country level as it deals with natural resources management and extreme weather events like drought and floods.

NREGA norms are rigid and hence some of the specific works related to CCA cannot be undertaken under this: example setting up of weather monitoring stations at the village level. Convergence of NREGA works with other schemes has recently started and hence need more time for its impact felt

NREGA needs to concentrate more on IEC activities for generating awareness among the people about the benefits of it especially related to Climate Change Aspects. UNDP can help in capacity building of the department on this.

There is a need to mainstream CCA related activities under NREGA .In order to do this NREGA guidelines can be suitably modified to accommodate climate change related works under this.

Ministry of Rural Development is already involved in a Climate change project namely Climate Proofing Government Schemes in India funded by GiZ . As a follow up of this another project has been already prepared and will be launched soon covering more number of states . The experience under this project will help in mainstreaming of CCA under MGNREGA

## **2.6 National Rural Drinking Water Programme**

The National Rural Drinking Water Programme (NRDWP) is a flagship programme of the Government of India with the objective of ensuring provision of safe and adequate drinking water supply to all rural households at the rate of 40 liters per capita per day (lpcd) . The Union Government is considering to increase the service levels from 40 lpcd to 55 lpcd during the 12th Five Year Plan period. Under this centrally sponsored scheme financial assistance is provided to States for coverage of all rural habitations, including quality affected habitations with safe drinking water provision. In the Union Budget 2013-14, an amount of Rs. 11,000 crore has been made for NRDWP and the rural water supply sector including Rs. 1100 crore earmarked for North-Eastern Region and Sikkim. In many States, rural drinking water schemes have been transferred to PRIs for operation and maintenance.<sup>16</sup>

The level of investment in water and sanitation, though low by international standards has increased during the 2000s.and as a result the access has also increased significantly. A number of innovative approaches to improve water supply and sanitation have been tested in India, in particular in the early 2000s. These include demand-driven approaches in rural water supply programmes, community-led total sanitation, public-private partnerships, and the use of micro-credit to improve access to water.<sup>17</sup>

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<sup>16</sup> [www.mdws.gov.in](http://www.mdws.gov.in)

<sup>17</sup> <http://www.indiawaterreview.in/Story/TopNews/india-plans-major-thrust-on-rural-water-supply-during-12th-plan/1067/15#.Ufut62dm7VM>



Provision of safe Drinking water continues to be an issue despite longstanding efforts by the government and civil society organizations . At present it is estimated that about 85 percent of rural areas have access to improved source of drinking water . The remaining 15 per cent of households depend on uncovered wells and other unimproved sources like rivers, springs and ponds. About 22 per cent of rural households have to fetch drinking water from sources that are more than 500 meters away from their premises. There are a high percentage of such households in the states of Manipur, Tripura, Orissa, Meghalaya, Jharkhand and Madhya Pradesh<sup>18</sup> .Only 31 per cent of rural households have access to tap water .States like Bihar, Jharkhand, Assam, Orissa and Madhya Pradesh were lagging behind in coverage with tap water supply.

**Pilot projects on achieving drinking water security** : Depleting ground water table and deterioration in water quality are threatening the sustainability of rural water supply in many parts of India .Hence pilot projects were launched with the objective of achieving drinking water security in a holistic manner mainly through convergence with MNREGS and Participatory integrated water resources management led by Gram Panchayats.Under this scheme ,about 10-15 blocks with alarming level of ground water depletion have been identified in the ten States of Rajasthan, Andhra Pradesh,Gujarat, Haryana, Punjab, Madhya Pradesh, Tamilnadu, Karnataka, Uttar Pradesh and Maharashtra for pilot projects. The pilot projects will focus on ensuring drinking water security and total sanitation .The pilot will also attempt to address the different dimensions of water security and sanitation in a holistic manner taking into account water quality and quantity ,cost and pricing, storage management etc. The total estimated cost for 10 blocks for 3 years is about Rs 150 crores. In Madhya Pradesh where ground water over exploitation is an issue two blocks each one from Ratlam and Satna districts were selected under the pilot project<sup>19</sup>

### **Climate Change and Disaster Impact on Rural Water supply**

Climate change poses a serious problem to the realisation of the rights to water and sanitation. We have already discussed about the impact of climate change on overall water supply under ‘water mission . It should be noted that climate change will impact rural water supply particularly water quality and quantity which will have a bearing upon health of human population. The Intergovernmental Panel on Climate Change (IPCC) has warned that in many regions of the globe, changes to the supply and quality of freshwater resources resulting from climate change may imperil sustainable development, poverty reduction and child mortality goals.<sup>20</sup>

In India ,there are many studies undertaken about the impact of climate change on different aspects of livelihoods ; however no comprehensive data are available about the impact of climate change on drinking water in Indian conditions. It is generally noted that in most plans and discussions, Water Sanitation and Health(WASH ) is a cross cutting issue and not received

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<sup>18</sup> <http://www.indiawaterreview.in/Story/TopNews/india-plans-major-thrust-on-rural-water-supply-during-12th-plan/1067/15#.Ufut62dm7VM>

<sup>19</sup> ibid

<sup>20</sup> [http://www.ohchr.org/Documents/Issues/Water/Climate\\_Change\\_Right\\_Water\\_Sanitation.pdf](http://www.ohchr.org/Documents/Issues/Water/Climate_Change_Right_Water_Sanitation.pdf)

independent and full fledged treatment .Separate Vulnerabilities assessment in WASH sector is necessary to develop a holistic plan about the sector. In the process ,it is important to identify the most vulnerable groups, adaptation and mitigation measures for them , means of financing these measures, identify structures that are most vulnerable, increase resilience to droughts and floods, and to develop infrastructure to withstand disaster.

Water resources, urbanisation, and disaster management are issues closely concerned with WASH. While these are managed by different departments, coordination among the sectors is necessary for effective coverage .<sup>21</sup> .The NAPCC has identified the following issues for adaptation to climate change related to drinking water and industrial water supply sectors.<sup>22</sup> :

Rain water harvesting (RWH)

Desalination (Sea/brackish water)

Waste water recycle/reuse

Capacity building of institutions targeted at coping with climate change

UNDP in its report has observed that “greening of rural water supply projects is an imperative of the programme. Wherever possible, multi-source systems are preferred to ensure reliability, safety and sustainability, even in times of calamities.”(UNDP,2012: p21)

## **2.7 Agriculture- National Agriculture Development Programme -Rashtriya Krishi Vikas Yojana (RKVY)**

RKVY -State Plan Scheme with Central Assistance was launched in August 2007 as a part of the 11th Five Year Plan by the Government of India. Launched under the National Development Council, it seeks to achieve 4percent annual growth in agriculture through development of agriculture and its allied sectors.

Objective: The main objective of the programme is to incentivize the states to increase public investment in agriculture and allied sectors so as to achieve the target of 4 percent of annual growth rate in sector during 11th Five Year Plan and to enable higher returns to farmers.

The scheme also enables states to have flexibility in designing schemes suitable to their requirements. Under this scheme the states are required to prepare district level agriculture plans based on agro-climatic conditions. RKVY aims to bridge the yield gaps to maximize the income return of farmers.

The programme is being implemented under three streams. Stream-I- with 25 percent of the annual budgetary provision available to only those States which are eligible based on their level of allocation from state resources . Stream-II, which will be 50percent of the annual budgetary allocation available to all the States. Stream-III, equal to 25percent of the annual budgetary allocation to the States where focused interventions launched by central government under RKVY umbrella are to be taken up.

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<sup>21</sup> National level workshop on Climate change and WASH sector,June-26-27,Mussorie

<sup>22</sup> NAPCC-Water Mission-Vol-2-2008

The projects of the State Governments are approved by the State Level Sanctioning Committees(SLSCs) under the Chairmanship of Chief Secretary of the respective States. Funds are routed through State Agriculture Department, which is the nodal Department for the scheme.Under RKVY (production growth) States will be able to take up any project(including CCA related) with potential for raising production and productivity in agriculture and allied sectors. RKVY(Infrastructure & Assets) stream aims at contributing to the national objective of achieving 4percent annual growth in the agriculture sector by assisting development of infrastructure in agriculture and allied sectors.

Progress: An outlay of of Rs.25,000 crore has been set out during 11th Five Year Plan. Of these, states have been released about Rs.14,598 crores during the period from 2007-08 to 10-11.It is observed that most of the states have been reasonably prompt in approving projects and incurring expenditure under RKVY .As noted earlier, RKVY links 50 percent of Central Assistance to States for stepping up State Plan expenditure on agriculture & allied sectors. Progress shows that states have increased allocation to agriculture and allied sector from 8770 crore (4.88percent) in 2006-07 to 22,158 crore( 6.04percent) in 2010-11.RKVY is proposed to be continued in the 12th Plan with some modifications. The proposed outlay during the 12<sup>th</sup> plan period is Rs 63,246 crores .The scheme will have three channels / streams RKVY (Production Growth), RKVY ( Infrastructure and assets) and RKVY (Special Schemes)under 12<sup>th</sup> plan

#### RKVY and CCA/DRR:

RKVY is a flexible programme which provides opportunities to the states for taking up any work related to CCA/DRR in agriculture sector .The programme envisages preparation of district agriculture plans based on local agro-climatic conditions which naturally helps in taking care of climate effects when planned and implemented properly. Under RKVY special scheme ,programme like Rain fed Area Development Programme (RADP) is undertaken the main objective of it is to minimize the adverse impact of possible crop failure due to drought, flood or un-even rainfall distribution .

### **2.8 National Disaster Management Authority (NDMA):**

India is extremely vulnerable to natural disasters such as floods, drought, cyclones, earthquakes, landslides etc.. Frequent disasters have been retarding the developmental efforts and progress, especially for the poorer and vulnerable sections. Concerned with the increasing frequency and magnitude of natural disasters, the GoI piloted the passage of the Disaster Management Act (2005). This Act created the National Disaster Management Authority (NDMA) at the National level headed by the Prime Minister and similar authorities at the State and district levels. Thus, a country-wide structure is in place for the first time backed by a statute that provides for administrative, legal and financial support for its effort. Thus there has been a paradigm shift, from the erstwhile relief-centric response to a proactive prevention, mitigation and preparedness-driven approach. These efforts are expected to conserve developmental gains and also minimize losses of life, livelihoods and property.The main objective of NDMA is to build a safer and disaster resilient India by developing a holistic, pro-active, multi-disaster and technology-driven strategy for disaster management through collective efforts of all Government Agencies and

Non-Governmental Organisations. It has prepared 18 guidelines on different disasters including drought and floods<sup>23</sup>

## **2.8.1 National Disaster Management Guidelines – Management of Drought and Floods**

### **Management of Drought**

India has a long history of drought which has affected nearly 1,061 million people and killed 4.25 million people in the country during 1900–2006 (Prabhakar and Rajib Shaw,2007). There is a growing evidence that climate change does have implications for drought vulnerable India with studies projecting future possible reductions in monsoon rainfall in the country. Hence the traditional approach to drought as a phenomenon of arid and semi-arid areas is changing . Now, even regions with high rainfall, often face severe water scarcities. Cherrapunji in Meghalaya, one of the world’s highest rainfall area, with over 11,000 mm of rainfall, now faces drought for almost nine months of the year.

The National Guidelines for the Management of Drought have been formulated with the consultation of various Central Ministries/ Departments and the States. The process also included consultations with scientific and technical institutions, academics,NGOs etc . The draft guidelines documents were circulated to all the Departments at the Centre and the States for their feedback. and workable suggestions have been incorporated<sup>24</sup> .

The Guidelines on drought describe in brief the phenomenon of drought, the efforts made so far to control them by diverse organizations and institutions and make several important and far-reaching recommendations on the measures to be taken by the Central and the State Governments and other selected agencies. Based on the guidelines, the State governments are expected to prepare their drought management plans, to minimize drought hazards.

NDMA in its guidelines has identified many challenges in drought management : a) Differences in the criteria followed for declaration of drought and the time taken across the states;b) methodology used and indicators followed for drought intensity assessment c)Data sharing for drought assessment and declaration; d) Insufficient use of Information and Communication Technology (ICT) tools by various agencies in management of drought; e) Lack of check dams in the rainfed areas results in inadequate storage-water in times of drought; f) Lack of community participation in drought management activities at the village/tehsil level, and the low levels of involvement of Self Help Groups, NGOs and the corporate sector.

CCA and Drought: One of the sections (4.2) of the Guidelines deals with climate change aspect of drought ,however no detailed discussion is given about the issue. However the NAPCC under its Water Mission has dealt with the issue of Drought Management under climate change.<sup>25</sup>

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<sup>23</sup> [www.ndma.gov.in](http://www.ndma.gov.in)

<sup>24</sup> <http://ndma.gov.in/ndma/presrelease/pdf>

<sup>25</sup> National Water Mission-Chapter 3.8-vol-11

Drought is a temporal phenomenon indicating a lack of water in that particular time as compared to other periods and areas which frequently suffer from droughts are classified as drought prone. However, in the method adopted by the CWC, such areas which frequently suffer from meteorological droughts, but which have large proportion of irrigated area are not considered as drought prone. As many as 99 districts, spread over 14 states, were identified by the CWC as drought-prone in the country. Most of the drought-prone areas so identified are concentrated in the states of Rajasthan, Karnataka, Andhra Pradesh, Maharashtra and Gujarat. They noted that during the last 50 years, there was no occasion when the percentage area of the country affected by drought was more than 50. In 124 years, probability of occurrence of drought was found maximum in West Rajasthan (25percent), Saurashtra and Kutch (23percent), followed by Jammu and Kashmir (21percent), and Gujarat (21percent).The main strategy followed by the Government in drought proofing seems to be the provision of reliable irrigation. For example large tracts of land in Punjab, Haryana and now parts of Rajasthan which are subject to frequent meteorological droughts have been drought proofed through irrigation. Drought prediction and communication and drought monitoring needs to be improved and the coping capacities of the communities need to be enhanced in view of the Climate Change.(ibid).

### **Strategies for Drought Management under CC:**

The following are the strategies identified by the Water Mission for addressing drought issue under climate Change

Conducting the economic carrying capacity studies considering land,water and livelihood to plan how much water is necessary to yield reasonable income.

- Increasing the use of irrigation through in-basin development as also inter-basin transfers.
- Changing cropping patterns towards less water use crops.
- Adopting integrated farming systems.
- Water harvesting, provided this is socially desirable and provided that corresponding water saving is possible elsewhere in the region.
- Encouraging non-agricultural developments of the type where not much water is required.

### **Management of Floods**

India is highly vulnerable to floods. Almost all of India is prone to floods .Out of 40 million hectares of geographical area about 32.9 million hectares (85 percent) is prone to floods.<sup>26</sup>

Floods have been a recurrent phenomenon in India and cause huge losses to lives, properties, livelihood systems, infrastructure and public utilities. On an average every year, 75 lakh hectares of land is affected, 1600 lives are lost and the damage caused to crops, houses and public utilities is estimated as about Rs.1805 crores due to floods.

Eighty per cent of the precipitation occurs during monsoon months from June to September. The rivers bring heavy sediment load from the catchments. These coupled with inadequate carrying capacity of the rivers are responsible for causing floods, drainage congestion and erosion of river-banks.<sup>27</sup>

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<sup>26</sup> <http://ndma.gov.in/ndma/guidelines/flood.pdf>

<sup>27</sup> Ibid

NDMA has prepared comprehensive compendium of Guidelines which lists out various action points to be implemented by central ministries/departments and the state governments/SDMAs/DDMAs for management of floods. There are 94 action points to help them in the formulation of Flood management Plans (FMPs) and their implementation for effective management of floods.

