Strengthening Climate Resilience

Building climate resilience at state level:
Disaster risk management and rural livelihoods in Orissa

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Abbreviations

CBT: Capacity Building Team
CCAP: Climate Change Action Plan
CSDRM : Climate Smart Resilient Development Approach
DFID: UK Department for International Department
DM: District Magistrate
DRM: Disaster Risk Management
DRR: Disaster Risk Reduction
GoO: Government of Orissa
HDI: Human Development Index
ICT: Information Communication Technology
IEC: Interactive Electronic Communication
IMD: Indian Metrological Department
IPCC: Intergovernmental Panel on Climate Change
LST: Livelihood Support Team
MDGs: Millennium Development Goals
NCAP: National Climate Change Action Plan
NGO: Non-Government Organisation
NREGA: National Rural Employment Guarantee Scheme
NRM: Natural Resource Management
ODRAF: Orissa Disaster Rapid Action Forces
OGFR: Orissa General Finance Rules
OSDMA: Orissa State Disaster Management Authority
OWDM: Orissa Watershed Development Mission
PIA: Project Implementing Agencies
SHGs: Self Help Groups
SLA: Sustainable Livelihood Approach
WDT: Watershed Development Teams (WDT)
WORLP: Western Orissa Rural livelihood Program

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Executive summary

Approach to case study

Due to the vulnerability of Orissa and record of disasters, including the 1999 super-cyclone, development policy initiatives have been instigated to address poverty, resilience and reduce impacts of extreme weather events in the State. These have been evolving over time and an active process is still underway, and are implemented from State to District to Panchayat (village) and community level. Orissa therefore is a suitable place for a case study to test the Climate Smart Resilient Development (CSDRM) approach and consider the extent to which development programmes in Orissa demonstrate CSDRM (for details see CSDRM approach on page 38).

There have been considerable investments for a decade by the Government of Orissa (GoO) and external donors in two particular programmes of activities covering the spectrum of action required for CSDRM. As there was sufficient available material in these two programmes they were selected for analysis: the Orissa State Disaster Management Authority (OSDMA) – disaster risk management focused government agency, and the Western Orissa Rural Livelihood Programme (WORLP) – a poverty focused project supported by DFID located in the Orissa Watershed Development Mission. Both these have influenced policy development at national-level disaster management and watershed management. The National Disaster Management Act is based on experience from Orissa State and its Disaster Management Authority.

The CSDRM approach (Mitchell et al., 2010a) has been developed through extensive consultation with practitioners, policymakers and academics concerned about the impact of climate change on disasters. The CSDRM approach incorporates three pillars: (a) Tackle changing disaster risks and uncertainties (b) Enhance adaptive capacity and (c) Address poverty and vulnerability and their structural causes. These three pillars are not mutually exclusive and include a spectrum of actions that should be considered simultaneously in programme, project or policy design or evaluation. The actions under each pillar are not supposed to be treated as a menu but as a prompt to help disaster risk managers ensure they are not inadvertently making things worse or missing opportunities. An information base was assembled about the programmes for this case study so the approach and each action under the menu could be applied and assessed.

1. Review of existing information: A study of the information available at state level, and from the WORLP programme, including a set of 69 working papers produced over 10 years; and the reports and website material of the ODSMA. In addition WORLP has been subject to regular independent review and monitoring under the DFID system. The production of the Orissa State level Climate Change Action Plan involved stakeholder discussions managed by CTRAN (May 2010), and these provided further insights.
2. Individual meetings with GoO departments and stakeholder organisations: A series of individual meetings were held with the GoO officials of the various departments. In addition, individual meetings were also held with DFID supported programmes that included WORLP. Selected meetings with individual experts and consulting companies were also held. Initially individual meetings were held in Bhubaneswar between November 30, 2009 and December 3, 2009, in connection with the preparation of the

Orissa State Climate Change Action Plan. In addition further interviews and field visits were undertaken in May 2010 to the WORLP activities in Nuapada District and a short trip to Kalandi District to explore the management of disaster risk at District level.

This knowledge base was used to assess the CSDRM approach in order to understand the way the selected policy interventions (WORLP and DRR) measured up and also iteratively, what modifications might be applied to the CSDRM.

Current approachees on disaster risk management in Orissa

In respect of disasters in the coastal zone, the state is now well-served by the Orissa State Disaster Management Authority (OSDMA). The establishment of the Agency was driven by the 1999 super-cyclone which meant that Orissa switched from a disaster relief and response approach to a proactive approach, centred on an agency which can now prepare, plan and tackle a range of disasters across the state. There is also now a multi-hazard approach to disaster management. Experience of extreme weather events such as flash floods and heat waves in recent years has been monitored and new responses devised. The OSDMA is placed at the centre of policy making. The Authority has the mandate to cover not only cyclones but all disasters and the entire gamut not only of management but also relief, restoration, reconstruction and other measures. The State Disaster Management Policy covers most of the facets of the CSDRM but OSDMA is not charged with tackling poverty directly.

OSDMA coordinates with the line departments involved in reconstruction, with bilateral and multi-lateral aid agencies, and with UN Agencies, International, National and State-level NGOs. It also has data and monitoring systems which can identify trends, for example, in lightning deaths. All its activities are well disseminated on its website (www.osdma.org). Having developed successful know-how capacities, preparedness for cyclones across the state, it is using its capacities to develop responses and preparedness to other extreme events. Recently it has started campaigns on heat waves and flash flooding.

WORLP was focused on poverty reduction at the outset, selecting the poorest (including proportions of scheduled castes and scheduled tribes), rain-fed western Districts which are some of the poorest in India in which to work. It started from a sustainable livelihood approach (SLA), adding this to traditional watershed management, creating "Watershed Plus". All WORLP activities are well disseminated on its website (www.worlp.com). Key activities have included:
- Natural resource management (NRM) interventions typically aimed at managing and checking runoff from different catchments and reducing the sediment load in water bodies, with a view to enhancing water resources and improving the productivity of land which have had marked effects on the groundwater table and improving the productivity of land.
- Empowerment of communities with a range of community-based organisations with almost 6,000 self help groups (SHGs) formed. These groups have been sensitised to develop norms for functioning, as well as participatory processes and group management creating social capital.
- Non-refundable grants either for consumption or assets have been available to those households that communities regard as "very poor", and there is a revolving fund for loans for micro-enterprises.

In the watersheds indicated above where data was maintained by Orissa Watershed Development Mission (OWDM), water tables were not only maintained but also improved during October (the rabi season), which was previously a water stress period. People in the programme 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.

There have been close connections with drought management, as WORLP's host institution OWDM is part of the Department of Agriculture, which has responsibility for drought management and works with the Indian Metrological Department (IMD). The Agriculture Department coordinates with the IMD department for the monsoon prediction for pre-

monsoon planning. Although it was not designed with climate change considerations in mind, the SLA has been considered as a rational platform to provide an increased capacity of people to adapt to elevated levels of climate-induced change and stress and increase people's ability to deal with climate change – principally drought – a slow onset disaster in DRM terms and outside the work of the OSDMA. However, there are noticeable flash flood events in WORLP areas so at this point the two approaches – SLA and potentially DRR – contribute. Three key weather dimensions have been identified as affecting vulnerability:

*   Drought and dry-spells at an interval of every 2 years, with a major drought every 5-6 years;
*   High variability of rainfall, leaving people with two peak periods of food stress in the region;
*   Flash floods during the rainy season.