Climate Change and Flood Risks Management: Almost all of India is flood-prone. Extreme precipitation events, such as flash floods and torrential rains, have become increasingly common in central India over the past several decades, coinciding with rising temperatures.<sup>28</sup> Recent work on climatic change indicates that the frequency and severity of flooding in many parts of the world could increase due to major changes in the hydro-climatic regime and a continuing rise in mean sea level. Changes in the magnitude and intensity of precipitation and the timing of runoff will increase flooding. Higher sea levels will increase the likelihood of coastal flooding and problems with urban infrastructure draining to tidal estuaries. Unless action is taken to lessen the vulnerability of human settlements, flood damages will increase. Hence adaptation strategies are needed that identify and direct development away from flood-prone areas, and incorporate infrastructure design criteria that take changing climate into account.(Brian etal 2007)

The NDMA guidelines though have given a comprehensive discussion about flood control and management, there is no specific discussion about climate change associated flood risks and methods of its management . National Water Mission under NAPCC has dealt with the issues of floods under climate change scenario<sup>29</sup> which should be considered for revision of these guidelines

#### Climate Change and Uttharkhand floods disaster :

The historic floods and the resultant disaster in Uttarkhand in June 2013 is now acknowledged due to climate change phenomenon. It is also commented that the disaster could have been less painful had the CCA plans incorporated disaster management aspects in it. (EPW June 29,2013).Similarly it is important to have CCA perspective in DM plans. All these underline the importance of reviewing the existing guidelines related to disaster by NDMA

Concept of Climate Smart Disaster Risk Management: ‘ Climate Smart Disaster Risk Management’ (CSDRM ) is suggested as an integrated social development and disaster risk management approach that aims to tackle simultaneously changing disaster risks, enhance adaptive capacity, address poverty, exposure, vulnerability and their structural causes and promote environmentally sustainable development in a changing climate scenario. CSDRM provides a guide to strategic planning, programme development and policymaking and can be used to assess the effectiveness of existing DRM policies, projects and programmes in the context of a changing climate. It is an approach to help cross-check the effectiveness of DRM

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<sup>28</sup> Goswami BN, Venugopal V, Sengupta D, Madhusoodanan MS, Xavier PK (2006). "Increasing trend of extreme rain events over India in a warming environment". *Science* **314** quoted in [http://en.wikipedia.org/wiki/Natural\\_disasters\\_in\\_India#cite\\_note-5](http://en.wikipedia.org/wiki/Natural_disasters_in_India#cite_note-5)

<sup>29</sup> GOI-MOWR-NWM report -Chapter 3.11, Vol-11

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interventions for their responsiveness to current and future climate variability and to those associated with resilience, adaptive capacity and uncertainty . (Wisner et al 2004). The three pillars of action under this approach are 1. Tackle changing disaster risk and uncertainties.2. Enhance adaptive capacity.3. Address poverty, vulnerability and their structural causes. ( Holling 1973, Folke 2006). As this is a novel concept which address issues of climate, disaster and development in a holistic framework this may be considered in CCA and DRR programmes in India. Some of the experiments are already underway in India using this framework though not spelt out explicitly (See Chapter 4 on CCA and DRR-Civil Society Initiatives, for more details)

## **2.9 Convergence of various programmes related to CCA and DRR**

From the above discussion ,it is evident that there are several national level programmes sponsored by by centre government .Though these are quite valuable individually to contribute to their sector development their effectiveness is not achieved fully when they are implemented in isolation .However if these are converged together and implemented combinedly focusing on specific issue (eg.drought) these programmes will produce optimum beneficial impact. The NREGA convergence programme provides a platform for undertaking such works. The Ministry of Rural Development has developed and disseminated Guidelines for Convergence of MGNREGA with different national schemes/programmes implemented by Indian Council of Agricultural Research, Ministry of Forest & Environment, Ministry of Water Resources, Department of Land Resources, Ministry of Rural Development etc. For this purpose , 115 pilot districts in 22 states have been identified..<sup>30</sup> These are important from the point of CCA and DRR as described below.

### Importance of convergence and its implication for CCA/DRR:

The Task force on Convergence has underlined correctly the importance of convergence in the following : “Substantial public investments are being made for strengthening of rural economy and livelihood base of the poor, especially the marginalised groups like SC/STs and women. To effectively address the issue of poverty alleviation, there is a need to optimise efforts through inter-sectoral approaches. The convergence of different programmes like Watershed Programmes, National Agriculture Development Programme (Rashtriya Krishi Vikas Yojana), National Horticulture Mission, Scheme of Artificial Recharge of Ground Water through Dug well, BRGF, with NREGA will enable better planning and effective investments in rural areas”. This convergence is hoped to bring in synergies between different government programmes/schemes in terms of planning, process and implementation and thus facilitate sustainable development..

Convergence of funds from other sources can help in creation of durable assets. For instance, funds available with PRIs from other sources such as the National Finance Commission, State Finance Commission, State Departments and other Central or Centrally Sponsored Schemes such as SGSY, DPAP,DDP, IWDP, BRGF can be dovetailed with other rural development funds for the construction of durable community assets under the works permissible.<sup>31</sup> NREGA is opted for Convergence as its scope is quite wide for undertaking almost all works required for watershed

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<sup>30</sup>Report on Convergence Initiatives in India: An Overview, Ministry of Rural Development,GOI (Undated)

<sup>31</sup>Report of the Taskforce on Convergence,Minsitry of Rural development,GOI,September,2008

development in rain-fed area, for command area development in irrigated areas with adequate provision for funds and legal backup with rights based approach. One of the objectives of convergence is drought and flood proofing and also mitigation of climate change by addressing issues such as carbon emissions and industrial pollution which are quite relevant for CCA and DRR

Convergence will help to address CCA issues effectively: The following works are identified under convergence programme which have significant implications from CCA/DRR perspective

Natural Resource Management: water conservation, water harvesting, renovation of traditional water bodies and desilting of tanks on watershed basis.

Irrigated area :Irrigation Canals including Micro and Minor irrigation, Flood control and Protection work including Drainage in water logged area based on respective ongoing programmes of Water Resource Department, Accelerated irrigation benefit programme, CAD & WM programme, Artificial Recharge of Ground Water through Dug well and flood control Scheme and Repair, Renovation and Restoration of Water bodies Scheme.

Drought Proofing : Afforestation, Tree plantation, Horticulture- based on concerned programmes of Forest Department and Horticulture Department that is, National Afforestation programme, NADP(RKVY) and NHM.

More specifically these following are works are relevant for CCA/DRR

Drought Proofing : Under drought proofing, there are three works which can be taken up under NREGA

- a) Afforestation,
- b) Tree plantation and
- c) Horticulture

Under Afforestation there are three activity which are common ie.

- Root stock regeneration,
- New plantation and
- Silviculture

These activities under NREGA can be executed on common/ panchayat/ revenue/ forest land. After execution of these activities the Protection, watch & Ward and Gap filling of plantation is very necessary for the sustainability of these activities. Therefore, the work of Barbed wire fencing, Gap filling and Watch & Ward can be done by convergence of National Afforestation Programme of M.O.E. & F. or Fodder Development scheme of A.H. Dep't. or NADP (RKVY) as a complimentary to NREGA. Similarly the activity of Boundary plantation, Agro forestry, Block plantation of Horticulture plants and Agro Horticulture plantation can be covered under convergence of IWMP, NADP (RKVY) and NHM programme .

Flood Control and Protection Work Including Drainage In Waterlogged Area:

Under this category activities which are common are--Diversion Channel for flood Control,  
-Peripheral Band for protection work and  
- Surface Drainage and Sub-Surface Drainage for Drainage in water logged area.

These activities can be executed under NREGA on common land and individual land of SC/ST/BPL and Beneficiary of Land Reform. For the execution of these activities on



individual land of other than SC/ ST/ BPL and Beneficiary of LR , the Flood Control Programme and C.A.D. and W.M. programme of W.R. department and N.A.D.P. (RKVY) and B.R.G.F. can be converged with NREGA as substitute and complimentary for maintenance.

**Irrigation works:** Under this there are three works possible

- a)Irrigation Canals
- b) Minor Irrigation , and
- c)Micro Irrigation

Under the work of Irrigation Canal, the activities which can be taken under NREGA are construction of new canal and renovation of canal including Desilting. These activities can be taken up under NREGA on common land but for durability running and maintenance, the Accelerated Irrigation Benefit programme of water resources department should be converged for putting gates and running & maintenance. The work to be executed by labour can be carried out NREGA and work requiring machine can be executed under AIBP. Thus AIBP will be complimentary to NREGA for this activity. Similarly, dug well in tail reach on common land and land of SC/ST/BPL and beneficiary of LR can be carried out under NREGA and on the land other than SC/ST/ BPL/ Beneficiary of LRP, IAY this activity can be executed under NADP (RKAY) as a substitute to NREGA.

Similarly for other activities like water courses, field channel sprinklers/ drip irrigation etc. convergence of C.A.D. and W.M. programme of W.R. department and N.A.D.P. (R.K.V.Y.) and N.H.M. should be made.Under this work there are following activities are common-

- a) Dug well with Recharge pit.
- b) Field channel – i)Earthen channel

ii)Lined channel iii)Renovation of field channel.

These activities on the individual land of SC/ ST/ BPL can be carried out under NREGA, but for individual land other than these, convergence of N.A.D.P. (RKVY)/ B.R.G.F./ C.A.D and W.M. programme of W.R. department .

**Renovation of Traditional Water Bodies /Desilting:** The work of renovation of Traditional Water Bodies / Desilting on the common land and individual land of SC/ ST/ BPL can be carried out under NREGA with N.A.D.P. (RKVY)/ W.R. department and IWMP

Thus it seems there is a wide scope for work related water management under NREGA convergence which will be helpful for CCA when implemented effectively.

## CHAPTER 3.

### REVIEW OF STATE LEVEL PLANS AND PROGRAMMES

#### MADHYA PRADESH (M.P)

#### 3.1 Madhya Pradesh State Action Plan on Climate Change (MP SAPCC)-2012<sup>32</sup>

##### **Introduction**

Madhya Pradesh is considered to be one of the most vulnerable states of India .The average annual rainfall for the state is 1160 mm with the heaviest rains in the south-eastern parts . The MP SAPCC has been prepared by the Climate Change Cell of Environmental Planning and Coordination Organisation (EPCO) under the Department of Housing & Environment, GoMP with assistance from UNDP India under the project “Strengthening of Madhya Pradesh Climate Change Cell”. The Government of Madhya Pradesh has declared EPCO as the Nodal agency for addressing Climate Change issues and has established a Climate Change Cell (GoMP CC Cell) in EPCO in 2009 . The Cell intends to manage the strategic knowledge related to climate change and would undertake activities that help to mainstream climate change concerns in the planning and developmental policies of the state and develop a mechanism to effectively monitor & evaluate the provision of SAPCC. The SAPCC has identified ten sectors considered sensitive to climate change through a wide-scale consultation process. Some of the key strategies identified related to overall CCA are

Identify CC champions in each department (CC cells)

Ensure that climate change roles and responsibilities are clear in each Department and Agency

Raise awareness and capacities down through Districts and Panchayats

Undertake specific scientific studies on key gaps e.g. changes in distribution and intensities of rainfall

Create baselines to monitor change and evaluate effectiveness of interventions

Create professional and scientific networks within and to connect them externally

Work with existing institutions and systems , scientific and technical staff generalist policy-makers

**Sectoral Issues:** There are some issues identified as specific to each sector .In the following we provide details about such issues related to water, agriculture and disaster management.

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<sup>32</sup> Madhya Pradesh State Action Plan on Climate Change, Department of Housing & Environment, GoMP,2 012

## **Water Resources**

The state has generally a semi arid topography with seven major river basins. Rainfall is the source of water most of which occurs in the monsoon period from June to September. The rainfall however varies across the state. Though the state receives 1100 mm rainfall, the ground storage capacity is low in the state due to the physiographic reasons: poor quality soils of low depth and high slopes, black soils of medium to deep soil depth with flat slopes and the underlying hard rock layer.

Groundwater constitutes a major water resource in MP. However, it is not uniformly distributed and used due to variations in hydrogeology of the state. About half of the available ground water is used for irrigation mainly from privately owned dug well or shallow tube wells. District-wise groundwater balance data indicate high levels of ground water abstraction in the western and north-western districts compared to the eastern and south-eastern districts where groundwater potential developed is only a tenth of the utilisable reserves.(MPSAPCC,2012).About 70percent of the domestic water supplied to rural areas is from ground water sources the same is about 30percent in the urban areas. The rest of the utilization is from surface water sources like rivers.

### **Concerns of Water Sector:**

Currently, about 94percent of the available water (81.5 lakh ha m), is used for irrigation and the rest is for industrial and domestic purposes. As noted earlier, the entire demand for rural drinking water is met through ground water extraction. As there is a competition from agriculture, the ground water available for drinking purposes is put under stress. Increasing water demand for human consumption, agriculture and industry, coupled with erratic rainfall has led to supply problems. The indiscriminate exploitation of ground water not only results in decline of ground water levels but also inland salinity in some districts like Mandsaur, Neemuch and Ujjain. (ibid,2012).The other serious issues of groundwater quality are high concentration of fluorides, agricultural, municipal and industrial pollutions. Water logging in canal command areas leading to soil salinity is also noted . Water use efficiency in irrigation is generally very low and this is area of major concern. The challenge is to increase efficiency in irrigation and enhancing agricultural productivity through new improved technologies. Over exploitation of water mainly for irrigation has rendered many areas dry, with minimal development of surface water resources. This brings into focus the need for serious efforts to reduce the gap between irrigation potential created and utilized .

### **Climate Change induced concerns <sup>33</sup> :**

- Shift in spatial and temporal distribution of rainfall
- Noted increase in intensity of rainfall and also increase in frequency of such events
- Decrease in number of rainy days
- Incidences of extreme weather events such as droughts and flash floods
- Endangered aquatic ecosystem due to disturbed river flow

**Strategies to address concerns of Climate Change in Water Sector:** The MPSAPCC has identified the following strategies to address the issues in water sector <sup>34</sup>

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<sup>33</sup> MPSAPCC,2012.

1. Development of a comprehensive water data base in public domain and assessment of the impact of climate change on water resources of the State
2. Accelerated pace of surface water development in the state
3. Recharge of ground water with special focus on over exploited areas
4. Improvement of supply and demand management for efficient and judicious use
5. Promotion of basin level integrated water management
6. Promotion of additional research
7. Capacity Building of stakeholders

### **Agriculture**

About 70 percent of the rural population of Madhya Pradesh is engaged in agriculture and allied activities covering agriculture, horticulture, animal husbandry, fisheries and dairy development. This sector contributes about 30 percent to the State Net Domestic Product. About 65 percent of farm holdings belong to small and marginal farmers occupying only 26 percent of cultivable land thus land distribution is quite unequal. Madhya Pradesh is divided into eleven Agro Climatic Zones (ACZ) based on rainfall, existing cropping pattern and administrative units. The state is also grouped into five major cropping zones, based on the cultivation of major crops.

### **Concerns of Agriculture Sector**

- High prevalence of mono cropping
- Dwindling Crop Diversity
- Near extinction stage of coarse grains or millets
- Deteriorating soil health
- High rate of pest impact
- Over dependence on groundwater for irrigation
- Lack of awareness about soil nutrition management and irrigation management among farmers at large

**Climate Change concerns in agriculture :** The following are important issues of concerns related to climate change and its adaptation in agriculture

- Shift in spatial and temporal distribution of rainfall
- Increase in intensity of rainfall and longer dry spells
- Gradual increase in temperatures across all seasons
- Frequent extreme weather events like frost, droughts, flash floods
- . Climate induced shift in cropping patterns
- Burning agri residues in fields causing CO<sub>2</sub> emissions
- Use of energy intensive water pumps
- Traditional paddy cultivation technique causing methane emissions

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<sup>34</sup> Ibid

## **Strategies to address concerns due to climate change :**

The Action Plan advocates a number of strategies to address CC concerns in agriculture sector. Some of these important issues are discussed below:

Promoting Soil and Water Conservation technologies: Higher evapo-transpiration rates and higher run offs with climate change would further lessen the already low natural water storage in the state. Hence, moving towards more water conservation technologies and avoiding exploitation of ground water is necessary. Also measures like *SRI* for rice, raised bed cultivation, use of micro/drip irrigation for crops like cotton, fruits and vegetables.