Assessment about components of current practice

a.   Both programmes have current activities which accord strongly with the institutional dimensions of the CSDRM in relation to coordination of agencies and partners and enabling their capacities to innovate. Both programmes have been given priority by the state government and donor organisations, are resourced to deliver, and given space to innovate. DRM has been reconfigured in a proactive mode around a new institution. WORLP has been a long-term poverty reduction project which has acted as a laboratory for its host and changed water basin management practices.

b.   Both programmes have components that provide crucial know-how, which can be marshalled for CSDRM. For example OSDMA works with national and international specialist forecasting agencies to pick up potential cyclone and storm events. WORLP works within the technology of water basin development, using a variety of land and water management techniques, to identify, plan and implement locally workable solutions.

c.   Some facets are strong in one programme and weak in another. For example OSDMA has capacity on public awareness, whilst WORLP focuses on empowerment and participation. Establishment of a CSDRM approach therefore should be able to select strong points from the "best" programme and draw these together. In fact because rapid and slow onset disasters are institutionalised separately this is unlikely to take place without an integrated vision.

d.   Both programmes suffer from gaps in knowledge. Neither is systematically assessing the effects of climate change on disaster risk and uncertainties, so they cannot then apply this knowledge to tackle the vulnerability and exposure of people's livelihoods and the physical environment to changing disaster risks and uncertainties.

e.   Both programmes are targeted in specific geographical areas and do not cover the state as a whole; OSDMSA is focused on the coastal communities and Districts and WORLP on Western Orissa, although the practices are now being replicated in ten other Districts.

f.   It is also clear from the presentation of the Orissa Climate Change Action Plan (CCAP) that working from a state plan basis there is a tendency to perpetuate existing organisational boundaries and activities and that it will be a challenge to create a seamless approach to climate change adaptation and disaster risk management, although the new planning process has created the potential in which this could happen.

Learning points for delivering on the CSDRM in Orissa and elsewhere

*   There is more than one route in to CSDRM. Both OSDMA and WORLP have a strong practice from which to build, but neither delivers everything that is needed. It makes sense to construct CSDRM out of a range of existing institutions and programmes, which themselves have taken many years to develop. Full CSDRM will need time to establish outside a project level: it will need to support the development of adaptive capacity and social resilience to address different aspects of the package of increased risks associated with climate change. It will also need to be able to assess these changing risks as more knowledge becomes available.

- There will also be a need to tackle some constraints associated with the sectoral/ departmental organisation of policy and need strong leadership from above to tackle departmentalism. Approaches to slow onset disasters (droughts) and rapid onset disasters (floods and cyclones) are currently institutionalised separately and mainstreaming climate change within them perpetuates sectoralism. There is a also need to scale up from projects, pilots and geographically targeted area, which presents challenges when different programmes need to be integrated across sectors, institutions and scales. Climate change could provide the driver.
- What has worked for emerging CSDRM in Orissa has been bureaucracy-independent agency status for key organisations giving flexibility for rapid innovation, but also providing links into the official government structures to provide authority and access to resources.
- When overviewing DRM policy and the Watershed Plus approaches in relation to the CSDRM approach, the principal gap that arises is the use of tools and methods to effectively manage the uncertainties related to climate change. This is principally because there are some significant uncertainties about climate change in India as a whole and there has been as yet very little downscaling of global climate scenarios – what has been done is basically confined to the national science institutes. This has meant that state-level institutions like universities are as yet unable to perform effective intermediary roles. Once science capacities are accessible, there are several models for training and information dissemination to set up coherent and robust systems from state to panchayat level, including farmers' schools, which can deliver access to and manage unfolding knowledge.
- Climate change is increasingly seen as relevant to both OSDMA and WORLP and becoming a driver for development in their activities. Further, the state is developing its Climate Change Action Plan. This might be a way forward but there is still fragmentation across sectors in its current draft. Whilst there is recognition that there are cross-cutting themes, this may lead to complication rather than simplification. A much broader approach to disasters needs to be defined, which includes climate risks. This would mean that there would be a drive to integration and linkage across sectors.

1. Explaining the climate smart disaster risk management approach

This work on Orissa is one of three case studies testing the CSRDM approach. The CSDRM approach has been developed through extensive consultation with more than 500 practitioners, policymakers, scientists and academics drawn from climate change, disasters and development communities in 11 'at-risk' countries in Africa and Asia (Mitchell et al., 2010a). An initial conceptual framework for these consultations was developed at an experts' workshop hosted in the UK in February 2010. Climate smart DRM experience on the ground in ten countries was investigated between April and May 2010 (Bangladesh, India, Nepal, Sri Lanka, Kenya, Tanzania, Sudan, Cambodia, Indonesia and the Philippines). Three regional workshops offered further opportunity to refine the approach with leading experts in South Asia, South East Asia and East Africa. In addition, the SCR programme also commissioned studies looking at (a) the applications of the concept of resilience to DRM and adaptation (Bahadur et al., 2010), (b) the convergence between DRM and adaptation in funding, policy and practice (Mitchell et al., 2010) and (c) the extent to which environmental and low carbon considerations are included in DRM interventions (Urban et al, 2010b). More intensive fieldwork was conducted in Cambodia (Polack, 2010) and Sri Lanka (Ibrahim, 2010) as well as this report in India to test the utility and applicability of the emerging approach in different levels and contexts.

Why now?

Climate change is affecting the frequency and severity of some natural hazards, is increasing people's vulnerability and exposure, and is creating greater uncertainty (see Box 1).

Box 1: What are the impacts of climate change on disaster risk?

Climate Change is …

1. Increasing the frequency and severity of some, but not all, hazards

 The Intergovernmental Panel on Climate Change (IPCC, 2007) concluded that the frequency and severity of hot and cold extremes and heavy precipitation events is increasing and this trend will continue. At the moment no clear patterns are seen with tropical cyclones. Confidence in understanding or projecting changes in hazards and extreme events depends on the type of extreme event, as well as on the region and season.

2. Increasing people's vulnerability and exposure to regularly experienced shocks and stresses

 Climate change is decreasing crop yields, increasing water scarcity, leading to a loss of biodiversity and natural assets provided by ecosystems, causing new patterns of disease and increasing respiratory illnesses, and possibly has become one of the triggers of migration and new patterns of conflict. These trends are projected to worsen (IPCC, 2007). This means vulnerability is increasing and disaster losses may increase even without any discernable increase in the severity or frequency of hazards.

3. Increasing uncertainty and unexpected events

 The complexity of the physical and human system and their interactions dictate that scientific models about future climate change impacts remain uncertain. Accordingly, the inability to predict the exact magnitude or timing of extreme climate-related events means that people must be prepared for the unexpected, whether related to the type or severity of the hazard or in the way in which the human system responds to it.

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[1]The SCR programme uses the term 'disaster risk management' as it describes the full range of management responses – reducing, transferring, sharing and managing residual risk.

As the trend of natural disasters increases, 'business-as-usual' disaster risk management[1] will become increasingly ineffective if the impacts of climate change on disaster risk are not taken into account by organisations and in policy and practice.

Currently, with the Mid-Term Review of the Hyogo Framework for Action and the Millennium Development Goals Summit, the international community is recognising the need to integrate their practice to be more effective. The rationale for the CSDRM approach rests on the relationship of climate change to disaster risks. Ignoring the impacts of climate change on disaster risk threatens the effectiveness of policies, programmes and projects designed to manage these risks, and in certain circumstances, can increase the vulnerability and exposure of intended beneficiaries. CSDRM is:

> "an integrated social development and disaster risk management approach that aims simultaneously to tackle changing disaster risks, enhance adaptive capacity, address poverty, exposure, vulnerability and their structural causes and promote environmentally sustainable development in a changing climate".

CSDRM (see page 38) provides a guide to strategic planning, programme development and policy making and should be used to assess the effectiveness of existing DRM policies, projects and programmes in the context of a changing climate. It is a tool to help cross-check DRM interventions for their responsiveness to current and future climate variability. It contains three pillars[2] of action:

Tackle Changing Disaster Risk and Uncertainties

Pillar One supports the priority areas of the HFA, highlighting the importance of collaboration between multiple actors. It calls for improved information on risks by conducting detailed risk assessments which recognises the value of multiple sources of knowledge. It highlights the importance of increasing access to information by all stakeholders through education, early warning and the media while foregrounding measures to understand and address vulnerability and the conditions creating risks. The CSDRM approach treats climate change as a key consideration and attempts to insert climate change into the most critical, climate-sensitive elements of the HFA.

Enhance Adaptive Capacity

Adaptive capacity refers to our ability to manage change sustainably by strengthening resilience[3]. Promoting adaptive capacity means that institutions and networks learn and use knowledge and experience and create flexibility in problem solving (Scheffer et al., 2000; Berkes et al., 2003). The key characteristics which enhance adaptive capacity have been identified as: promoting diversity; creating flexible, effective institutions; accepting non-equilibrium; adopting multi-level perspectives; integrating uncertainty; ensuring community involvement; promoting learning; advocating for equity; recognising the importance of social values and structures and working towards preparedness, planning and readiness[4]. Enhancing adaptive capacity is a key strategy for managing increasing uncertainty associated with a changing climate and allows people and organisations to respond to shocks and unexpected events more effectively. The CSDRM approach weaves together many of the characteristics of adaptive capacity highlighted above and offers guidance on how to consider these in a practical way.

Address Poverty, Vulnerability and their Structural Causes

Pillar Three is strongly influenced by the 'pressure and release' model (Wisner et al., 2004) and longstanding research that attributes the causes of disasters to failures in development (e.g. Bankoff et al., 2003). Wisner et al's model treats root causes, dynamic pressures, unsafe conditions and hazards as all contributing to disaster risk. Root causes underscore the importance of access to power, structures and resources. A lack of skills and institutions (i.e. markets, press freedom) coupled with macro forces, such as urbanisation and population growth, contribute to vulnerability.

The CSDRM approach recognises the complexities and interdependencies of any one interventions and thus promotes the inter-relation of the three pillars. Guiding questions that supplement the actions depicted on page 38 are examples that are intended to stimulate discussion, planning and action in a specific context. The CSDRM approach needs to be tailored to local realities and specific challenges.

[2]The three pillars are founded on established concepts of vulnerability and disaster risk (e.g. Wisner et al., 2004) and resilience, adaptive capacity and uncertainty (e.g. Holling, 1973; Folke, 2006).
[3] The term 'resilience' is increasingly used in climate change and disaster discourses and in policies and programming related to these issues. It has become common to describe the intersection between these two fields and those of poverty and development as 'climate resilient development'. The SCR programme recognises the difficulty in operationalising the concept of resilience and its multiple meanings and as such has chosen to focus on more tangible and practical dimensions of 'adaptive capacity'. Carpenter et al. (2001) highlight that little attention has been paid to the operational indicators of resilience.
[4]For more details on the ten characteristics see SCR Discussion Paper 1 "The resilience renaissance? Unpacking of resilience for tackling climate change and disasters" by Aditya V. Bahadur, Maggie Ibrahim, and Thomas Tanner.

In order to ensure a CSDRM approach in any project, programme or policy, managers should seek to integrate actions from each of the pillars, rather than focusing on just one. No single CSDRM intervention could possibly integrate every element or try to tackle all the drivers of poverty or vulnerability. Nonetheless, actions across the three pillars provide a way of reassuring those managing disasters risks that they are not accentuating poverty or vulnerability or creating new risks. Naturally there are limits to what disaster risk managers can achieve alone, so the CSDRM approach highlights the importance of working in partnership with development and climate change stakeholders to ensure DRM and development outcomes are more robust to changing contexts.

Who is the CSDRM approach for?

The CSDRM approach is designed for those responsible for managing disaster risks at regional, national, sub-national or community levels. It has been developed through extensive consultation with policymakers and practitioners working at each of these scales. Feedback suggests that the CSDRM approach can be used for strategic planning and as part of programme and project design[5]. It can also be used to evaluate the effectiveness of existing initiatives as part of monitoring and evaluation processes. The approach has not been designed as a manual or a checklist against which to rate DRM interventions. Rather it is intended to prompt in-depth reviews and assessment to inform decision-making. The CSDRM can be linked to specialised guides on how to implement action points included in the approach such as vulnerability and capacity assessments (CARE, 2008) or Climate Change Information for Effective Adaptation: a practitioner's manual (Postdam Institute for Climate Impact Research and GTZ, 2009).

The approach that was adopted to testing this approach in Orissa is outlined in section 3 and 4.

[5]'Climate smart' language may not appeal in particular cultural or organisational contexts, it is acceptable to replace 'smart' with 'savvy', 'compatible', 'integrated', 'resilient' or 'sensitive'; options that have been suggested at national and regional meetings.

2. Orissa as a case study and the approach

Orissa has long been prone to disasters: recurring droughts, flood and cyclones are regular features in the state and have had a crippling effect on the economy. In 1999 a severe cyclone followed by a super severe cyclone lashed the entire coast of Orissa causing large scale loss of life[6]. Whilst the extent to which climate change will exacerbate floods and droughts is not yet fully understood – one thing is clear – their frequency and intensity will increase, not diminish. Cyclones may intensify. Temperature increase is underway and causing heat stress. Further, different topographical areas in Orissa are frequently vulnerable to different kinds of natural disasters – floods, droughts and cyclones. Environmental degradation (deforestation, coastal vegetation/wetlands loss and soil erosion) has compounded the impact of the natural disasters that are striking new areas.

Orissa is part of 'Poorest India' and has the highest incidence of poverty[7] despite recent improvements. Latest figures show that 57 per cent are living below the poverty line[8] and almost 90 per cent of the poor live in rural areas. Poverty is significantly worse in the western and southern districts of the state – linked to agriculture with more than two-thirds of the population employed in the sector. Most people are subsistence farmers and many practice sharecropping. Productivity is low; the poorest scraping together a living on marginal lands[9].

The Human Development Index (HDI) of the state increased from 0.27 in 1981 to 0.40 in 2001, which was a rise of around 51 per cent. Of Orissa's 40 million people[10], about 16 per cent live in urban areas. In total, 22 per cent of the population comprises Scheduled Tribes (against the all-India percentage of 8 per cent) and 16.5 per cent Scheduled Castes (about the same as the all-India percentage).