Management of risks for sustainable productivity: In some of the regions in the state the mono cropping of soyabean-wheat is rendering the soil infertile due to over use of chemical fertilizer. It is therefore suggested that traditional practices like inter cropping, multiple cropping and crop rotation may be encouraged. Further the use of organic farming may be encouraged by promoting integrated farming where by livestock rearing, horticulture and fisheries are practiced. Providing advance information on local climate that accommodates the changes in temperature, precipitation amounts and onset of monsoon is essential to prepare the action plans accordingly.. Additionally risk management through crop insurance will be beneficial to farmers in the case of total crop failure.

Agriculture Information management: For maximising productivity in the context of challenges posed by climate change, it is necessary to establish an integrated data centre where by data related to all aspects of agriculture, such as weather and climate information, crop biodiversity, research, technology, markets, and policy for maximising productivity are to be made available through a single window, with the back end linked to various agencies that actually produce the data. This will be useful not only for the farmers but also for formulating informed decision making by policy makers.

Capacity building towards sustainable agriculture: Capacity building of planners, extension workers, farmers association etc on sustainable agriculture practices should be strengthened, so as to build better understanding of regional and sectoral climate change concerns. Capacity building of the officials managing agriculture in the state for integrating climate change concerns in their planning as well as implementation and management of programmes is also important.

### **Vulnerability Assessment**

With an agrarian economy and natural resources dependent livelihoods of majority of its population, Madhya Pradesh tend to be vulnerable to the vagaries of climate change. Natural calamities like drought, floods and hailstorms are common features for the state. Almost every year one or the other part of the state is affected by drought like conditions enhancing distress migration .In order to have a broad understanding of the climate change induced vulnerabilities of the state a detailed assessment was carried out taking into account socioeconomic and environmental indicators.<sup>35</sup> A composite Index of Vulnerability was constructed taking a number of related aspects of vulnerability like social, economic, environmental, agriculture, climate, water resources and forest .Based on this Index districts were ranked.

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<sup>35</sup> Based on Indo-UK Vulnerability & Adaptation assessment project on MP

## **Analysis and results - Composite Vulnerability Index (CVI)**

On the basis of CVI, vulnerability rankings were assigned to districts. A rank value 1 indicates that the district is least vulnerable to climate change and rank value 50 indicates that it is the most vulnerable. These 50 districts are grouped into four categories as very high (4), high (3), moderate (2) and low vulnerability (1) according to their degree of vulnerability and for three scenarios namely Baseline, Mid Century and End Century.

Baseline: It is noted from the assessment that districts namely, Dindori, Jhabua, Mandla, Alirajpur, Arwani, Umariya, Guna, Sidhi, Balaghat, Panna, Shahdol, Chhindwara, Seoni are the most vulnerable to climate change while Bhopal, Indore, Jabalpur, Hoshangabad and Gwalior are less vulnerable districts. The districts which are under very high vulnerability category lack adaptive capacity and show higher sensitivity and exposure to climate change. The lesser vulnerability of districts is associated with its relatively higher economic capacity, its highest irrigation potential and high literacy rate.

Mid century: It can be seen that additionally seven districts i.e Anuppur, Sheopur, Ashoknagar, Shivpuri, Rewa, Singrauli and Tikamgarh have moved to very high vulnerable category from the high vulnerable category in the baseline. Thus the overall vulnerability of districts increases in mid century as compared to the base scenario. It is also seen that even within the high vulnerability category of 20 districts, Dindori stands out because of high exposure, sensitivity and very low adaptive capacity. Additional seven districts which have moved from high to very high vulnerability in the mid century are because of increased sensitivity and exposure variables. Bhopal, Indore, Jabalpur, and Hoshangabad remain low vulnerable districts.

End century: It can be seen that additional one more district namely, Betul moves to very high vulnerable category from the high vulnerability in the mid century. The overall vulnerability of districts increase in the end century compared to the base scenario. Bhopal, Indore, Jabalpur and Hoshangabad remain low vulnerable districts. Though vulnerability of Gwalior remains moderate, because of improvement in the sensitivity variables, (specially the climate) it becomes comparatively less vulnerable in the cluster of districts in the moderate category.

### **Overall Evaluation:**

Overall the SAPCC document is quite comprehensive to address various challenges related to Climate Change backed by a number of studies, support from international agencies including UNDP. An evaluation study on MPSAPCC has made the following observations which are important<sup>36</sup> for implementation of CCA activities.

“At the state level, Madhya Pradesh State Action Plan on Climate Change (MPSAPCC) focuses on devising appropriate adaptation guidelines with the aim of strengthening the developmental planning process of the state to adequately address climate change concerns. The MPSAPCC also ensured that grassroots voices were taken into account through an extensive consultation process. However, some unanswered issues remain that impede the adequate planning and implementation of climate resilient strategies at the ground level. “At this stage, the MPSAPCC

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<sup>36</sup> <http://www.devalt.org/ClimateChangeWorkshop.aspx>

contains strategies that are on paper and are yet to be mainstreamed in policy and planning processes gap. The strengthening of the MP Climate Change Cell and the operationalisation of the Knowledge Management Centre will support a two-way policy dialogue and effectively bridge the gap between scientists, communities and decision makers. There is an urgent need to use an integrated approach so as to enable a convergence between government departments (e.g., Agricultural and Irrigation Departments) and planning agencies (e.g., District Planning Commission) and across their various governmental levels (e.g., village, district, state, and national). The project findings highlight the fact that the agriculture departments of each district have prepared contingency plans to advise farmers on appropriate adaptation responses in the situation of a delayed or deficient monsoon. Advice includes implementing measures such as using improved crop management techniques, and practicing soil nutrient and moisture conservation measures that can help to mitigate the potential impacts of different rainfall situations. However, there is evidence that the dissemination of this information to the grassroots farming communities is limited for several different reasons.

Other findings stress that even though the planning at the policy level is taking climate change concerns into consideration but as it reaches the local level, the authorities are interested more in the practical implementation of the schemes/plans. They are chiefly unaware of the concept behind the formulation of the particular scheme. Although several adaptation measures have been implicitly included in many parts of the planning process (i.e., watershed management plans, irrigation schemes, agricultural development schemes), inefficient delivery mechanisms at the ground level and communication gaps has led to weak implementation of schemes at the most crucial bottom level. Therefore, efficient delivery mechanisms need to be strengthened (by frequent trainings, exposure visits to model villages and regular monitoring of the Government officials) so as to ensure the sustainable execution of concrete options at the bottom level.

Addressing these issues will require increasing the institutional capacities of local level departments (village and district), collaboration between governmental departments in scheme development and additional focus on more long-term climate adaptive planning. Finally, the communication of climate change related information needs to be enhanced to enable both communities and local level governmental departments to adequately respond to the threat posed by climate change on the region.”( ibid,2013)

### **3.2 Madhyapardesh State Water policy (2003)**

The State Water Policy formulated in 2003 needs revision in the context of new water policy at the national level and also SAPCC .In fact this was one of the recommendations from the workshop on sector consultation on Climate Change Action Plan. Though State Water Policy 2003 mentions that groundwater should be only explored for drinking purposes, there is no adherence to this policy. Lack of sufficient surface water has already put extreme pressure on the subsurface water resources and the use is unlimited for various purposes . Such activities are responsible for the dwindling condition of groundwater in the State which was once an abundant resource. Lack of awareness among people in general about the fact that surface water in the state is depending on rains and groundwater is not a perpetual source of water is resulting in merciless wastage of water, irrespective of its source. Distribution loss that happens during

municipal water supply is another issue which needs to be attended to. Master plan for each basin should be revised on top priority. Accordingly the State Water Policy should be reviewed and reframed based on latest Master Plan.<sup>37</sup>

### **3.3 Watershed Development programmes in M.P**

Madhya Pradesh is among the many states in the country in taking up a large number of watershed projects. There are three main stream watershed projects implemented in the state: Integrated Watershed Management Programme (IWMP) under Rajiv Gandhi Watershed Mission, National Watershed Development Programme For Rainfed Areas (NWDPA), River Valley Projects (RVP). About five million hectares of land have been covered under the three major projects viz; IWMP, NWDPA, and RVP. Though, there is no systematic database for coverage of different WDPs in the state, the available information indicates that IWMP under RGMWM is the single largest contributor accounting for nearly 66 per cent of the area covered by the three projects. This is followed by NWDPA (20 per cent) and then by RVP (14 per cent).

The main aims of the IWMP are to restore the ecological balance by harnessing, conserving and developing degraded natural resources such as soil, vegetative cover and water. The outcomes are prevention of soil run-off, regeneration of natural vegetation, rain water harvesting and recharging of the ground water table. This enables multi-cropping and the introduction of diverse agro-based activities, which help to provide sustainable livelihoods to the people residing in the watershed area.

A review study (GIDR, 2007) has brought out the following points about the implementation of watersheds in the state: The three projects viz. RGMWM, NWDPA, and RVP have been implemented in a manner that avoids duplication of efforts each one of them catering to specific areas. However, it is likely that there is not much of synergy between various programmes because first, the projects are being planned within the context of departmental priorities; and secondly, the unit for planning is generally milli and/or micro watershed rather than a stream or river basin. In absence of synergy, the actual achievements of the programmes may have remained sub-optimal, notwithstanding the effective implementation of the micro/milli-watershed projects.

WDPs under RGMWM have been concentrated mainly in twelve districts viz. Bhopal, Chhindwara, Dhar, Jabalpur, Khargonda, Raichur, Satna, Shahdol, Sheoni, Shivapuri and Sidhi. NWDPA, on the other hand, is concentrated in eleven districts — Betul, Chhindwara, Guna, Indore, Jabalpur, Jabalpur, Jabalpur, Jabalpur, Jabalpur, Jabalpur, Jabalpur, Jabalpur, Jabalpur, Jabalpur, Jabalpur. This suggests complementarities between the two major programmes for which areas have been broadly demarcated. The two projects together cover 19 out of the 26 districts identified as those deserving' priority when viewed in terms of bio-physical as well as socio economic criteria including irrigation. This suggests that the prioritization laid down in the guidelines has been by and large adhered to at least at the level of districts. A more disaggregated analysis of blocks within Jabalpur district also by and large confirms the pattern. It is however, imperative to examine

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<sup>37</sup> GOMP-SAPCC-Water Sector Consultation



the reasons for the neglect of seven districts so as to be able to make necessary corrections at the stage of planning as well as implementation. The seven districts are: Betul, Shajapur, Guna, Vidisha, Chhatarpur, Damoh, Khandawa, and Shajapur.

Another study has noted that Micro Watershed has contributed in raising income, generating employment and conserving soil and water resources.( Shrichand Jat<sup>1</sup>, S.K. Jain<sup>2</sup> and A.M. Rajput,2008).One more evaluation of MP watersheds has shown that there is a reduction in soil erosion, increase in groundwater level and increase in cropping intensity due to watershed works. This also helped in enhancing drinking water supply and thereby reducing the burden on women in fetching water supply from distant places. However it is noted overall the quality of water Harvesting Structures (WHS) in majority of micro watersheds in the state is only 'average' compared to states like Gujarat and Tamilnadu (Premsingh et al,2010)

### **3.4 MGNREGA in M.P**

Madhya Pradesh is one of the front runner states in implementing of MNREGS. In fiscal year 2009-10 the state has generated 2624 lakh person employment days under MNREGA. There are 46.17 lakh assets created under the MNREGS in M.P. It is the largest development programme in the state since its enactment .It was initiated in 18 districts of state in Feb 2006 and from April 2008 extended to all 48 districts . At the state level the Department of Panchayat and Rural Development is the nodal agency for the implementation of the scheme. Madhya Pradesh has been one of the states, which has engaged the Panchayats in a major way for implementation of the NREGA.

#### Impact:<sup>38</sup>

About 76 percent of 83 lakh rural households are given job cards under this scheme. Of them only 23 percent demanded jobs and 50 percent of the got jobs.(Samartan,2010).

Majority of people do see an impact of MNREGS at the village level. As high as 68percent households have said that there is an impact of MNREGS on the village.Most of the people (75 percent) see development of approach roads as the most important impact followed by increase in surface water (42 percent).People also see ground water (29 percent) and drinking water (29 percent) as important impact of MNREGS in the village. Around 52 per cent of the beneficiaries found the work quality to be very good and 21 per cent perceived the quality as good.

#### Recommendations:

To improve the performance of MGNREGA , the following recommendations are made:

More active engagement with NGOs to reach out to most backward blocks having high tribal or schedule caste population

Strong monitoring at the district level on the muster roll .

Enhanced availability of civil engineers for verification of muster rolls and work measurement. In certain districts where there is an acute shortage of civil engineers, a panel of professionals or retired civil engineers can be identified.

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<sup>38</sup> SAMARTHAN, 'Impact Assessment of MGNREGA in Madhya Pradesh', Submitted to Poverty Monitoring and Policy Support Unit (PMPSU), State Planning Commission, Madhya Pradesh, 2010.

Provide handholding support to the village Panchayats through technical support group, with subject matter specialist (including those with knowledge/training about CCA) in preparing participatory annual plans that includes CCA

Plans should essentially focus on converging with activities of some key departments like Agriculture and water resources. Promote greater number of activities and convergence around strengthening agriculture, with special focus on CCA.

### 3.5 RKVY in M.P

RKVY is a centrally sponsored scheme with flexibility of implementation at the state level .The scheme is implemented in MP based on some priorities identified.<sup>39</sup> The state has identified the following priority areas of intervention under the scheme during 2011-12.

Crop Development (26.5percent)

Irrigation (26.5percent)

Animal Husbandary (14.7percent)

Extension (9.2percent)

Fisheries (5.5percent) Others-  
(IPM,FINM,SEED etc)

It is noted that out of total expenditure of 525 crores about 27percent is spent on irrigation and almost similar for crop development both are important from the point of adaptation to drought and increase of agriculture productivity .The state has identified the following strategies<sup>40</sup> under RKVY which are important for assured water supply and productivity increase in major crops .

- Promote ground water recharge and in-situ moisture conservation
- Double area under SRI in three years
- Promote a sustainable, diversified agriculture model based on optimum resource use
- Promote intensive mechanization and marketing mechanism
- Support research for increasing agriculture productivity.

#### **Recommendations:**

The state has already identified the following points for improving the effectiveness of the scheme:

- Micro irrigation and in-situ moisture conservation, area expansion in agriculture and horticulture
- More state spending in agriculture sector
- More focus on agriculture sector inputs than creating buildings through RKVY
- Intensive mechanization
- Strengthen extension for horticulture and floriculture
- Post Harvest Management infrastructure creation
- Planning capacity at district level to be improved

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<sup>39</sup> RKVY,MP-MIS report ,Department of Farmers welfare and Agriculture  
<sup>40</sup> <http://rkvy.nic.in/download/compendium/MadhyaPradesh.pdf>

### 3.6 M.P Disaster Management Authority<sup>41</sup> :

Madhya Pradesh is vulnerable to various natural and manmade disasters. Looking towards the vulnerability it's very important to address all in a holistic manner for sustainable development. There are 32 districts of the State affected by the flood and seven highly affected by drought. In order to address the disaster related issues ,Madhya Pradesh State Disaster Management Authority (MPSDMA) was setup in 2007 under section 14 of National Disaster Management Act 2005. The Madhya Pradesh Disaster Management Authority is chaired by Chief Minister of the State. The minister of Finance, Revenue, Public Health and Family Welfare, Public administration and development, Commerce industry and employment, PWD and Home Department are the members of the MPSDMA. The department of Home, Government of Madhya Pradesh is the nodal department of the Authority. The Authority has the mandate not only to take up the mitigation activities but also the relief, restoration, reconstruction and other measures. These activities cover the entire gamut of disaster management including preparedness activities:

#### **Functions of State Disaster Management Authority**

- Lay down state disaster management policies and approve the state plan in accordance with guidelines laid down by NDMA.
- Approve DM plans prepared by State departments.
- Lay down guidelines for integration of measures for prevention of disasters and mitigation in the development plans and projects.
- Coordinate implementation of State plan.
- Lay down detailed guidelines for standards of relief.