Orissa continues to be off-track on all the MDGs. IMR rates, despite an impressive decline from 2001 to 2006, continue to be among the highest in the country. Institutional births are still low at below 40 per cent[11]. Trends are closest to the target in education (including gender equality) and tackling infectious diseases. The rate of literacy has increased by 14 per cent since 1990 and the number of drop-outs in schools has decreased in ten years from 1.27 million to 0.2 million.

Specific weather and disaster background

Orissa has been called the disaster capital of India. Cyclones are the big catastrophic events. The cyclone zones are also prone to tidal surge affecting the coastal districts. Flood during the rainy seasons occurs without fail every year. The coastal districts of the state, as well as other districts which have the major rivers flowing across it and have large reservoirs, are prone to such hazards. Damage to river embankments are also caused due to flooding. Most of the western districts of the state are prone to drought every year and thus belong to the high-risk category. Erratic rainfall and under-utilisation of water resources are the main cause for such calamities. Between 1965-2009 it has been repeatedly hit by various disasters such as cyclones (6), floods (17), droughts (19) and heatwaves. Climate change has increased the intensity and range of disasters and reportedly, more areas within the State have become vulnerable to disasters.

Orissa current problems

In Orissa, over 80 per cent of annual rainfall occurs during the monsoon period, average 1,400 mm, with an average of 70 rainy days. The State experiences either heavy flood or drought every alternate year due to disproportionate distribution of rainfall. In recent years, wide fluctuation in climate has been observed and irregular rainfall causing both floods and droughts is a major concern[12]. The impact of drought on farmers has been deleterious in some areas. Floods in 1980, 1982, 2001 and 2003 were particularly severe but there have been notable flood events in each of the past 4 years. For example, in 2009, 1,451 villages in 15 districts were affected, 13,000 houses were lost or damaged, over 60,000 people were evacuated and accommodated in 80 camps[13]. Saline water ingression has been observed in some coastal districts. There are also major pollution and water quality issues emerging as industrialisation and urbanisation proceed in the State. Increased disaster intensity interacts with low resilience to compound problems of food security, water security and livelihood

[6]OSDMA State Disaster Management Policy 2005
[7]National Statistical Survey
[8]Suresh Tendulkar committee
[9]DFID case sheet – mainstreaming the livelihoods agenda
[10]Census of India – projected population 2008
[11]Statistics for 2004-05 (BPL) and 2006 (others) taken from the Orissa Budget 2008-2009, quoting the GoI Economic Survey 2007-2008
[12]Orissa State of the Environment Report 2006, State Pollution Control Board, Orissa
[13]www.OSDMA.org

security in the State, and is leading to poor health conditions[14].

Policy interventions assessed

Due to its vulnerability and record of disasters, development policy initiatives have been instigated and are constantly evolving to address poverty and resilience and reduce impacts of extreme weather events. These have been evolving over time and are implemented from state to district to panchayat and community level. Two pivotal interventions were selected for assessment covering the spectrum of activities required for CSDRM. These have been supported by the State Government and donor agencies over a period of time: the Western Orissa Rural Livelihood Programme (WORLP) and the Orissa State Disaster Management Authority (OSDMA) – whose establishment was driven by the 1999 super- cyclone[15].   Both these have influenced policy development at national level – on water shed management and disaster management. The National Disaster Management Act and institution is based on experience from Orissa State and its Disaster Management Authority.

Orissa State Disaster Mitigation Authority (OSDMA) was set up by the Government of Orissa as an autonomous organisation in the aftermath of the super-cyclone in 1999. It was registered under the Societies Registration Act, 1860 as a non-profit making and charitable institution. The Department of Revenue is the administrative department of OSDMA. Subsequently, the name of the Authority was changed from Orissa State Disaster Mitigation Authority to Orissa State Disaster Management 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.

The Government of Orissa is implementing the Disaster Risk Management (DRM) programme in 16 disaster-prone districts in order to reduce the vulnerabilities in two phases from 2002-08 with the support of the Government of India (Ministry of Home Affairs) and the United Nations Development Programme (UNDP, supported by DFID). The Community Based Disaster Preparedness (CBDP) programme is being implemented in ten blocks of seven coastal districts on a pilot basis. The overall goal of the programme is 'Sustainable Reduction in Disaster risk in some of the most hazard-prone districts'. The disaster management plans start from the village/ward level and are consolidated through similar planning at the panchayat, block, district and urban local bodies levels in the selected districts. A cadre of village volunteers has been created to carry out the village based natural disaster risk management programmes.

Orissa implements in the order of ten different watershed programmes or projects in the state, including the Western Orissa Rural Livelihood Programme (WORLP). The Western Orissa Rural Livelihoods Project (WORLP), funded by DFID and implemented by the State Government's Orissa Watershed Development Mission, was set up in 2000 with the aim of reducing poverty by making the livelihoods of rural people in the project area more sustainable. WORLP is a partnership between the Department for International Development (DFID), UK and the Government of Orissa (GoO). The project was inaugurated by the Chief Minister of Orissa in August 2000 at a cost of Rs 230 crores (GBP 32.75 million). WORLP was designed to cover 870 villages in 290 watersheds of 29 blocks in four of the poorest districts of Orissa, where human development indicators are comparable to sub-Saharan Africa. WORLP is unique in its design and approach and has less of the technical confines of other, previous watershed programmes. 'Watershed Plus' is a term which was coined during the design of this project, and refers to the additional focus on people's livelihoods which was introduced.

Planning for adaptation to climate change in India

For India as a whole, the Government has decided that climate change may alter the distribution and quality of India's natural resources and adversely affect the livelihood of its people. India may face a major threat because of projected changes in climate as its economy is closely tied to its natural resource base and climate sensitive-sectors[16].

The Government has a vision to create a prosperous but not wasteful society, and economy

[14]Powerpoint from Management Support Team 2009, Orissa Department of Health

[15]Super-cyclone magnitude is about 6 times greater than normal cyclones with speeds around 120 knots (140 mph; 220 km/h) where as normal cyclone speeds around 34–47 knots (39–54 mph; 63–87 km/h).

[16]For a fuller context about responsibilities for policy relating to DRR and climate change in India see Strengthening Climate Resilience in Disaster Risk Management Governance Mapping – India (Christian Aid, 2010).

that is self-sustaining: maintaining a high growth rate to increase living standards is vital for the vast majority of the people and to reduce their vulnerability to climate change. The vision aims to achieve national growth objectives by enhancing ecological sustainability leading to further mitigation of greenhouse gas emissions. (NCCP, 2008)

The Indian Prime Minister has urged each State Government to create their own state level action plan consistent with the strategies in the National Plan (18-08-09). The Government recognises that to deal with the challenge of climate change there is a need to act on several fronts simultaneously. Eight National Missions form the core of the National Action Plan, which will promote understanding of climate change, adaptation and mitigation, energy efficiency and natural resource conservation. The priority National Missions are:

1. Solar energy
2. Enhanced energy efficiency
3. Sustainable habitat
4. Conserving water
5. Sustaining the Himalayan ecosystem
6. A 'Green India'
7. Sustainable agriculture
8. Strategic knowledge platform for climate change.

The National Action Plan has been prepared under the guidance and direction of Prime Minister's Council on Climate Change. Some of the national strategies and programmes are already part of current action, although it is known that they may need a change direction and accelerated implementation. The Missions are being institutionalised by their respective Ministries and it is clear that several will involve action at state level, a process which is beginning to get underway.