#### **Functions of District Disaster Management Authority (DDMA)**

- DDMA to act as the district planning, coordinating and implementing body for DM and take measures in accordance with the guidelines laid down by NDMA and SDMA.
- Prepare district disaster management including response plan.
- Coordinate implementation of national policies, state policies, national plan, state plan and district plan.
- Take measures for prevention of disaster and mitigation of its effects through departments at district level and local authorities.
- Examine construction standards; ensure communication systems; involve NGOs and take all operational measures.

Discussion with SDMA: Following points emerged from the discussion with SDMA about the disaster risk reduction and climate change adaptation

-Coordination of different line departments in undertaking the works is challenging task related to DM activities both at the state and local levels

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<sup>41</sup> <http://mpsdma.nic.in/>

-Climate Change Adapataion (CCA) in the state has to involve disaster management authority in its planning and implementation of activities to make better impact on CCA front .

-Similarly for mainstreaming CCA in various departments the department working guidelines should be modified

-Climate Change Division should coordinate and take up these tasks on priority basis

#### Drought as a Disaster:

Drought is known as a gradual disaster as its effect is felt slowly over a period of time. Though it is a gradual disaster, it can have devastating effects on agriculture and water supplies. Hence forecasts and monitoring and help to take adaptation and mitigation measures are necessary . The MPSAPCC has taken into account the ‘water resources vulnerability ‘in working out the overall climate vulnerability in the state ,however not much details have been given in the document about drought.

#### UNDP project on DRR in MP: GoI-UNDP Disaster Risk Reduction Programme:<sup>42</sup>

UNDP in partnership with Ministry of Home Affairs has implemented a Disaster Risk Management Programme (DRM) in MP from 2002-2009 for building community resilience in disaster preparedness and mitigation measures. After the successful implementation of the DRM Programme in 176 multi-hazard districts spread over 17 States (excluding MP) the Government of India together with UNDP, has launched a new programme for Disaster Risk Reduction (DRR) . At present the DRR Programme is being implemented in 26 states (including MP) and 58 cities across the country. The overall objective of the programme is to strengthen the institutional structure to undertake Disaster Risk Reduction activities (including risks due to climate change ) at various levels like state, district, city, urban local body.

#### Major Activities:

- Strengthening the State and District Disaster Management Authorities to fulfill their responsibilities as stipulated in the Disaster Management Act, 2005.
- Developing methodologies and modalities for ensuring risk reduction through integration in development programmes of all partners at National, State and community levels.
- Enhancing the capacity for urban risk reduction by addressing planning, capacity building, and ensuring suitable legislative & regulatory mechanisms to promote safe built environment.
- To strengthen the recovery framework, through which the people affected by disasters (especially the most vulnerable) are able to access resources for rebuilding their lives and reviving their livelihoods.
- To strengthen the Knowledge and Information sharing platform in disaster management.

Thus already a DM framework has been established at the state and district levels in MP which can be used for CCA and DM activities in the state.

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<sup>42</sup> State level Programmes for Strengthening Disaster Management in India Initiatives by Ministry of Home Affairs, GoI, 3rd February 2011

## **REVIEW OF STATE LEVEL PLANS AND PROGRAMMES**

### **ODISHA**

Orissa is predominantly an agrarian State. Almost 70 per cent population of the State are dependent on agriculture. The agriculture sector contributes only about 26 per cent of the Gross State Domestic Product (GSDP) resulting in low per capita income in the farm sector. About 60 percent of land is devoted to rain fed agriculture. Rice dominates the crop area (75percent). During kharif mainly rice is cultivated however farmers diversify the cropping pattern during the Rabi season. Due to the predominantly subsistence nature of agricultural production, the use of fertilisers and pesticides is very low -one of the lowest in India. Ground water use is also low in the state. However, saline water ingression has been observed in some coastal districts.(GOO-CCAP-2010)

Whilst there are major uncertainties about the behaviour of the monsoon with climate change, changes are likely to upset the existing balances in eco-systems affecting water and agriculture sectors dramatically . Apart from direct impacts through extreme weather events there may be indirect changes in the distribution, frequency and severity of pest and disease outbreaks, incidence of fire and disturbance in soil properties. Change at national level in food production is likely to affect Orissa as well change within the state. There will be greater pressure on Orissa to intensify food production systems if food supplies decline elsewhere.

### **3.7 Odisha State Action plan on Climate Change (2010)**

#### **Climate Change Adaptation and DRR are serious issues for Orissa**

Orissa has a vast coast line that is prone to climate-induced disasters like cyclones and coastal erosion due to climate change . As its water resources are dependent on monsoons, which is influenced by climate change its development is affected by extreme variability in rainfall resulting in intensive droughts and floods . Agriculture is vulnerable to climate changes -floods and droughts are common having direct consequences on agriculture .Though Orissa records 38 percent of the state's geographical area as under forests much of them are degraded and hence not of much use for combating climate change effects. Overall climate change has the potential to derail the economy and intensify poverty in Orissa. Continuing climate variation is predicted to alter the sectoral growth, including the ability of the poor to engage in farm and nonfarm sector activities. The direct impacts of extreme climate-induced events could include loss of life, livelihoods, assets and infrastructure. All of these could affect the state's economic growth and nullify the effectiveness of macro economic policies and pro poor initiatives.(GOO-CCAP-2010)

Following NAPCC, Orissa has prepared a climate change action plan (CCAP) and it is the first state in India to produce such a plan. The CCAP is the blueprint to reduce climate change risk in Orissa during 2010-15. It was prepared in six months time using a Strategic Environmental Assessment (SEA) framework . It provides guidelines to assess a broad range of issues that

contribute to the integration or mainstreaming of climate change in development planning. More specifically, it aims to identify key climate vulnerabilities and risks likely to affect development; Assess institutional and planning capacities to manage these, identifying key institutional and planning gaps at the state level and their linkages with national and local level planning Facilitate better coordination, integration, and enhancement of various existing programmes. The SEA was followed by discussion on potential action by 11 working groups drawn mostly from Departments and non-governmental organisations (NGOs) .The CCAP was published online in June 2010 to generate comments from a wider group of stakeholders. The Orissa experience underlines the need for political engagement and leadership; high-level administrative coordination and inter-departmental consultations; broad stakeholder consultation; and integration with regular planning and budgetary processes.(CDKN- IDS Policy Brief November2010)

**Key features:** The CCAP is the blueprint to reduce climate change risk for the five years from 2010. Actions have been identified across 11 sectors and 287 priorities have been validated. Potential financial sources have been identified for each from the state, national government and donors. The plan shows that 136 actions relate to adaptation, 123 to mitigation and 28 are common to both. Most (190) actions have state-wide implications whilst 66 actions relate to specific areas. The major sectors energy, forestry, agriculture and coastal disasters - constitute about 80 percent of the total budget. A Climate Change Agency is to be established in the first year of implementation to provide information, advice, supervision and coordination.However this has not yet been established . As of now a special cell has been created within the state forest & environment department to oversee the implementation of the plan.

The CAP document has eight chapters : Chapter first on ‘Background’ provides the context, methodology and outlines the structure of the document. The second chapter gives an overview of the National Action Plan on Climate Change, eight missions and other initiatives. The third chapter describes the vulnerability assessment of Orissa and highlights climate sensitivity from both biophysical and socio economic perspectives. The fourth chapter indicates the green house gas emission with per capita emission in the state. The next chapter highlights a detailed overview of the Climate Change issues relevant to Orissa. This covers all the eleven sectors and also includes a section that identifies the issues that are cross cutting. The subsequent chapter analyses and synthesizes the sector information to arrive at the key findings. The last chapter summarises the conclusions and recommendations . (GOO-CCAP-2010)

Review of CCAP : In the following we provide assessment of key aspects of CCAP with reference to three sectors: Water, agriculture and Disaster Management

#### Agriculture:

The agriculture sector contributes about 26 percent of the GSDP. With almost 60 percent of land under rain fed agriculture and with water-dependent rice as its main crop, the agriculture sector is particularly vulnerable to the vagaries of climate change. Further, paddy fields in the coastal areas are prone to frequent erosion, salinization and inundation. Climate projections indicate that drier areas will become drier and flood prone areas will be subject to more flooding. Other problems such as pest and disease outbreaks are also

likely to increase due to climate variability.(GOO-CCAP,2010) .

**The following priority areas of interventions are identified in the CCAP**

Rapid screening and strategy assessment of State Agriculture Policy

Establishing an effective institutional delivery mechanism to promote best practices on climate change

Undertaking capacity building

Continuing the livelihood-focused, people-centric integrated watershed development in rain fed areas

Increasing the area under perennial fruit plantation

Developing water use-efficient micro irrigation methods and individual /community farm ponds

Improving monitoring and surveillance techniques

Developing sustainable soil, water and crop management practices

Breeding studies on major crops for tolerance /resistance

Conducting climate-linked research studies

Discussion/review points for strengthening the CCAP related to agriculture:

Overall the section on agriculture sector has identified basic issues related to climate change and adaptive measures. However the following points need focus and further attention:

There is a need to change agricultural practices suitably to changing monsoon pattern in different regions in the state. June rainfall should be utilised maximum by early planting in flood prone areas to avoid crop failure due to floods in September.

Irrigation methods should be changed to suit crop water requirements

Need to develop local specific climate forecast model down to basin /block level. OUAT is already involved in this on a pilot basis .

Need to develop extension service about climate information to farmers -Location specific Agro-met services is essential as a part of the effort.

Need to adopt drought and flood resistant varieties like IR 43,Mahanadu,Indravathi,Pooja,PanidhanDurga etc

Raising of nurseries for re-transplanting after flood damage

Encouraging of organic farming as industry so as to give a boost to organic practices in agriculture that would help reduce the chemical vulnerability of agricultural lands.

System of Rice Intensification (SRI) which is emerging as sustainable paddy cultivation practice and is believed to be contributing positively to arrest climate change by emitting less methane gas and less water should be promoted among the farmers. Similar practices like SSI (Sustainable Sugarcane Initiative) are to be promoted.

### **Traditional Farming Systems as an alternative practice:**

Before green revolution period in India food was grown using natural fertilizers primarily farm yard manure (FYM) which today is now known as organic form of agriculture. This method came to be known as traditional agriculture. Risks reduction and stability are the basic features of the traditional farming system. This is important in the context of climate change which has added vulnerability, unsustainability in agriculture and food production.

Policy makers are now referring to the traditional approaches in agriculture in order to sustain life and livelihood. "Gradually, it has been also realized by various groups (of farmers and civil society organizations) that there is a need to move towards establishing area specific appropriate farming system approaches which would sustain and improve agriculture and farm based livelihoods, strengthening the farming communities to deal with risks and vulnerabilities. Sustainable Agriculture approaches reforming agro-ecosystem, natural ecosystem and social support system are now acknowledged by both grower and consumer community. Some of these strategic initiatives have remained restricted to small pockets while some could be scaled to a larger area. Conservation of indigenous resources through organic practice provides scope to re-form the control over food production system." (Pratab Panda, 2011). The study has shown the traditional production systems, crop diversification can both increase the efficiency of systems and build their resilience to climate change in Odisha.

### Water Resources Management:

In Orissa, over 80 percent of annual rainfall occurs during the monsoon period with average rainfall of 1400 mm, with an average of 70 rainy days. The state experiences either heavy flood or drought every alternate year due to uneven distribution of rainfall. In recent years, wide fluctuation in climate has been observed and irregular rainfall causing both floods and droughts is a major concern.

The impact of both drought and floods on farmers has been invariably severe. Saline water ingress has been observed in some coastal districts. With large demand for water coming from the industry and agriculture sectors, the state will be confronted with water scarcity in varying degrees in different areas. Impact of climate change on water resources is likely to be due to erratic monsoons creating variability in river flows. Moreover further research and studies are required for a realistic assessment of climate change impacts. This will have to be done at the state and basin levels. Conservation of water resources, adoption of better management practices to increase water use efficiency are important programmes to be



implemented. IWRM and River basin approach should be integral part of CCA in water sector.(GOS-CCAP-2010)

**Key Priorities identified in water sector :**

- Expansion of hydrometry network
- Development of flood forecasting models  
Downscaling of Global circulation Model
- Increasing the water use efficiency in irrigation  
Improving drainage systems
- River health monitoring and eco-systems environmental flow demand studies
- Raising awareness with Pani Panchayat through Farmers' Training programme
- Integrated Water Resources Management

Overall the sectoral analysis is comprehensive and covers all vital points related to Water resources management with reference to climate change.

Points from discussion: Discussion with water resources department official and experts revealed the following :

It is necessary to develop objective Basin level water resources availability and its use and the likely impact of climate change on water availability and utilization for different purposes. For this purpose there is a need to develop local level weather models and weather monitoring systems .More number of automated weather stations (AWS) are required to be installed for this. The present number of such stations are inadequate to cover the local level variations. Also a number of studies are required to understand the likely impact of CC on water resources availability and use. Integrated Water Resources Management (IWRM) is to be given utmost importance to address various issues. Inter-sectoral coordination to be improved which is related to water management governance. There is an urgent need to undertake a number of pilot projects related to CCA and water management . The existing funding under different programmes can be utilised for this purpose. Improving water use efficiency is an important area of work through pilot projects. Water Resources Department has utilized the existing fund from routine budgets to take up some of the CCA activities .The department is involved in developing two basin models on Mahanadhi and Baitrani for flood control under the existing hydrology project funded by world bank. The required fund for CCA in water sector is estimated to be Rs 725 crores out of 17,000 crores requirement for all the sectors

Coastal Disasters: Orissa has a long coastline of 480 kms which is vulnerable to disasters such as cyclones due to Climate Change. NAPCC does not have a separate mission on coastal protection and disasters, however the state action plan considers this as important its coast line is frequently subject to extreme weather events.

Key areas of intervention identified :

- Downscaled climate change projections modeling  
Studying coastal erosion
- Conducting micro-level vulnerability assessment

- Needs assessment and constructing multipurpose cyclone shelters Dredging and river mouth to improve flood management
- Integrating climate change risk in the state's disaster management policy

One of the main criticisms related to disaster management under CCA is relatively more attention has been paid to Coastal disaster management than drought . Drought as a disaster has not been much recognized in the Draft action plan and less attention has been given to this issue in the context of climate change. It has been merged with agriculture and water sectors. It is reported that there is a clear neglect of western Orissa and droughts in the document.”(CCAP-Civil Society Consultation,2010 ).

- Coordination issues in DRM between OSDMA and various line departments. OSDMA should be given statutory backup to undertake effectively this.
- Integrating climate change risk in the state's disaster management policy is required Policy for Rehabilitation of disaster affected community needs to be incorporated.
- Action plan should incorporate actions for enhancing the capacities of community who are going to be affected and respond to the disasters immediately to reduce the vulnerability at different level.
- Constructing flood shelters in unconventionally vulnerable locations. These shelters must have multiple advantages, like it should be at a height that would render it safe from the flood water , have adequate deep borewells to ensure safe drinking water supply sanitation facility with separate provisions for women.
- Strengthening of coastal protection by declaring mangroves as critical natural protection systems placed under the control of a single authority like OSDMA for protection, conservation, and management through community involvement. (CCAP-Civil Society Consultation,2010 ).