Disaster management finds a brief reference in the NAPCC, not as a Mission, but as an additional initiative integrated with the government's 11th Five Year Plan. It can also be noted that climate change is only mentioned briefly in the National Policy on Disaster Management as providing one factor in increasing vulnerability. It is however possible to identify inter-related policies in the NAPCC. For example, the National Mission on strategic knowledge is expected to develop accurate weather indices and better prediction of extreme events, early warning systems that can enhance preparedness. One of the potential linkages of national policy to state policy for the CSDRM is through the Mission on Sustainable Agriculture. This mission fosters adaptation in the agriculture sector by propagating varieties tolerant to extreme weather conditions.

There are several national and state-level policies across a range of sectors like agriculture, water, forest, health, housing, resettlement and rehabilitation that have the potential of integrating climate change and disaster risk reduction. This intermeshing of national, state and sub-state level policies takes place through the existing national and state-level institutions as well as local authorities. For example national government may moot mandatory rainwater harvesting or solar water heater usage for large residential complexes, but the state has to enact and amend rules to implement this.

2.1 Orissa state climate change action plan
Orissa is the first State in country to produce a State Climate Change Action Plan (CCAP). This move is a response to the particular pressing issues in Orissa and also direction from national policy. In addition to the disaster experiences outlined above there are also energy and development issues around the climate change agenda. There has been high growth in the metal and mineral sectors which has put pressure on the environment both due to land use change and degradation of forest area. Rapid urbanisation and industrialisation have resulted in high congestion in transport and scarcity of water and electricity. There is recognition that climate change has the potential to derail the current growth strategy and deepen poverty in Orissa. The underlying rationale for the CCAP is to lead Orissa to move towards a carbon-conscious, climate resilient development path.

In the first instance a scoping study was commissioned by DFID-India to support the

Government of Orissa[17]. The CCAP was prepared following presentation of the findings of this scoping study. The GoO established a High Level Co-Ordination Committee headed by the Chief Secretary with Principal Secretary Forest and Environment acting as its convenor to steer preparation of the CCAP. The GoO established 11 working groups to cover the different sectors, drawn from departments to deliberate on various actions that would help in reducing the impact of climate change in the state. The groups had multiple consultations with experts and officials and identified 287 priority actions in 11 sectors – some are adaptive and some are related to mitigation. Five stakeholder consultations were organized with about 500 people participating and sharing their point of view, helping government to finalise the action plan. The draft Climate Change Action Plan (CCAP) 2010-2015 was published on 5th June 2010[18]. Then the draft report was shared with stakeholders and is currently on the web to invite more comments from the wider stake-holding community.

The main feature of the Climate Change Action Plan is the high commitment of the state to the process, with the attention coming from the highest echelons of the administration. The Climate Change Action Plan has projected a budget of Rs 17,000 crores in different sectors in adaptation, mitigation, knowledge building and policy reform. A new Orissa Climate Change Agency is to be established during the first year of implementation with information, advisory, supervisory and coordinating role on climate change issues. This Agency will be a single-window contact for dealing with the Government of India and external funding agencies in issues relating to climate change.

The CCAP is the blue print for the next five years for reducing risk from climate change. In total the Draft Climate Change Action plan validated the 287 priority actions in 11 sectors:

Sectors	No of priority actions deliberated
Agriculture	37
Coastal Disaster	9
Energy	42
Fishery	14
Forestry	13
Health	10
Industry	60
Mining	42
Transport	19
Urban	21
Water	20
Total	287

The total climate budget is expected to be around Rs 17,000 crores for five years. This compares to spending in OSDMA of 1,300 crores over five years, and 230 crores for WORLP over ten years.

The CCAP framework could create the enabling environment to drive forwards the comprehensive approach to disasters which the CSDRM approach can frame. Because the OSDMA and WORLP cover two programmes with different geographical foci and are focused on different aspects of disasters – slow onset disasters (drought) under the WORLP interventions and rapid onset disasters (floods, cyclone, quakes) under the OSDMA, both with quite distinct types of activities – they are not yet related within the state frameworks. OSDMA and WORLP staff contributed to the development of the CCAP but to different sectors. In fact the recent Orissa Climate Change Action Plan creates distinct priorities under agriculture, water, basin development, rural development, and places disasters within a coastal context but recognises these are all cross-cutting.

The Orissa CCAP has several priority actions in coastal and fishery sectors which are relevant to the CSDRM, including scenario development, modelling, mainstreaming elements of disaster management policy at the district level (e.g. preparedness for heat wave, flash floods, etc.) It can be noted that the priority actions in agricultures sector has drawn heavily from experience of WORLP. The CCAP, for example, refers to the need for capacity building of

[17]Hedger and Vaideeswaran, 2010
[18]For the Orissa Climate Change Action Plan see: http://www.orissa.gov.in//forest&environment//ActionPlan//CAP_Report_Draft.pdf accessed 18/7/10

communities to adapt to climate change and better management of climate risks. Similarly the fishery and animal resource sectors' key priorities include early disease warning system, analysis of climate change impacts on aquatic resources and promotion of hardy breeds in the livestock sector.

Coastal and disaster management budgets run into Rs 1,300 crores in five years and focuses on investment in infrastructure, capacity building and enhancing knowledge base about climate events. Some of these actions will be implemented through the OSDMA and regular line departments and some also with the help of the NGOs.

2.2 Approaches and Methods

The case study has been undertaken by IDS and Ctran Consulting and is a development from previous work on the scoping study for the Orissa Climate Change Action Plan by IDS, and the close involvement of Ctran Consulting, in Orissa state policy issues over 10 years, including responsibility for the stakeholder consultations and currently finalising the CCAP. The purpose of assembling the database was to provide material which could be used to assess which of the CSDRM pillars were operative in Orissa. To fill gaps, and understand the dynamics of the policy processes involved, interviews were held with key informants at state level. Further assessment of the interactions of state and district level policy was made through interviews in Kalahandi district. The stages of the study are listed below.

(i) Review of existing information: A study of the information available at state level, and from the WORLP programme, including a set of 69 working papers produced over 10 years and a large number of other material such as newsletters and annual reports; and the newsletters, reports and website material of the ODSMA. The production of the Climate Change Action Plan involved stakeholder discussions managed by CTRAN (May 2010), which provided further insights.

(ii) Individual meetings with GoO departments and stakeholder organisations: A series of individual meetings were held with the GoO officials of the various departments. In addition, individual meetings were also held with DFID programmes that included WORLP. Selected meetings with individual experts and consulting companies were also held. A first set of individual meetings were held in Bhubaneswar between November 30, 2009 and December 3, 2009, in connection with the preparation of the Orissa State Action Plan. In addition further interviews were undertaken in May 2010 with interviews, and field visits to the WORLP activities in Nuapada District and a short trip to Kalandi District to explore the management of Disaster Risk Reduction at district level. A full list of meetings held is included in the Annex.

(iii) Analysis and assessment of the current policy interventions (WORLP and DRR) in relation to the SCR approach to identify strengths, gaps and implications for interventions elsewhere. Each facet of the three pillars (see page 38) was considered separately for OSDMA (section 3) and WORLP (section 4). If there was no obvious coverage this has been indicated. The assessment was undertaken in a qualitative way with expert judgement.