### **Overall assessment of CCAP in the state**

The CCAP has been prepared in 2010 and the state government had sent it to MoEF in June 2011.However this has not yet been approved by MOEF apparently due to “delay in preparation of reports by concerned departments, delineating action points and strategies for implementation coupled with lack of inter-departmental coordination.”<sup>43</sup> This needs to be given more importance as the delay in approval will affect the fund allocation for CCA activities much. Until that the existing schemes can be utilised to undertake CCA specific activities under different programmes. It is understood that Department of Water Resources-climate cell has undertaken a

<sup>43</sup> [http://www.business-standard.com/article/economy-policy/moef-team-to-finalise-funding-for-odisha-climate-change-action-plan-113010900234\\_1.html](http://www.business-standard.com/article/economy-policy/moef-team-to-finalise-funding-for-odisha-climate-change-action-plan-113010900234_1.html)

number of works utilizing existing funds for CCA activities.<sup>44</sup> The department's annual requirement(2013-14) for CCA activities is estimated to be Rs 762 crores, and it has identified funds of Rs.613 crores (81percent) from the existing schemes. There are also funding opportunities under MGNREGA as important source to assist climate change adaptation in the state.

Relation between the climate change and poverty should be analysed to better mainstream the CCA in all poverty related programmes .Reorientation of policies and programmes is required to better address climate change issues

Climate Change Impact Mitigation Programme and Strategy is essentially a joint responsibility of the public and the government. Hence Citizen's monitoring and social audit can be made mandatory for kinds of CCA activities .

There is need for creation of a dedicated specialized independent agency to oversee the implementation of CCAP with adequate finance and powers.Climate Change programme /agency should be managed by a higher authority in the rank of Chief Secretary

Need for exclusive funding funded by external agencies as the amount required is huge .Already water resources Department has prepared a project for funding for AusAid for water related climate adaptation action works

### **3.8 Odisha State Water policy (2007)**

Orissa's State Water Policy(SWP) was first formulated in 1994 based on 1987 National Water Policy. The current policy was notified in the Orissa Gazette in March 2007. In the following the main features of SWP are presented<sup>45</sup> .

**State Water Plan.** The State has developed a State Water Plan with a horizon of 2051. The Plan adopts National Water Policy priorities for water allocations. Accordingly perspective plans that are holistic, participatory, and environmentally sustainable will be prepared for each of the priority allocations.

**Institutional Mechanism.** The State Water Planning process requires the preparation of River Basin Plans. Responsibility for this work is assigned to the Orissa Water Planning Organization (OWPO).The same is also presently looking after Climate Change adaptation activities. The Plans will be vetted by River Basin Organizations (RBOs), to be established for planning and management, and then submitted for approval to the Water Resources Board. Institutional capacity for development of new water resources will be upgraded, and data collection, analysis, and presentation systems will be modernized.

**Drinking Water.** Adequate and safe drinking water for human beings and livestock is to be provided through appropriate components in irrigation and multipurpose projects. Water quality, will be assured through legislation, education, and monitoring.

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<sup>44</sup>Key activities for water sector with budget provision-Letter No 5126,dt11/03/13-Department of Forests and Environment.

<sup>45</sup>Orissa Water Management project-ADB-PPTA-report,2007

**Development of Irrigation and Drainage.** This will take into account all available options including surface and groundwater as well as rainwater harvesting. Irrigation expansion will include Major, Medium, Minor and Lift irrigation projects. Traditional systems (tanks, check dams, etc) will be renovated with the involvement of local stakeholders. Infrastructure expansion will be distributed equitably throughout the State. Water conservation will receive equal priority to horizontal expansion of infrastructure. Irrigation systems will include participatory command area development components. A master plan comprising both physical and biological interventions for drainage improvement will be prepared to reclaim about 195,000 ha of waterlogged land.

**Hydropower Generation.** A plan for power development will be prepared, including to the extent practicable, mini and micro hydropower, pumped storage, and the utilization of released water for irrigation.

**Industrial Water Supply.** Industries will be supplied with water in accordance with the State Water Plan and an incentive structure will be put in place to promote recycling of water.

**Ecology and Water Quality.** Environmental impacts of projects will be considered in the approval process including allowances for in-stream flow needs. Wetlands will be sustained. Industrial and municipal effluents will be treated and the “polluter pays” principle adopted.

**Resettlement and Rehabilitation.** This component will form an integral part of every water resource development project and the associated costs will receive priority. Resettlement of displaced persons will precede project completion.

**Ground water Development.** Groundwater will be utilized in a sustainable manner with legislation to be put in place to prevent over-exploitation. To preserve the resource, efforts will be directed towards artificial recharge.

**Flood Control and Management.** Both structural and non-structural measures will be used. In highly flood-prone areas, consideration will be given to operating reservoirs to control flooding, even at the expense of hydro-power or irrigation. Control of urban flooding will also be given attention.

**Management of Saline Ingression.** Saline ingression from tides will be addressed through appropriate structural interventions. Studies, including sharing of experience with other states, will be conducted to determine how to balance sea and river water to maintain estuarial ecosystems.

**Participatory Irrigation Management.** The Orissa Pani Panchayat (PP) Act, 2002 and Rules, 2003 provide the legal framework for the involvement of stakeholders in irrigation activities. Accordingly, a time-bound program will be established to transfer the responsibility for operation and maintenance to farmer organizations. The State will provide support, including capacity building and financial assistance as a proportion of water rates collected. WALMI will become a centre of excellence for PIM.

**Financial Sustainability.** A proportion of capital costs and all operation and maintenance costs will be recovered from beneficiaries. There will be different water rates for different categories of user. In the case of private sector participation, riparian and traditional rights will be protected.

**Catchment Treatment.** Action plans will be prepared to reduce reservoir sedimentation through forestation and soil conservation.

**Dam Safety.** Legislation for inspection, surveillance, maintenance and rehabilitation will be enacted. The Dam Safety Organization under Engineer in Chief, Water Resources will be

strengthened as required.

**Role of NGOs.** Participation of NGOs in information, education and communication campaigns for water management, conservation and PIM will be welcomed. They may also assist in resettlement and rehabilitation of displaced persons. Civil society organizations will participate in monitoring and implementing the State water policy.

The State Water Policy in general is comprehensive in many respects related to environmental protection and conservation, participatory irrigation management ,IWRM and River Basin Management etc.. The State Policy acknowledges the need to target resources to the poor and disadvantaged,. It promotes integrated planning-basin level based on comprehensive assessments of the resource, and sets out domestic water supply as the top priority. The State policy also addresses the importance flood control by adopting both structural and non-structural measures. However the state water policy does not specifically discuss about climate change though many priority areas identified are related to CCA.As mentioned earlier the OWPO is incharge of climate change activities under the department which is already involved in CCA activities based CCAP.

### 3.9 Watershed development programmes in Odisha

Watershed development projects under various schemes are undertaken in Orissa in a mission mode since 2001 under Integrated Wasteland Development Projects (IWDP), Drought Prone Area Programme (DPAP), National Watershed Development Project in Rain-fed Areas (NWDPA), River Valley Project (RVP), and Western Orissa Rural Livelihoods Project (WORLP) funded by DFID. The Orissa Watershed Development Mission is under the administrative control of Department of Agriculture. It is registered as a society and responsible to plan, monitor, supervise and implement all watershed programmes in a coordinated manner in the State. So far 2594 micro-watersheds are under implementation covering an area of 12.71 lakh hectares under various programmes. Since 2001, the Mission is giving emphasis on participatory rural appraisal techniques to promote community participation in planning and implementation of watershed programmes. As a part of the programme, 17024 Self Help Groups have been promoted in various watershed areas enrolling about 209742 members. All these Self Help Groups have mobilized a saving of Rs.7.65 crores. Similarly for maintenance of community assets created under watershed programmes, 29606 User Groups have been formed who have contributed Rs. 7.72 crores to the Watershed Development Fund of the respective villages.<sup>46</sup>

WORLP: Western Orissa Rural Livelihoods Project (WORLP) works in four districts of Orissa namely, Balangir, Nuapada, Kalahandi and Bargarh. WORLP is a joint venture of the Government of Orissa and DFID and managed by the Orissa Watershed Development Mission.

Evaluation: An evaluation of WORLP has brought out the impact of watershed development in the state (GOI-Planning Commission,2010). Though the evaluation is related to WORLP, the findings from this can be applied to other watersheds programmes.

Watersheds helped to get assured irrigation and increase in crop output through area and yield effects.

Land development measures have enabled cultivation of fallow lands which have contributed for increase in cropped area.

Increase in Irrigation has also contributed for increase in cropped area especially during Rabi season.

The value of land both irrigated and dry lands has gone up in villages within watershed.

Assured supplemental irrigation through reducing crop-risk has induced intensive use of farm inputs especially the HYV seeds and chemical fertilizers

Increase in wages contributes for about 44 percent of the household annual income and became a major livelihood option of the people.

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<sup>46</sup> [www.Orissawatershed.org](http://www.Orissawatershed.org)

- Overall the project has had a substantial impact on poverty with about 30 percent reduction in the number of poor households

#### Climate Change Adaptation in Watershed-Case study of WORLP:

A study was undertaken to document by DFID (2012) about the coping mechanisms and adaptation practices of local communities due to climate change in WORLP watershed areas in Odisha. The study has brought out the following points:

Climate variation: There is some evidence of changing trends in the micro-climate in the project area over recent decades, with up to 10 percent more rain in monsoon periods with increased likelihood of prolonged dry spell . The interventions have helped in providing recovery from the effect of changes in weather condition as there are indications for this.

Impact: NRM interventions appear to have increased the adaptive capacity of the community during climate stress, especially in areas of marginal land holdings. NRM interventions have had marked effects on the groundwater table, cropping intensity and productivity as already noted. The study notes that “although it may not be possible to draw strong conclusions based on such limited data, the results should be considered as an indication of the resilience of natural systems and their capacity for recovery, which it may be concluded are at least in part an outcome of project NRM interventions. People in the project area, in particular women, now appear to be better prepared for, and adapted to, extreme weather events and variability. Vulnerability for the poorest has been reduced, and their strategies for coping rendered more confident”(ibid).

### **3.10 MGNREGA in Odisha**

As already noted MGNREGA is a national employment guarantee programme implemented all over India. In Odisha, this scheme was launched in 19 Districts in 2006 extended to another 5 Districts in April 2007, and to another 6 Districts in 2008. Now it is being implemented in all 30 districts from April, 2008. Unlike many other states, a separate entity- viz. society is formed to implement the employment scheme in the state. The implementation of the programme is governed by national NREGA Guidelines 2013.

As noted in the national plan review on MGNREGA, the programme is mostly used for NRM activities like water conservation and water harvesting, drought proofing, including afforestation and tree plantation, micro and minor irrigation, land development etc. Works of renovation of traditional water bodies, de-silting of tanks, flood-control and protection works including drainage in water logged area are quite relevant for Odisha which have both drought and floods as major issues of water and disaster management.

### Evaluation:

Though the scheme has good potential to address the NRM and there by climate change the impact seems to have been affected by' malfunctioning 'of the scheme as pointed out by many evaluations. It is seen that Orissa's expenditure on the scheme was only 10 percent of what it could have been possible if all poor families with job cards been provided 100 days of employment. In 2009-10 the expenditure is only 12 percent and 9.8 percent during financial year (2010-11). This reflects the state's inability to fully tap the scheme's potential and use for CCA.<sup>47</sup> These points need to be taken in to consideration for improving the efficiency of the scheme and thereby better mainstreaming CCA in it. Some of the basic points relevant for our purpose are as follows<sup>48</sup> .

Discrepancy in number of days of employment recorded- only 60 percent of the days of employment recorded could be confirmed by the concerned labourers.

Improper maintenance of records related to works completed and its quality.

Non-participation of people in NREGA planning- It was found in general that the rule that Annual Plans under NREGA should be formulated by Gram Sabha was not followed .

Recommendations: The issue of delayed payments should be addressed by involving new technology for payments like smart cards.This experiment may be up scaled . The district administration should take special care to start work before the migration season, and continue during the lean agricultural season. This would prevent migration of people from the state in search of work. Improving the quality of work by inspection and social audit by Gram Sabha committees for making the interventions more effective to address CCA/DRR issues.

### **3.11 RKVY in Odisha**

As described in the national programme review, RKVY is centrally assisted scheme implemented in all the states including Odisha. There are flexibilities in undertaking work suitable to local necessity and conditions .Hence it can be used effectively for CCA activities when planned properly. For effective coordination and smooth monitoring of execution of different projects under RKVY, the Agriculture Department has formed an RKVY Cell in the state which has been functioning from April 2010. All the 30 districts have formulated a District Agriculture Plan (DAP) by including the resources available from other existing schemes and keeping in view the natural resources and technological possibilities in each district. A State Agricultural Plan (SAP) has also been developed by integrating the District Plans. A total of 235 projects have been implemented during 11th Plan period (2007-08 to 2011-12) spending Rs 895.68 crores during 11th Plan period. It is seen that about 20 percent of total allocation is accounted for by NRM and Micro Irrigation schemes which are directly related to CCA .Of the remaining, about 31percent is allocated to crop development (including SRI) ,extension and agriculture research.<sup>49</sup> However the evaluation of the state agriculture plan by NIRD<sup>50</sup> has noted

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<sup>47</sup> <http://infochangeindia.org/poverty/features/mgnrega-performs-poorly-in-poverty-stricken-orissa.html>

<sup>48</sup> <http://www.chittabehera.com/NREG/Summarypercent20ofpercent20NREGApercent20Studies-percent20Eng.pdf>

<sup>49</sup> <http://www.agriorissa.org/pdf/RKVYHighlights.pdf>



that the plan has not followed prescribed procedures like SWoT analysis and also convergence with other line departments and overall it requires significant improvements in its plan and priority attention during 12<sup>th</sup> plan.

### **3.12 Odisha Disaster Management Plan (Floods )**

Orissa is vulnerable to multiple disasters like cyclone , floods<sup>51</sup> , earthquake, tsunami, etc. Orissa State Disaster Mitigation Authority (OSDMA) was set up by the Government of Orissa as an autonomous organization in 1999. The Authority has the mandate not only to take up the mitigation activities but also the relief, restoration, reconstruction and other measures. These activities cover various aspects of disaster management including preparedness activities . The Government of Orissa is implementing the Disaster Risk Management (DRM) programme in 16 disaster-prone districts in order to reduce the vulnerabilities with the support of the Government of India and the United Nations Development Programme (UNDP). Prior to this, UNDP sponsored Community Based Disaster Preparedness (CBDP) programme was implemented in ten blocks of seven coastal districts on pilot basis. The overall goal of the programme is “Sustainable Reduction in Disaster risk in some of the most hazard-prone districts”. The main disaster in Orissa context due to climate change is floods .We have discussed in detail about this already in the section on State Action Plan on Climate Change . (Please refer to section 3.9)

### **3.13 Command Area Development Programme and Water Logging in Odisha**

Command Area Development and Water Management (CADWM) is a Centrally Sponsored Plan Scheme implemented in the State since 1976 -77. The objective of the programme is to reduce the gap between irrigation potential created and utilized through on-farm development (OFD) works like construction of field channels, field drains, crop demonstration, farmers training on scientific water management etc so that the agricultural productivity can be increased. Construction of drainage channels under this programme helps in draining out excess water from agriculture field to main drains. This prevents over irrigation and increase in agricultural productivity. The programme is implemented in Odisha under a separate agency viz. Command area development authority(CADA) formed to focus on farm water management especially flood related water logging issues. There are four CADAs in the state which have covered 21 major and medium irrigation projects with command area of 9.92 lakh hectares .Of this the area covered by various CADA schemes is 5.6 lakh ha (56percent)<sup>52</sup> . A significant extent of these works (2.16 lakh ha) are carried out in Mahanadhi delta which is having severe flooding and drainage problems .

In general CADA programme has made good impact on the productivity of agriculture . The impact of the Field Drain scheme is also reported by the farmers as good. ‘It has been observed that due to construction of Field Drains, the water logging problem has been substantially removed and the average yield of the affected area has been increased<sup>53</sup> .Apart from Field drains

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<sup>50</sup> [http://rkvy.nic.in/Evaluation\\_of\\_SAPs/Evaluation\\_SAP\\_OR.PDF](http://rkvy.nic.in/Evaluation_of_SAPs/Evaluation_SAP_OR.PDF)

<sup>51</sup> We have already discussed about floods in the Section about Coastal Disasters under CCAP

<sup>52</sup> Department of Water Resources –Govertment of Odisha-Annual report-2012-13

<sup>53</sup> On-Farm Water Management Options for Increasing Irrigation Efficiency in Command

,there is another scheme viz. 'Reclamation of Water Logged and Salinity Area' implemented under CADA programme. Under this, both surface and sub-surface drains are excavated in the area to provide a permanent solution to the water logging and salinity problem. An amount of Rs 8600 crores has been allocated during the annual plan 2012-13 out of which Rs.752 crores (9 percent) has been allocated to Field Drains and Reclamation of Water logged area . It is seen that 'construction of field channels' is the major work undertaken under CADAWM programme which accounts for about 67 percent of total outlay.

Indian Council of Agricultural Research (ICAR) have developed multi-cropping techniques in water-logged areas of coastal Orissa which can be demonstrated under CADA programme. The technique named 'pond-based farming system' has been devised to stabilise and enhance the productivity of coastal water-logged areas where water-logging is around 1.5 m to 2.0 m deep.It is also reported that the scientists have developed four 'Deep water rice varieties ('Hangseswari', 'Ambika', 'Saraswati', 'Sabitri') which can be popularized under the programme.<sup>54</sup>

CADA works are useful in the context of CCA as it helps to address the increased flooding and water logging problems due to climate change .The programme also helps to increase water use efficiency through other schemes like construction of field channels ,crop demonstration etc. thus contributing for CCA activities.

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<sup>54</sup> <http://www.hindu.com/2011/04/26/stories/2011042660680500.htm>

## **CHAPTER 4. PROJECT INTERVENTIONS BY UNDP AND CIVIL SOCIETIES**

### **4.1 Pilot projects in MP and Odisha by UNDP**

In order to address CCA and DRR issues, two pilot projects are being implemented by UNDP under the AusAid supported project. The objective of these projects is to demonstrate models on how to adapt to climate change at the community level by responding to climate induced extreme events of drought and floods. When successful these can be up scaled in other areas. The project also will help in providing lessons to mainstreaming of CCA issues in existing government programmes related to watershed, NREGA, agriculture, disaster management etc.

For this purpose one site in MP (West Nimar district) and one in Odisha (Puri district) have been chosen to pilot models on issues related to drought and floods respectively. More specifically the following are the objectives of the pilot projects;

Developing models of community based water resources management by adopting participatory community vulnerability assessment.

Integrating water management and climate change risk concerns into disaster management planning at district and gram panchayat levels

Informing state-level policy and planning process about climate change and disaster risk reduction based on adaptive water management practices like rainwater harvesting, sustainable drainage system, plantations, etc

The pilot projects are implemented by selected NGOs in the states: Samaj Pragati Sahayog (SPS), in Madhya Pradesh and SWAD-RCDC in Odisha

Pilot Project in M.P.<sup>55</sup> The project area of Ranjana watershed, Narmada valley in Madhya Pradesh covers over 12 villages. The majority of the population belongs to marginalized communities and depends on agriculture. The traditional crops of the area are cotton, maize, jowar and pigeon pea. The region is prone to droughts and highly vulnerable to climate change risks. The project in MP is a collaborative one among SPS, UNDP and the GoMP. The state government has funded part of the plan through its Integrated Micro-Plan (IMP) project. The project has started in December 2011 and the following works have been completed under the project:

- Construction of a stop dam in the River Dabri in Ranjana Watershed in Dewas district. The dam is expected to provide irrigation to 10.5 ha of land.
- Two dugout farm ponds have been completed to serve farmers during the *rabi* season. The dam could provide protective irrigation in *kharif* in the event of a rainfall failure due to climate variations. These farm ponds together could protect 10-12 hectares of land.

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<sup>55</sup> water and food security in drought-prone central India, West Nimar district, Madhya Pradesh, Progress Report, SPS and Final Report of the First Year Of SPS-UNDP Partnership On Climate Change

-Farm bunding on several private lands to help to arrest soil erosion for enhancement of the soil fertility.

It is expected that these watershed work will help in drought mitigation -an important aspect of CCA .

In addition, the project has implemented a dryland agriculture package for demonstrating drought-proofing agriculture practices . Under this component ‘Participatory Variety Trials’ were undertaken to experiment with improved seeds and seed varieties over a range of crops such as sorghum, maize, cotton, soybean, groundnut and chickpea. These practices were ‘tuned to the resource endowments of the watershed, which is accessible to the poor (*low-cost*) and sustainable (*low-risk*) ‘and resilient to climate change .Over 70 improved varieties based on indigenous seeds of 9 crops — sorghum, maize, pigeonpea, cotton, soybean, gram, pearl millet, groundnut and wheat — which give good yields even with low external inputs have been demonstrated in the area. These varietal trials help to identify locally suitable crop varieties which can be adopted by the farmers to diversify their cropping systems and to reduce climate change vulnerability. (SPS: 2013)

#### Pilot project in Odisha :

As already noted the project aims to demonstrate a model on CCA /DRR in flood/water logged areas based on community approach in Puri district, Odisha<sup>56</sup> The following are three major objectives of the project

- a) Comprehensive assessment of vulnerabilities, coping mechanisms, prevalent limiting factors and identification of possible mitigation and adaptation measures - especially of the most vulnerable groups of the society - in context of increasing natural disasters, particularly to flood
- b. Pilot replicable community-led disaster mitigation and adaptation programmes, largely through IWRM approach.
- c. Pilot measures to institutionalize integration of interventions through better coordination and dialogue on water issues between various stakeholders at different levels to enable community resilience mechanism and influence governance and policy formation.

A Participatory Vulnerability Assessment (PVA) was undertaken initially to map the vulnerabilities of the community due to impact of climate change in their livelihoods. Apart from empirical analysis direct interaction with villagers have been undertaken to highlight the adverse impact of climate change upon the livelihoods. Based on this exercise the nature of interventions with details of location and beneficiaries were identified for adaptation and mitigation of flood risks. The interventions are based upon concept of ‘ecological farming ‘as a means to achieve food security in order to withstand the impact of climate crisis.(ibid).The assessment also focused on gender dimensions of vulnerability due to climate change. The assessment noted that ‘communities are progressing towards greater gender equality in all spheres of life. Gender norms are clearly changing and women besides care taking role are increasingly considered as economic supporter of families, however women still are considerably affected by gender discrimination in many ways”(Ibid)

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<sup>56</sup> Project completion report, PRAYAS, RCDC, Bhubaneswar, SWAD, 2013

#### CCA /DRR works undertaken:

Under the project the following water management works with focus on CCA/DRR are undertaken

- Renovation of an existing pond in Dokhandpur village of Sukal panchayat to harvest more rain water for better serving livelihoods of the villagers.
- Construction flood proof drinking water structure (at a higher level ) so that it can be used during floods hygienically
- Integrated livelihoods model (through integrated farming systems) to provide livelihoods during Kharif and also summer when there is no cropping. Demonstration of Flood Resilient Crop varieties (Barsha) .
- Renovation of drainage system in water logged areas which has increased the cultivation area from about 700 acres to 2100 acres

It is reported all these interventions were felt by village community as useful to address the flood related risks and vulnerabilities and ‘have yielded results raising hopes of the communities.’

#### **4.2 Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) –Lessons from some Civil Society Initiatives**

There are many civil society organisations working under many of the government programmes discussed so far like Watersheds NREGA,RKVY etc. These organisations have contributed significantly and created a number of good models in implementation of the programmes. Though these are useful in their own domain , most of these lack focused activities related to CCA and DRR. There are only a few experiments/projects undertaken by civil societies specifically related to CCA in general and particularly in water sector which are worth discussing :

##### **4.2.1 Experiment by Watershed Organisation Trust (WOTR),**

WOTR is an NGO established in 1993 in Pune to undertake integrated developmental activities for poverty reduction in rain-fed areas in India mainly through watersheds . It has taken up the ‘Climate Change Adaptation project’ in Maharashtra, Madhya Pradesh and Andhra Pradesh covering an area of 40,734 ha in 65 villages .The objective of the project is” to improve the adaptive capacities of rural communities to respond to the effects of emerging climate changes by regenerating the eco-systems they live in, diversifying livelihood sources in order to reduce risks, and adopting new agricultural and renewable energy technologies.”(WOTR.org). Besides watershed development, there are other aspects covered by the project like agro-meteorology services ,water budgeting, irrigation management , crop planning ,DRR etc.

Agro-meteorology service is implemented by providing local specific meteorological information to farmers so that they can plan their agricultural activities accordingly. Automated Weather Stations are installed in the villages to provide daily meteorological information which is collected and displayed in villages by local youth from the communities. The advantage of the Agro-meteorology service is local specific weather related information and recommendations for suitable agriculture practices to the farmers in their villages and hence more useful for crop

planning as generally these information are collected at taluk level by the government .As agriculture extension is weak in many states even available information is not disseminated to farmers by the states.

Water budgeting and Crop planning : WOTR's concept of Water Budgeting is “geared towards ensuring equitable, optimum and most efficient use the judicious uses of water and decide on the crops water available at their disposal for the coming months.” This is based on local planning by community with the knowledge about water availability, community's requirements.

DRR: The project has adopted Community Based Disaster Management(CBDM) . DRR and CBDM activities involve awareness campaigns and village sensitization to motivate the community in preparation of disaster management plans, review and analyze past disasters, create a seasonality calendar of disasters, mapping of local resources and assets, risks and vulnerability prone areas and working out safe and alternate route maps, and training of local bodies in basic and immediate disaster response.

The project is based on cluster approach (sub-basin) which is more relevant for water resources management than administrative boundary approach .The project is being implemented since 2011 and however the details about the impact of the project are not much known.

#### **4.3 Strategic Pilot on Adaptation to Climate Change (SPACC) in Andhrapradesh**

The objective of the project is to increase the knowledge and capacity of communities to adapt to climate variability and change in seven drought-prone districts of Andhra Pradesh. The project is expected to build the skills of communities to integrate climate change adaptation into sustainable land and water management (SLWM) practices. The project is a continuation of earlier project on Andhrapradesh Farmer managed ground water systems(APFAMGS )funded by FAO which has made good impact on local ground water management practices .(FAO,2009)

There are three important components of the project are : (i) farmers and community based organizations make informed decision on land and water management based on scientific and local knowledge taking into account impacts of climate variability and change; (ii) farmers have acquired skills in managing climate risks through participation in climate change schools; (iii) adequate adaptation technologies and practices piloted and best practices identified; (iv) package of best adaptation tools and practices documented and disseminated to support scaling-up .

The Strategic Pilot on Adaptation to Climate Change (SPACC) Project facilitated the formation of CBOs, called as Climate Change Adaptation Committees (CCACs) which are based on Hydrological unit for better planning of water resources management and CCA. These committees lead implementation of project activities at the community level such as Participatory Climate Monitoring (PCM), Sustainable Land and Water Management (SLWM) Pilots, and Climate Field Schools(CFS).These are key farmers’ institutions that manage the climate monitoring system at the habitation and hydrological unit level and disseminate information and knowledge on climate variability/change. This includes identification of site for establishing climate monitoring system, selection of volunteers, data collection, and update climate change database. They also lead the organization and conduct of Climate Field Schools

(CFS). This includes curriculum design, organizing village meetings, select CFS participants, identify Community Resource Persons (CRPs), form Common Interest Groups (CIGs), conduct of CFS sessions, identify pilots to test adaptation measures, select field sites for pilots, prepare climate change adaptation plans, conduct field surveys, and disseminate project lessons and results.

In a project review meeting in June 2013 consisted of FAO , Government officials from both centre and state, it was noted that several good initiatives are being implemented under the project outside government domain. “The project is contributing to the development discourse through building farmers capacities to grapple with climate change scenario and its impact on rural livelihoods. SPACC already has incredible and important results in a short span of time. The Government is eager to learn from such pilots and scale up the best practices. The project’s efforts to build linkages with Community Managed Sustainable Agriculture (CMSA) of Rural Development Department, is appreciated. The Project demonstrates feasibility of farmer-led monitoring and data analysis which has a good potential and can be replicated in India in other places. The strength lies in its institutional structure of NGO- Network, in comparison to those implemented by a single NGO; and institutional structure from village level to HU level. The project has a strong community empowerment element and the uptake of climate resilient agricultural practices is critical at the HU-level.”<sup>57</sup>

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<sup>57</sup> Reversing Environmental Degradation and Rural Poverty through Adaptation to Climate Change in Drought Stricken Areas in Southern India: A Hydrological Unit Pilot Project Approach, Minutes of the Fifth Project Steering Committee (PSC) Meeting, 12, June 2013

## CHAPTER 5

### **SUMMARY OF FINDINGS, CONCLUSIONS AND RECOMMENDATIONS FOR MAINSTREAMING OF CCA AND DRR IN WATER MANAGEMENT AND AGRICULTURE RELATED PROGRAMMES, PLANS AND POLICIES**

It is now widely recognized that climate change is a reality and will impact society mainly through water resources and related sectors. As climate change increases the frequency and intensity of hydro-meteorological disasters, new challenges are faced by disaster managers. Hence disaster risk managers are required to help adapt conventional strategies to deal with the dynamic climatic context. Mainstreaming of climate change adaptation (CCA) and Disaster Risk Reduction (DRR) into development planning is essential to respond effectively to climate change and related disasters. The expected benefits from the mainstreaming are bound to be significant in terms of, greater efficiency in implementation, reduced risks and vulnerability to society and greater impact of the development. Hence there is an urgent need for planners, policy-makers, particularly in the ministries related to development such as in finance or planning, to better understand how climate change adaptation can be mainstreamed in national and state plans, programmes and policies and through fiscal and investment decisions. There are many flagship programmes implemented in the states most of them are centrally sponsored. Considering significant importance of these programmes for rural development in India these are reviewed to analyse how CCA and DRR concerns be mainstreamed in to these programmes. In the following we present the findings and conclusions along with recommendations from such review of programmes especially focused on Madhyapardesh and Odisha taken up for piloting under UNDP-AusAid project on Water Resources Management for CCA and DRR. For easy reference, the summary of findings, recommendations and action points both at the national level and for the two states are given in a tabular format (See Annexure –I)

#### **5.1 Watershed Development programmes**

Rainfed area is the most vulnerable to climate change in India and about 60 percentage of cultivated area is by rainfed. Watersheds assume considerable importance as it is the main programme for the development of rain-fed agriculture and many schemes have been under implementation under successive five year plans in both Madhyapardesh and Odisha. The Watershed projects have contributed for development of rain fed area in terms of conservation of soil and water resources, bringing new area under cultivation, increasing cropping intensity and productivity in both the states. This has led to increased income and poverty reduction in many areas. Watersheds are quite important as most of these interventions under watersheds are directly or indirectly related to CCA as these take care of impact of droughts in watershed areas associated with climate change. However, the existing watersheds do not have CCA specific interventions to monitor weather condition, provision of agro-met service to farmers and adaption of cropping pattern to suit available water supply conditions etc. More over both officials and farmers lack awareness about CCA. In order to remove these inadequacies, it is necessary to modify the Watershed Guidelines 2008 suitably especially section 19d on IEC and



26 on training .There is also need for a number of pilot watersheds based on the civil society's experiments on these though these are limited.