3. Assessment of the CSDRM pillars: the work of OSDMA

3.1 Pillar one: Tackle changing disaster risks and uncertainties: disaster risk management: OSDMA

1A STRENGTHEN COLLABORATION AND INTEGRATION BETWEEN DIVERSE STAKEHOLDERS WORKING ON DISASTERS, CLIMATE AND DEVELOPMENT

The formal structure of an integrated system on disaster risk management at all scales of governance has been driven by national level. Institution building in India has been given momentum from events, so the process started after the super-cyclone was accelerated with experience of the 2004 tsunami. A Disaster Management Bill was tabled in Parliament in 2005. This bill enacted structures at all levels – national, state, district and block levels – to prepare and reduce the effects of the disaster. Climate change was cited as one factor increasing vulnerability, but the system did not aim to integrate climate change. It is not clear to what extent the DRM system is operational state-wide and guidance manuals are followed. The focus so far has been on the coastal zone.

Before national legislation, Orissa had established OSDMA as an autonomous nodal agency under the Revenue and Disaster Department of GoO. This Department comprises the Directorate and Resettlement and Rehabilitation (focused on resettlement associated with industrial and mining projects), the Special Relief Commissioner, the Board of Revenue, land records as well as OSDMA. The direct connection between revenue and disasters is due to the work of the Special Relief Organisation (SRO), which comes under the Commissioner. The SRO was created in 1965 for a "relief and rescue operation during and after occurrence of various natural calamities"[19]. Its scope has been widened, principally though the OSDMA. The Special Relief Organisation however, has ultimately has the responsibility for dealing with disasters.

This means OSDMA is not burdened with full responsibilities for operational matters. The Special Relief Commissioner has a wide range of powers to help deal with emergencies and can requisition services of officers, and vehicles. The activities extend to the 11 "natural calamities" prescribed by the GoI: drought, cyclone, flood, fire, earthquake, hailstorm, tsunami, cloud burst, landslide, avalanche, and pest attack. Functions are to provide funds and supervise relief and rescue, to remain in preparedness to meet contingencies, undertake repair and rehabilitation work. The key proactive function is to undertake long-term measures by coordinating the activities of different department to minimise the impact of natural calamities and human casualties. The State Government is reimbursed by the GoI for payments out of the National Calamity Contingency Fund.

Stated principles of Disaster Management Policy in Orissa (2005) cover most of the tenets of the CSDRM approach, the main exceptions being about direct approaches to poverty reduction and their structural causes, and that climate change is not addressed directly – the focus is on disasters. The stated focus of policy is on "total risk management and vulnerability reduction by strengthening the physical infrastructure as well as the bio-physical, psychological, social and economic status of the people and increasing their disaster resilience"[20].

OSDMA has authority to coordinate with the line departments involved in DRR, relief and reconstruction, with bilateral and multi-lateral aid agencies, and with UN Agencies, international, national and state-level NGOs. OSDMA is placed at the centre of state policy making with the mandate to cover all disasters and management of relief, restoration, reconstruction and other measures. It has played a key role in coordinating with various line ministries like Environment, Agriculture, Panchayati Raj, Human Resource Development, Urban Development, and Rural Development to integrate DRR into some of the ongoing flagship programmes such as JNNURM, IAY, SSA and NREGA. But DRR is yet not mainstreamed in to all the development projects.

It does not have operational responsibilities for actions, but it mobilizes and prepares those who do: the complex delivery systems at district level under the District Natural Calamity Committee headed by the DM (District Magistrate) and other members from NGOs Elected Representatives and the Orissa Disaster Rapid Action Forces (ODRAF). OSDMA has also been

[19]www.orissa.gov.in/revenue/index.htm accessed 18/7/10
[20]OSDMA State Disaster Management Policy 2005

at the hub of several externally funded projects on DRR.

OSDMA has only a core professional staff of 25 with 32 support staff and basically works through a network including ODRAF action forces, which can be activated as needed (5 bases with 500 staff). District administrations initiate the process of handling of disasters by constituting various committees at different levels to prepare and plan for the disaster management through a system failure scenario.

Their work is framed by Relief Code guidelines and DDMPs to provide guidance to the ministries, departments and state authorities for the preparation of their detailed DM plans. These guidelines call for a proactive, participatory, well-structured, failsafe, multi-disciplinary and multi-sector approach at various levels. The District Disaster Management Plan contains protocol for line of command in disaster management and budgetary provisions for emergency procurement in the case of disaster occurrence.

1B PERIODICALLY ASSESS THE EFFECTS OF CLIMATE CHANGE ON CURRENT AND FUTURE DISASTER RISKS AND UNCERTAINTIES
Until the publication of the draft CCAP in March 2010, climate change had been identified ad hoc, as potentially increasing the number of disasters the state has to deal with, but there is not yet a coherent system. For example, the Annual Report of the Special Relief Commissioner 2008-9 links experience of extreme weather event in the state with an "erratic geo-climate situation"[21.] With heat waves and floods which have fallen outside the range of historic experience in the past decade or so, there is a general recognition amongst senior decision makers from interviews undertaken that climate change is an issue which needs addressing and emphasises the need for an effective DRM.

One major problem at state level is the fact that there are major gaps on information about climate change, and the management of uncertainty associated with available data. These data gaps originate from national level, but there is also a need to set up coherent and robust systems from state to Panchayat level which can deliver access to and manage unfolding knowledge. The principal gap that arises is the use of tools and methods to effectively manage the uncertainties related to climate change.

This is principally because there are some significant uncertainties about climate change in India as a whole and there has been, as yet, very little downscaling of global climate scenarios – what has been done is basically confined to the national science institutes. This has meant that state level institutions like universities are yet unable to perform effective intermediary roles. Once science capacities are accessible, there are several models for training and information dissemination available, for example, farmers' schools. The CCAP will be able to provide a bridging mechanism for this to happen.

For weather data the State Meteorological Centre, Bhubaneswar, was established in 1975. There are 18 departmental/part-time observatories under its control to record the weather in Orissa and 131 rain gauge stations. This is the probably the only climate data aggregated at the decentralised level. However, visits to some of these locations have shown that rain gauges hardly work.

Decadal changes in weather pattern are determined based on the rainfall and temperature data (diurnal and seasonal) gathered from one metrological station from each meteorological region is chosen for a detailed study e.g. Balasore, Bhubaneswar, Gopalpur, Jharsuguda, Titlagarh and Phulbani. Apart from that the data from IMD is used for prediction. There exists no systematic prediction system to aid crop planning relating to weather forecast.

Based on the deliberations in the climate change action planning process, the state agriculture department has started integrating the climate consideration in the kharif planning. It has introduced weather based crop insurance with an initial allocation of Rs 100 crores. It uses 25 years rainfall data and advance weather incidence protocol and the main crop paddy is covered under this scheme.

[21]http://www.orissa.gov.in/disaster/src/ANNUAL_REP_04-05/2008-09/Natural_Calamities_2008-09.pdf

1C INTEGRATE KNOWLEDGE OF CHANGING RISKS AND UNCERTAINTIES INTO PLANNING, POLICY AND PROGRAMME DESIGN TO REDUCE THE VULNERABILITY AND EXPOSURE OF PEOPLE'S LIVES AND LIVELIHOODS
As there is no formal assessment of climate risk as such, this dimension to the approach is covered by other sections.

1D INCREASE ACCESS OF ALL STAKEHOLDERS TO INFORMATION AND SUPPORT SERVICES CONCERNING CHANGING DISASTER RISKS, UNCERTAINTIES AND BROADER CLIMATE IMPACTS
Orissa has been building public awareness in the coastal zone about disasters, principally cyclone and flooding, and people should prepare. Obviously with communication abilities tuned to train people to respond to early warning systems for cyclones, there is considerable know-how about communication reaching out to the "last Mile Connectivity"[22].

Training has been focused on the 16 Districts (155 blocks and 23,600 villages) in the UNDP supported project (see section 2). Disaster Management Committees have been formed in all the blocks and members of Panchayati Raj institutions have been trained at various levels. In addition there are various formal educational and professional training packages developed with students in the XI grade studying DM.

OSDMA has tried to make the communication systems linking the state, district, block, gram panchayat as fail-safe as possible. Simultaneously, there are alternative standby systems of communication to ensure that there is no breakdown of communication during extreme events. Educating or making the community aware of the various warning levels and what response is required core to the OSDMA awareness programmes. Application of Information Communication Technology (ICT) in early warning systems, evacuation planning and execution, and rapid damage assessment has been promoted by OSDMA with satellite phones. A dedicated civil VHF network has been created and HAM radio systems deployed for the early warning systems in the disaster prone area.

Various innovative programmes like "Integrating disability in community-based disaster risk reduction and response" have been taken by the authority. As well as detailed and continuous interactive electronic communication (IEC) activities designed to create awareness among people through dedicated radio and print media. In remote areas NGO and traditional folk artists have been engaged to create awareness among the communities. OSDMA also shares information regularly with stakeholders in the form of books, documents and other IEC materials. Special IEC programmes have been designed for schools in the high-risk areas. It has brought out a compilation comprising submissions made by sub-groups formed by the Government of Orissa to look into multiple hazards facing the state.

OSDMA effectively links knowledge, technology by specialist institutions and civil societies, with grassroots experience, organisational capacity, participatory management skills, and community-based initiatives to generate awareness about disaster reduction. People in the coastal region are responding to the Community Based Disaster Management Plans and also regular mock drills are undertaken to ensure better preparedness. Special attention is paid to the vulnerability of disadvantaged groups like women, children, elders, physically and mentally challenged, and other marginalised groups. OSDMA has also brought out a booklet on women, which highlights the sufferings of women during disasters and their role in prevention, preparedness and mitigation in association with Care India.
All its activities are well disseminated on its website (www.osdma.org). Having developed successful know-how capacities, preparedness for cyclones across the state, it is using its capacities to develop responses and preparedness to other extreme events. Recently it has started campaigns on heat waves and flash flooding with NGOs and published adverts.

[22]See "The Response" OSDMA annual newsletter page 2 October 2009

3.2 Pillar Two: Enhance adaptive capacity: disaster risk management
2A STRENGTHEN THE ABILITY OF PEOPLE, ORGANISATIONS AND NETWORKS TO EXPERIMENT AND INNOVATE
In part 1a of this section, there was detail provided on how the national and state governments created the space for the development of OSDMA as an independent autonomous nodal agency. What has worked for emerging CSDRM in Orissa has been

bureaucracy-independent agency status for the key organisations like OSDMA, giving flexibility for rapid innovation, but also providing links into the official government structures to provide authority and access to resources. The space for innovation provided to OSDMA has in turn enabled it to support change amongst the agencies with which it works, notably NGOs. Overall it has started to link up knowledge and technology of specialist institutions, to civil society with grassroots experience, organisational capacity, and participatory management skills.

OSDMA has established coordination among government departments, state headquarters and district administration, and had the developmental space to create stronger institutional coordination with NGOs. It also developed its own database on NGO initiatives and held regular consultations with NGOs which has ensured quick and efficient response to floods. NGO initiatives to strengthen community- based disaster preparedness, which involve mock drills, training, contingency planning, and the formation of village task forces, have enabled people to better cope with floods. Close collaboration between NGOs enabled OSDMA to assess capacity building needs and prepare action plans, and helped NGOs to receive support from the government in carrying out rehabilitation activities in cyclone-hit areas. NGO involvement is also necessary for effective livelihood integration into disaster preparedness, as adaptation tools in many livelihood programmes are implemented through NGOs at the block level.

After the cyclone many international and local NGOs (such as the Red Cross, Concern World Wide) became involved specifically focusing on providing humanitarian aid and advocacy to disaster victims. More than 300 Local NGOs have also played an active role in emergency response, relief and rehabilitation – such as the Harsha Trust. This collaboration between Government and NGOs, on initiatives in disaster response, mitigation and reduction, has been vital for transparency and effectiveness. There is always a strong co-relationship needed between GoO-NGO for successful project implementation.

Even though NGOs are seen as key stakeholders in the DM process from the top, they themselves still sense they are seen as outsiders in the present political-bureaucratic environment in Orissa. Field discussions in Kalahandi revealed that the functioning of the District Natural Calamity Committee is of concern for NGOs due to their nominal representation in the overall process. However, more recently, some proactiveness from both sides (the new generation of NGOs like Harsha Trust and some departments) have helped in better implementation of certain programmes.

There are strong top-down drivers in managing climate risks in view of the responsibilities for human life. Even the multi-hazard planning that envisages significant local input for customised plans for the area is prepared mechanically. The plan when done at a decentralised level takes token inputs from the NGOs. The officials cite NGOs vested interest to be the problem to include the in planning and the NGOs blame the official reticence to be driven by resource available than the actual requirement of the people and also tardy implementation.

It should also be noted that there are some financial auditing implications of OSDMA's independent status. Most of the departments under the Government of Orissa are guided by the procurement rules of the Government called Orissa General Finance Rules (OGFR). This rule, which is quite archaic in nature, does not work during emergencies. The Finance Department also has provisions and flexibility from some discretionary grant funds and relief funds from the state to address micro-scale events. Large-scale events are mostly funded through the National Calamity Relief Fund and in the absence of any reasonable criteria it has been a charge/counter-charge and tug-of-war between the centre and state on quantum of release. The allocations are also mired by political preferences. Apart from this both MP-LAD and MLA-LAD funds are available to take adaptive, mitigative and emergency response.

OSDMA is registered under the Society Act 1860 as a financially autonomous, non-profitable and charitable organization. The Authority has introduced an operation manual containing administrative and financial powers delegated to the Managing Director and Chairman

with various rules and procedures for smooth functioning of financial activities. This manual has been approved by the World Bank on the concurrence of Finance Department and Accountant General of India. All the financial transactions of Externally Aided Project Works (EAP) funded by the World Bank and other funding agencies have been computerised in "Tally" accounting software since 1 April 2003. This works on the principle of a double entry system of book keeping and aligns the chart of accounts as per the requirement of the World Bank and other funding agencies with online cheque printing facility. This system seems to be working well[23].

2B PROMOTE REGULAR LEARNING AND REFLECTION TO IMPROVE THE IMPLEMENTATION OF POLICIES AND PRACTICES
Several of the points raised in 1D are also relevant to this section.

Probably the best example of the formal reflective and learning mode of OSDMA is the national workshop on heat waves which was convened by OSDMA in March 2006 in Bhubaneswar for national and state policymakers, experts and NGOs. This was prompted by the 1998 event when over 2,000 people lost their lives in the State. The event was opened by GoO Ministers and officials and convened by national science experts on heat waves and weather data in the state and was specifically linked to climate change. A report was published of the workshop proceedings.