## **5.2 MGNREGA programme**

The MGNREGA is the largest employment guarantee programme in the country as it provides legally for wage employment for 100 days for rural households in a year. Water conservation, land development and afforestation works under NREGA have helped for ground-water recharge, enhanced soil fertility and increased biomass. Evaluation studies of NREGA in many States including MP and Odisha have shown that the programme has generated multiple environmental benefits, leading to improved water availability, soil fertility and increased crop production.. Overall MGNREGA works have contributed for improving the adaptive capacity of rural people and reducing their vulnerability to climate risks. However it is noted that the quality of work undertaken under MGNREGA has to improve much both in terms of PRI involvement and the technical soundness of design. These should be removed by proper modification of MGNREGA Guidelines (2013) and problems in its implementation. Like watershed programmes, there is a requirement for building of CCA elements in to the programme as these works are also mostly related to NRM and hence directly relevant for CCA. Some of the works related to CCA can be undertaken by modifying the MGNREGA Guideliness. These include work related to IEC, Training and capacity building of both officials and common people on CCA issues. Thus MGNREGA can undertake IEC activities for generating awareness among the people about the benefits of MGNREGA especially related to Climate Change Aspects.

## **5.3 National Rural Drinking Water Supply Programme**

Provision of safe Drinking water continues to be an issue despite longstanding efforts by the government and civil society organizations. Depleting ground water table and deteriorating ground water quality are the major issues in the sustainability of rural water supply in many parts of India .Hence pilot projects were launched with the objective of achieving drinking water security in a holistic manner mainly through convergence with MNREGS .Climate change poses a serious problem to the realization of the rights to water and sanitation .WASH is a cross cutting issue and not received independent and full fledged treatment. Hence there is a need for more analysis about the impact of climate change on water and sanitation in India. However as many issues related to water sector in general are also relevant for rural water supply these recommendations discussed under watersheds/CCAP can be considered for rural water supply also. These are mainly related to ground water recharge, increase of water use efficiency ,etc.

## **5.4 Rashtriya Krishi Vikas Yojana (RKVY)**

The main objective of the scheme is to incentivize the states to increase public investment in agriculture and allied sectors to achieve the target of 4 percent of annual growth rate in agriculture. The programme envisages preparation of district agriculture plans based on local

agro-climatic conditions which naturally helps in taking care of climate effects when planned and implemented properly. Agriculture extension is the weakest link noted in both the states which should be improved .In Odisha the preparation of agriculture plan has not followed prescribed procedures like SWoT analysis and also convergence with other departments. RKVY is a flexible programme which provides opportunities to the states for taking up specific work related to CCA/DRR in agriculture sector. To do so the RKVY Guidelines (2007) can be modified suitably which includes IEC , agriculture extension related to CCA, setting up local weather stations, provision of agro-met services etc .

### **5.5 Disaster Management Plans-Drought and Floods**

India has a long history of disasters like drought and floods which are also problems noted in MP and Odisha. NDMA has issued guidelines on Drought(2010) and Floods(2008) . Sections (4.2) of the Guidelines on Drought deals with climate change aspect of drought but not much discussion is given about the issue. As regards floods, NDMA guidelines though given a detailed discussion about flood control and management, there is no specific discussion about climate change related flood risks and methods of its management . National Water Mission under NAPCC has dealt with the issues of floods and droughts under climate change scenario which should be considered for revision of these guidelines. As regards Odisha waterlogging due to floods is a significant issue which can be addressed by utilising effectively the Command area Development Programmes in the state by construction of field drains in water logged areas and adoption of suitable crop varieties resistant to floods. Under the CADA programme suitable CCA activities can also be dovetailed like pilot demonstration of flood resistant agriculture, conjunctive use of surface and ground water, etc.

### **5.6 National and State Water Policies :**

Water Policy is one of the instruments used for addressing CCA issues in water sector The National Water policy 2012 has given adequate emphasis on climate change adaptation issues and a separate section is devoted to this. The policy has identified a number of water resources management strategies for climate change adaptation like Water demand management, Improving water use efficiency, IWRM etc. However both MP and Odisha have not revised their state water policies by including CCA related aspects. As the National water policy already has comprehensive provisions related to CCA, both the states can revise their policies based on this.

### **5.7 National and State Action Plans on Climate Change :**

India after an elaborate consultations have come out with a plan viz. National Action plan on Climate Change (NAPCC) in 2008 for addressing climate change issues. NAPCC has identified eight sectors/missions for addressing the climate change issues under different spheres of activities contributing for climate change including water and agriculture sectors. It is generally observed that the mission documents are quite elaborate but lack focus, targets and road map including funding for achieving the objectives under each mission. Hence it is suggested that each mission under NAPCC is split in to smaller missions for the purpose of fixing targets and monitoring of the action plan. It is also seen better implementation of existing schemes itself

will take care of most of the CCA issues in water and agriculture. Moreover it is noted that the progress in undertaking the work related to various missions was constrained by lack of adequate funding. It seems there is an issue of lack of coordination between national and state missions in implementation of the action plans related to various sectors.

At the state level , Madhyapradesh SAPCC is noted to be quite comprehensive to address various challenges related to Climate Change as the preparation of the plan was aided by a number of external studies and support from international agencies including UNDP. In fact the state has got separate Cell/Division on Climate Change to take care of CCA activities. However the implementation of the plan is constrained by lack of adequate funding .Moreover it is reported that lack of awareness about the climate change aspects of development programmes is retarding the implementation at the field level. Hence it is suggested to undertake regular campaigns about CCA to enable both communities and local level governmental departments to adequately respond to the threats posed by climate change. The IEC component of the existing programmes can be used effectively for this purpose. Similarly the education programs of the state can be utilized for creation of awareness among students and youth.

In Odisha though the Action Plan was prepared in 2010 it was not yet approved by MoEF. This needs to be given more importance as the delay in getting approval will affect the fund allocation for CCA activities . Until that the existing schemes can be utilised to undertake CCA specific activities under different programmes. There is need for creation of a dedicated specialized independent agency to oversee the implementation of CCAP with adequate finance and powers. Climate Change programme /agency should be managed by a higher authority in the rank of Chief Secretary .Need for exclusive funding by external agencies as the amount required is huge which can not be provided under state plans. The suggestion is applicable to both centre and states.

### **5.8 Convergence of Development Programmes for better mainstreaming of CCA and DRR related to Drought and Floods**

As discussed above ,there are many development programmes undertaken in the states like MGNREGA, Watershed, Ground water recharge, RKVY,Rural Water Suply,Command Area Developemnt etc which are very much related to CCA especially related to drought and floods. However as these programmes are implemented in isolation from each other , the optimal impact is not realized as synergy among different programmes is lacking .Hence convergence of programmes is suggested to bring in synergies among government programmes. Convergence of funds from different sources can help in creation of durable assets. MGNREGA is opted for Convergence as its scope is quite wide for undertaking almost all works required for CCA like watershed development in rain-fed area, command area development in irrigated areas as it has adequate provision for funds and legal backup with rights based approach. One of the objectives of convergence is drought and flood proofing and also mitigation of climate change by addressing issues such as carbon emissions and industrial pollution which are quite relevant for CCA/DRR. There are several convergence guidelines issued already by MORD but it is noted that implementation is lacking in the field level .Hence this aspect needs strengthening through monitoring of MGNREGA to make good impact on CCA/DRR activities through convergence.

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## APPENDIX-1

### FRAMEWORK OF THE STUDY

#### Details of Objectives, Methodology Data sources and work plan/Time Frame of the study

##### **Objective:**

The main objective of the consultancy is to review national and state level plans and programmes which have scope to mainstream Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) in Madhya Pradesh and Odisha especially related to the water resources management . With this objective in mind, the following methodology is adopted for undertaking the assignment:

##### **Methodology and Data sources for the study:**

1. **Desk Review of documents:** The study is mainly based on secondary sources of materials published in web sites, and documents from UNDP Office, New Delhi and from various Government offices collected during the field visit to Delhi, Bhopal and Bhubaneswar. As a part of the work, I have undertaken initially a comprehensive review of the programmes related to Water and Climate Change like National and state action plans on climate change, Watershed Development , MGNREGS, RKVY, National Rural Drinking Water Programme, Command Area Development , Disaster Management Guidelines related to Drought and Floods, 12<sup>th</sup> plan etc. These programs were reviewed at the state levels for Madhyapradesh and Odisha. More over I have done a review of latest literature related to Water and climate change and DRR and its relevance for the study. In addition a review of the National Water Policy 2012 and State water Policies of the two states have been undertaken to understand its importance in addressing climate change issues. The National Action plan on Climate Change under its Water Mission has advocated many strategies for CCA in the water sector. The Desk review had reviewed these strategies to understand its significance for the two pilot states and improvements required in the action plan . Similar exercise was undertaken for National Mission on Sustainable Agriculture. Based on the Desk Review we are able to identify in detail the water management and agriculture issues related to climate change and associated risks like drought and floods ,existing mitigation and adaptation options available under each of the government programmes, its effectiveness and the scope for improvement in the programmes .<sup>58</sup>

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<sup>58</sup> Better water harvesting , Improving water use efficiency, enhanced Ground water recharge and its regulation , water pricing and full cost recovery , community participation in weather monitoring and water management , capacity building of stakeholders ,institutional reforms for effective water regulation by independent authorities, waster water management ,PPP in water management ,Integrated water resources management (IWRM)are some of the issues already identified for better water management and climate change adaptation.

## 2. Field Visits

a) Visit to Delhi: A field visit was undertaken in June 3-7, 2013 to New Delhi for the following purposes.

- a. Discussion with Project Officer /Head -Disaster Management Unit in the UNDP Office in New Delhi and also others related to the study like Environment and climate Change unit, to discuss important issues identified from the Desk review. The field visit programme to the concerned states has been finalized in consultation with Project officer,UNDP.
- b. To collect data from related Government Offices located in Delhi such as Ministry of Water Resources, Ministry of Agriculture, Ministry of Rural Development ,academic institutions like National Institute Disaster Management, TERI,IWRM data base Directorate under ISRO etc<sup>59</sup> .

b) Visit to State Head Quarters of MP and Odisha

A visit was undertaken to two state head quarters viz.Bhopal and Bhubaneswar in June and July 2013.In the state head quarters, discussions were held with a number of officers of the state government departments like Department of Water Resources, Department of Environment and Forest, Watersheds, Agriculture, Command Area Development Agency, Rural Development, research institutions and NGO ,individual experts etc. These discussions had helped in getting good picture regarding the implementation of the State Action Plan on Climate Change by various departments ,the steps taken to mainstream DRR/CCA in their programmes including those related to red institutional changes and capacity building. The discussions also explored other issues identified during the desk review like convergence of different government programmes, funding for CCA/DRR activities etc. A number of documents related to the various programmes were collected during these visits which provided additional information relating to various programmes.

**3.Virtual sources:** Discussions over phone and emails to various experts whom I could not meet in person are also important sources of information for the study. This includes Dr.Mihir Shah ,Member Planning Commission, Government of India, Dr.K.Hanumantha Rao,Adviser,National Institute of Rural Development (NIRD ) and Dr.Suman Chandra, Director of DM centre ,NIRD.

**4.Draft report :** A draft report has been prepared based on analysis of the secondary data and findings of the field visit in the two states. The draft report presents programme specific analysis related to climate change and disaster risks reduction both at the national level and also for the two states Madhyapradesh and Odisha. These analyses provide details about each development programme taken up for review , method of its implementation, its impact on the beneficiaries

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<sup>59</sup> A list of persons met in various government offices in Delhi and in the state HQ in MP and Odisha is given in appendix 2

especially poor and women ,vulnerability of the target groups to climate change ,existing provisions in the programme for adaptation ,disaster mitigation and risks reduction and the scope for improvement in the programme. A summary of the findings under each programme has been prepared to understand the common issues and measures required for addressing the DRR and CCA issues. Based on this exercise ,recommendations are made for suitable modifications in the National and State level programmes, plans and policies on Water and Climate Change and related Disaster Management in the two states.

The draft report on Odisha focus more on flood related issues and Madhyapradesh on drought and thus would serve as a model for similar analysis in other states .

**Presentation of findings in the two states:** The findings of the study has been presented in two states HQ's Bhopal and Bhubaneswar in Focused Group Discussion(FGD) method to get feed back about the preliminary findings from various stakeholders. These meetings were held on 23 August 30, 2013 in Bhubaneswar and 29 th August,2013 in Bhopal .

**Finalising of the report :** The report was revised based on comments from UNDP and feedback from FGD meetings in the two states.

**Work plan and Timeframe:** The study was undertaken from 3 April,2013 to 31 August,2013.A detailed work plan has been submitted to UNDP in the beginning of the assignment .

**APPENDIX- 2**

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ANNEXURE -I  
SUMMARY OF FINDINGS, RECOMMENDATIONS/ PROPOSED ACTION POINTS

**A) National Programmes**

S.No	Name of the Programme	Findings ,Recommendations/ Proposed Action Points	Department concerned
1	<b>National Action plan on Climate Change (NAPCC)</b>	<p>The multi-dimensionality of climate impacts underlines the importance of new approach that is interdisciplinary in its character and breaks traditional ministerial boundaries</p> <p>Each mission under NAPCC is split in to smaller missions for the purpose of fixing targets and monitoring</p> <p>The Water and agriculture sectors is faced with many challenges of adaptation /risk reduction as extension service which was a basic requirement for dissemination of knowledge to farmers is lacking much.</p> <p>IEC (Information, Education and Communication) is an important part of creating awareness about climate change /DRR.</p> <p>UDNP can help in Capacity Building of various missions based on its expertise in relevant areas</p>	PMO, MOEF
2 A	<b>National Water Mission on Climate Change</b>	<p>Integrated Water Resources Management (IWRM) will be a major requirement and also a challenge in the water sector to address CCA/DRR issues</p> <p>An important development is related to setting up of River Basin Authorities for implementing IWRM. A forum of State Water Ministers was formed recently and the first meeting was conducted in June 2013 .This should be followed</p>	MOWR, MOEF

		<p>up vigorously for achieving basic requirement for IWRM</p> <p>Achieving 20 percent water use efficiency is one of the objectives of the mission .Vast difference across regions in water availability, technology development for its use , institutional efficiency it is difficult to use this criteria uniformly. Need local specific strategy for achievement of targets.</p> <p>A positive development is setting up of Bureau of Water Use Efficiency by the mission.</p> <p>The mission is planning to take up a country-wide programme on Aquifer Mapping which will help for Ground Water Recharge Porgrammes for CCA Basin wise Water resources reassessment taking CC with reliable data base is important.</p> <p>IEC materials is an important part of creating awareness about climate change and water use efficiency related work .</p> <p>Convergence between various water resources related programmes</p>	
<b>2 B</b>	<b>National Mission on Sustainable Agriculture</b>	<p>A programme of action (POA) covering both adaptation and mitigation measures worked out in ten key areas under agriculture including water use efficiency .</p> <p>POA would be operationalised by mainstreaming adaptation and mitigation strategies in ongoing research and development programmes especially in its flagship schemes like Rashtriya Krishi Vikas Yojna (RKVY), National Horticulture Mission (NHM), National Food Security Mission (NFSM)</p> <p>Importance is given for programmes related to soil and water conservation and developing Integrated Farming System (IFS) model with focus on rain fed agriculture.</p> <p>The mission is concentrating on developing seed varieties which are flood and drought resistant under NICRA programme. This is to be strengthened .</p>	MOA, MOEF

		The new sub-mission called National Extension Mission is to take care of extension activities related to new technologies including climate change related activities. This is a basic requirement which requires great attention and strengthening under agriculture mission	
3	<b>National Water Policy 2012</b>	<p>The policy is quite comprehensive encompassing many aspects of water resources management and climate change and related disasters.</p> <p>Review of criteria for new water projects integrating CCA aspects</p> <p>Water demand management and Enhancing the water use efficiency</p> <p>Planning and management of water resources structures with stakeholder participation</p> <p>Adaptation to climate change and mitigation at micro-level by enhancing the capabilities of community is important step in the policy</p> <p>States need to revise the water policies based on the national policy</p>	MOWR, MOEF
4	<b>Watershed Programmes</b>	<p>Modification of watershed Common guidelines (2008) to include local specific weather monitoring, agri-met information services to farmers for CCA and DRR</p> <p>The DPR of the watersheds should contain specific measures related to CCA and DRR..Modification of Sections 3.12 and 3.13 of the Guidelines is suggested for this.</p> <p>Watershed guidelines (section 19D) can be modified to include provisions for undertaking IEC activities specific to CCA and DRR to create awareness to PIA, Watershed Development Committees, SHGs etc.</p> <p>The guidelines (section 26) provide for appointment of 4 to 7 professional experts at the state level to help state level nodal agency (SLNA).All these experts should be trained in CCA and DRR aspects and where required one of them can be a CCA/DRR specialist.</p> <p>Capacity building of watershed development projects at various levels about CCA/DRR.</p> <p>.Modify section 10.2 of the Guidelines to include this.</p>	MORD, MOEF

5	<b>MGNREGA</b>	<p>MGNREGA work should be treated as a climate change adaptation work at the country level as it deals with natural resources management and extreme weather events like drought and floods.</p> <p>In many parts of the country this programme has created good impact in terms of environmental benefits .The potential of this act is quite large from the point of CCA as most of the works undertaken under this massive programme relates to drought and floods.</p> <p>MGNREGA plan to take into account the hazard profile of the area to offer continuous employment opportunities in the event of disasters to ensure livelihood security</p> <p>The programme must give priority to works which reduce disaster risks such as local mitigation works etc.The work can be used for Constructing emergency shelters in high lands in flood/cyclone prone areas.</p> <p>It is noted that the quality of work undertaken under MGNREGA has to improve much both in terms of PRI involvement and the technical soundness of design</p> <p>MGNREGA norms are reported to be rigid and hence some of the specific works related to CCA cannot be undertaken under this: example setting up of weather monitoring stations at the village level.These works can be allowed under convergence .Section 15.3 should be modified to include CCA /DRR related works.</p> <p>MGNREGA needs to concentrate more on IEC activities for generating awareness among the people about the benefits of it especially related to Climate Change Aspects. Section 12.5.5 of the Guidelines can be modified for this purpose</p>	MORD, MOEF
6	<b>National Rural Drinking</b>	Provision of safe Drinking water continues to be an issue despite longstanding efforts by the government and civil society organizations. Climate change poses	MODW,

	<p><b>Water Programme</b></p>	<p>a serious problem to the realisation of the rights to water and sanitation.</p> <p>Depleting ground water table and deterioration in water quality are threatening the sustainability of rural water supply in many parts of India .</p> <p>No comprehensive data are available about the impact of climate change on drinking water in Indian conditions.</p> <p>Vulnerabilities assessment in WASH sector is necessary to develop a holistic plan about the sector. In the process ,it is important to identify the most vulnerable groups, adaptation and mitigation measures for them , means of financing these measures, identify structures that are most vulnerable, increase resilience to droughts and floods, and to develop infrastructure to withstand disaster.</p> <p>Rain water harvesting (RWH), Desalination (Sea/brackish water), Waste water recycle/reuse, Capacity building of institutions targeted at coping with climate change important.</p> <p>Wherever possible Multi-source systems are preferred to ensure reliability, safety and sustainability of drinking water and sanitation even in times of disasters .</p> <p>Provision of additional funds for construction and repair of drinking water infrastructure ,Construction of tube-wells on higher level platforms in flood prone and low lying areas</p> <p>Guidelines related to National Rural Drinking Water Programme (2013) should be modified suitably to include CCA/DRR especially Annexure vi of the Guidelines related to Policy on Research and Development .</p>	
7	<p><b>National Agriculture</b></p>	<p>RKVY is a flexible programme which provides opportunities to the states for taking up any work</p>	<p>MOA, MOEF</p>

	<p><b>Development Programme (RKVY)</b></p>	<p>related to CCA/DRR in agriculture sector .</p> <p>The programme envisages preparation of district agriculture plans based on local agro-climatic conditions which naturally helps in taking care of climate effects when planned and implemented properly.</p> <p>Under RKVY special scheme ,programme like Rain fed Area Development Programme (RADP) is undertaken the main objective of it is to minimize the adverse impact of possible crop failure due to drought, flood or un-even rainfall distribution.</p> <p>Utilise the programme to undertake all CCA/DRR related activities including weather monitoring, climate resilient agriculture practices to take care of drought and floods.</p> <p>Creation of Seed Banks to take care of drought and floods for replanting purposes.</p>	
<p><b>8</b></p>	<p><b>National Disaster Management Guidelines- Drought and Floods</b></p>	<p>Drought: Section (4.2) of the Guidelines deals with climate change aspect of drought ,however no detailed discussion is given about the issue.</p> <p>NAPCC under its Water Mission has dealt with the issue of Drought Management under climate change the recommendations of which can be included in the NDM guidelines.</p> <p>The NDMA guidelines though have given a comprehensive discussion about flood control and management, there is no specific discussion about climate change associated flood risks and methods of its management . National Water Mission under NAPCC has dealt with the issues of floods under climate change scenario which should be considered for revision of these guidelines</p>	<p>NDMA, MOH</p>

ANNEXURE -I  
SUMMARY OF FINDINGS, RECOMMENDATIONS/ PROPOSED ACTION POINTS  
**B) State Programmes-Madhya Pradesh**

Sl No	Name of the Programme	Findings, Recommendations / Proposed Action Points	Department concerned
1	<b>Madhya Pradesh State Action Plan on Climate Change (MP SAPCC) 2012</b>	<ul style="list-style-type: none"> <li>• MP SAPCC is comprehensive and prepared by a dedicated Climate Change Cell under UNDP project backed by a number of studies</li> <li>• Strategy is identifying CC champions in each department (CC cells) and ensure that climate change roles and responsibilities are clear in each Department and Agency</li> <li>• Need for accelerated pace of surface water development in the state</li> <li>• Recharge of ground water with special focus on over exploited areas</li> <li>• Promotion of basin level Integrated Water Management</li> <li>• Lack of awareness about the climate change aspects of development programmes at the field level.</li> <li>• Undertake regular campaigns about CCA to enable both communities and local level governmental departments.</li> <li>• The IEC component of the existing programmes can be used effectively for this purpose. Education programs (like SSA) can be utilized for creation of awareness among students and youth.</li> <li>• Strengthening of the MP Climate Change Cell and the operationalisation of the Knowledge Management Centre</li> </ul>	Climate Change Cell/Division of Environmental Planning and Coordination Organisation (EPCO) under the Department of Housing & Environment
2	<b>Madhyapradesh State Water policy (2003)</b>	<ul style="list-style-type: none"> <li>• Water Policy is one of the instruments used for addressing CCA issues in water sector</li> <li>• State Water Policy 2003 mentions that groundwater should be only used for drinking purposes, there is no adherence to this policy.</li> <li>• Lack of sufficient surface water has already put pressure on ground water resources and the use.</li> </ul>	Department of Water Resources/M P Climate Change Division



		<ul style="list-style-type: none"> <li>• Master plan for each basin should be revised</li> <li>• Policy needs revision based on National water policy and also SAPCC related to water sector</li> </ul>	
<b>3</b>	<b>Watershed Programmes</b>	<ul style="list-style-type: none"> <li>• Micro Watershed have contributed for raising income, generating employment and conserving soil and water resources</li> <li>• Watersheds have shown that there is a reduction in soil erosion, increase in groundwater level and increase in cropping intensity</li> <li>• Also helped in enhancing drinking water supply and thereby reducing the burden on women in fetching water supply from distant places. Overall the quality of water Harvesting Structures (WHS) in majority of micro watersheds in the state is not up to mark.</li> <li>• Needs improvements by including CCA and DRR activities like weather monitoring, water budgeting, drought resistant agriculture services in its planning and implementation</li> </ul>	Rajiv Gandhi water shed Management Mission, Department of Panchayat and Rural Development & Climate Change Division
<b>4</b>	<b>MGNREGA in M.P</b>	<ul style="list-style-type: none"> <li>• More active engagement with NGOs to reach out to most backward blocks having high tribal or schedule caste population</li> <li>• Provide handholding support to the village Panchayats through technical support group, with subject matter specialist (including those with knowledge/training about CCA) in preparing participatory annual plans that includes CCA/DRR aspects</li> <li>• Convergence around NRM with focus on CCA/DRR.</li> </ul>	M.P Employment Guarantee Council and Climate change Division
<b>5</b>	<b>RKVY in M.P</b>	<ul style="list-style-type: none"> <li>• Promote ground water recharge , in-situ moisture conservation and Micro irrigation</li> <li>• Double the area under SRI in three years</li> <li>• More focus on agriculture inputs supply than creating buildings</li> <li>• Intensive mechanization</li> <li>• Strengthen extension for horticulture and floriculture</li> <li>• Post Harvest Management infrastructure creation</li> <li>• capacity building for district level planning to be improved</li> </ul>	Department of Farmer Welfare and Agriculture Development & and Climate change Division
<b>6</b>	<b>M.P Disaster Managemen</b>	<ul style="list-style-type: none"> <li>• Coordination of different line departments in undertaking the works is challenging task related</li> </ul>	M.P Disaster Management

	<b>t</b>	<p>to DM activities both at the state and local levels</p> <ul style="list-style-type: none"> <li>• Climate Change Adaptation (CCA) in the state has to involve disaster management authority in its planning and implementation of activities to make better impact on CCA front .</li> <li>• Similarly for mainstreaming CCA in various departments the department’s working guidelines should be modified</li> <li>• Climate Change Division should coordinate and take up these tasks on priority basis</li> <li>• DM framework has been established at the state and district levels under UNDP project which can be used for CCA and DM activities in the state.</li> </ul>	Authority &CC Division
7	<b>Convergence of Development Programmes for better mainstreaming of CCA and DRR related to Drought and Floods</b>	<ul style="list-style-type: none"> <li>• Many development programmes implemented in isolation from each other</li> <li>• Convergence of programmes is recommended to bring in synergies among government programmes and impact of programmes</li> <li>• MGNREGA is opted for Convergence as its scope is quite wide for undertaking many works required for CCA</li> <li>• This aspect needs strengthening through monitoring of MGNREGA to make good impact on CCA/DRR activities through convergence</li> </ul>	All Departments

ANNEXURE -I

SUMMARY OF FINDINGS, RECOMMENDATIONS/ PROPOSED ACTION POINTS

**B) State Programmes- Odisha**

Sl.No	Name of the Programme	Findings and Recommendations/Proposed Action Points	Department concerned
1	<b>State Action Plan on Climate Change (2010)</b>	<ul style="list-style-type: none"> <li>• There is need for creation of a dedicated specialized independent agency to oversee the implementation of CCAP with adequate finance and powers.</li> <li>• Climate Change programme /agency should be managed by a higher authority in the rank of Chief Secretary</li> <li>• Need for exclusive funding.Sourcing from external agencies is the option as the amount required is huge</li> <li>• Utilise the existing schemes to undertake CCA specific activities under different programmes.</li> <li>• Civil society role in monitoring and social audit can be made mandatory for all kinds of CCA activities</li> </ul>	Department of Environment and Forest And Government of Odisha
2	<b>Odisha State Water policy (2007)</b>	<ul style="list-style-type: none"> <li>• State Water Policy in general is comprehensive with IWRM</li> <li>• It needs revision based on National water policy 2012</li> <li>• State water policy does not discuss about climate change issues</li> <li>• Need to include CCA/DRR in the policy on the lines of CCAP and National water Policy 2012</li> </ul>	Government of Odisha- State Water Resources Board/Water Resources Department
3	<b>Watersheds development programmes</b>	<ul style="list-style-type: none"> <li>• Watersheds are quite important as most of these interventions under watersheds are directly or indirectly related to CCA</li> <li>• The existing watersheds do not have CCA specific interventions to monitor weather condition , provision of agro-met service to farmers and</li> </ul>	Orissa Watershed Mission/ Department of Agriculture

		<p>adaption of cropping pattern to suit available water supply conditions etc.</p> <ul style="list-style-type: none"> <li>• Both officials and farmers lack awareness about CCA</li> <li>• Necessary to modify the Watershed Guidelines 2008 suitably especially section 19d on IEC and 26 on training</li> <li>• Initiate more number of CCA pilot watersheds based on the civil society's experiments .</li> <li>• Up scale the CCA/DRR lessons into all watershed programmes progressively</li> </ul>	
4	<b>MNRE GA in Odisha</b>	<ul style="list-style-type: none"> <li>• Lesser utilisation of programme funds under MGNREGA</li> <li>• Improper maintenance of records related to works completed and its quality.</li> <li>• Non-participation of people in NREGA planning.</li> <li>• Improving the quality of work by inspection and social audit by Gram Sabha committees for making the interventions more effective to address CCA/DRR issues.</li> <li>• Start work before the migration season, and continue during the lean agricultural season.</li> <li>• Rectify delayed payments by involving new technology for payments like smart cards.</li> <li>• Vigorous planning for utilising the funds available for CCA purposes</li> <li>• Gram Sabha involvement in the planning and implementation of the programme should be improved greatly</li> </ul>	Department of Panchayat Raj/MGNRE GA society
5	<b>RKVY in Odisha</b>	<ul style="list-style-type: none"> <li>• The programme is important for CCA/DRR point of view as the programme envisages preparation of district agriculture plans based on local agro-climatic conditions</li> <li>• Flexibilities in the programme for undertaking work suitable to local conditions .Utilise effectively the funds for CCA/DRR activities by planning more allocation for Micro Irrigation, SRI etc</li> <li>• Preparation of agriculture plan in coordination with other departments</li> <li>• Improve IEC , agriculture extension related to CCA like setting up local weather stations and provision</li> </ul>	Department of Agriculture

		of agro-met services to farmers .	
6	<b>Odisha Disaster Management programme (Floods )</b>	<ul style="list-style-type: none"> <li>• The main disaster in Orissa context due to climate change is cyclone and flood</li> <li>• Need for Downscaled climate change projections modeling</li> <li>• Need for micro-level vulnerability assessment</li> <li>• Needs assessment and constructing of multipurpose cyclone shelters</li> <li>• Dredging of river mouth to improve flood management</li> <li>• Integrating climate change risk in the state’s disaster management policy</li> </ul>	Odisha Disaster Management Authority /Home Department
7	<b>Water Logging and Command Area Development (CADA) Programme</b>	<ul style="list-style-type: none"> <li>• Water logging an important problem due to floods - about 2 lakh ha affected</li> <li>• CADA helps to address the increased flooding and water logging problems due to climate change</li> <li>• Construction of drainage channels under this programme helps in draining out excess water from agriculture field to main drains increasing agricultural productivity.</li> <li>• CADA programme also helps to increase water use efficiency through other schemes like construction of field channels ,crop demonstration (SRI) etc. thus contributing for CCA activities.</li> <li>• More area has to be brought under CADA</li> </ul>	Command area Development Agency (CADA), Department of Water Resources
8	<b>Convergence of Development Programmes</b>	<ul style="list-style-type: none"> <li>• Many development programmes implemented in isolation from each other</li> <li>• Convergence of programmes is recommended to bring in synergies among government programmes</li> <li>• MGNREGA is opted for Convergence as its scope is quite wide for undertaking many works related to CCA &amp;DRR like Rainwater harvesting, ground water recharge, storage of surface water resources etc</li> <li>• Convergence needs strengthening through monitoring of MGNREGA to make good impact on CCA/DRR activities</li> </ul>	All Departments related to water, agriculture environment ,climate change and DRR