OSDMA has data and monitoring system on a range of disasters, which can identify trends, for example, in lightning deaths (an increase in which has been linked to climate change). Records of disasters and how they were tackled, such as floods, are all recorded on its website.

Having developed know-how and preparedness for cyclones across the state, OSDMA is using its capacities to develop responses and preparedness to other extreme events. Recently it has started campaigns on heat waves and flash flooding. OSDMA is constantly improving its knowledge base. In 2009 OSDMA conducted hazard risk assessment and vulnerability analysis (HRVA) and came up with a Composite Risk Atlas for the entire state – this however only uses historic data to estimate the disaster occurrence frequency in a particular block.

At the district level, District Disaster Management Committee monitors pre- and post-disaster management planning. In the block H.Q. the Block-level Disaster Management Committee is responsible for monitoring of the Block Disaster Management Plan for efficiently handling natural calamities and disaster.

In terms of formal monitoring and evaluation, no external overviews of the work of OSDMA have been undertaken. OSDMA is judged within the state system in the annual report by classic DRR indicators: the number of reconstruction works undertaken (embankments, roads, water supply, schools rebuilt) after major disasters such as floods; the number of preparedness measures such as multi-purpose cyclone shelters it has created; its progress on improving communication of warnings of disasters through radio systems; and other aspects such as the equipment and training provided to the Rapid Action Forces listed. However capacity building activities are another indication of progress and policy planning initiatives, such as the creation of a GIS system. The Orissa State Disaster Management policy 2005, suggested taking risk reduction indicators as one of the monitoring indices for developmental activities.

Some further points about NGO activities are relevant in addition to those made in section 2A OSDMA has developed its own database on NGO initiatives for disaster response and preparedness and held regular consultations with them for sharing information, problems, and plan future courses of action. This unique innovative and participatory approach made it possible to handle the 2001 floods effectively. The 2001 floods were an acid test for this process, which the government and NGOs successfully passed. Emergency coordination among government departments, state headquarters and district administration, along with NGOs, ensured quick and efficient response to floods. This was made possible due to several steps taken by government and NGOs.

[23]Personal communication Ctran Consulting

NGO initiatives to strengthen community-based disaster preparedness, which involved training, contingency planning, and formation of village task forces, enabled people to better cope with floods. Closer collaboration between NGOs and OSDMA enabled OSDMA to assess capacity building needs, identify problems, and prepare action plans for strengthening disaster reduction measures, and helped NGOs to receive support from the government in carrying out rehabilitation activities in cyclone-hit areas.

2C ENSURE POLICIES AND PRACTICES TO TACKLE CHANGING DISASTER RISK ARE FLEXIBLE, INTEGRATED ACROSS SECTORS AND SCALE AND HAVE REGULAR FEEDBACK LOOPS
There is no obvious additional material to include covering this section.

2D USE TOOLS AND METHODS TO PLAN FOR UNCERTAINTY AND UNEXPECTED EVENTS
Planning for uncertainty and unexpected events, currently is related to climate variability and not climate change. However, since the major new extreme events of the 1998 heat wave, the 1999 cyclone, the 2004 tsunami, and the 2008 floods, there is now a disaster mindset that anything can happen:
"The geo-climatic conditions of Orissa induce occurrences of natural calamities like flood, cyclone, fire, hailstorm, drought, lightning, heat wave, earthquake and tsunami. Flood cyclone, hailstorm fire and heat wave are more frequent and intense bringing misery to the lives of people"[24].

As indicated in 2B OSDMA has data and monitoring systems that can identify trends. The short-term reactive information on cyclones and floods in Orissa, are monitored with the help of land based, ocean-based and space-based observational systems which include conventional meteorological observations, reports from ships, observations from ocean data buoys, coastal radar (conventional and Doppler) and national and international satellites (geo-stationary METSAT, INSAT, OCEANSAT and MEGHATROPIQUES), algorithm development, timely product generation, and updated terrain/land use mapping, etc. OSDMA runs early warning system based on 48 hours of advanced weather forecasting from IMD. This system worked well in the recent floods in 2001 but more robust research is needed to handle climate induced challenges like tornados and heavy rain falls.

Land-based systems are linked in to the Indian Meteorological Department (IMD) with 48 hours of advanced weather forecasting (see this section in the WORLP analysis regarding drought information). These systems work on short-time frames and have not factored in the additional risks from climate change for future planning.

3.3 Pillar Three: Address poverty and vulnerability and their structural causes: disaster risk reduction and OSDMA
3A PROMOTE MORE SOCIALLY JUST AND EQUITABLE ECONOMIC SYSTEMS
This is the aim of national and state policy and cannot be assessed here.

3B FORGE PARTNERSHIPS TO ENSURE THE RIGHTS AND ENTITLEMENTS OF PEOPLE TO ACCESS BASIC SERVICES, PRODUCTIVE ASSETS AND COMMON PROPERTY RESOURCES
Protocols based on the potential disturbances are an important step towards the development of plans for the management of disasters. These have been documented in relief code guidelines and DDMPs to provide guidance to the ministries, departments and state authorities for the preparation of their detailed DM plans. These guidelines call for a proactive, participatory, well-structured, failsafe, multi-disciplinary and multi-sector approach at various levels. The district disaster management plan contains protocol for line of command in disaster management and budgetary provisions for emergency procurement in the case of disaster breakout.

[24]Special Relief Commissioner. Annual Report 2008-9 page 1

Micro-level disaster management planning is carried out by the Gaon Panchayat Disaster Management Committee. This committee is supported by respective block offices in their area of jurisdiction. At village level, the village headman is instructed to initiate the process of constituting the village-level committees and is supported by the PRI's members and NGO's volunteers in the development of a community contingency plan. This way local knowledge is integrated in to the overall planning. Indigenous knowledge about weather forecasting has

not been systematically integrated into the planning process. However, these systems are not fully operative throughout the state – so far there are 16 District Level Disaster Management Planning Committees, which reach out to 155 Block Level Disaster Management Planning Committees and 22,000 Village Level Disaster Management Committees.

The following activities are supposed to take place:

- Training of trainers and orientation on Block and Panchayat Disaster Management Plans;
- Formation of Block and Gram Panchayat Disaster Management Committees, working plans, training of task forces;
- Selection and training of volunteers from each village in CBDP and mitigation and community;
- Contingency planning (preparedness and mitigation measures);
- Hazard vulnerability and resources mapping discussion, formulation of CCP and approval by the village's Palli Sabha;
- Formation and training of village response groups/task forces;
- Finalisation and approval of the GP and Block;
- Disaster management plans;
- Mock drills, plan implementation and social mobilization at various levels.

However systematic implementation varies from district to district.

3C EMPOWER COMMUNITIES AND LOCAL AUTHORITIES TO INFLUENCE THE DECISIONS OF NATIONAL GOVERNMENTS, NGOS, INTERNATIONAL AND PRIVATE SECTOR ORGANISATIONS AND TO PROMOTE ACCOUNTABILITY AND TRANSPARENCY
See comments under sections 1D and 2A.

3D PROMOTE ENVIRONMENTALLY SENSITIVE AND CLIMATE SMART DEVELOPMENT
Poverty reduction is the responsibility of departments such as Rural Development and Agriculture and not directly within the remit of the Revenue and Disaster Department of GoO where OSDMA is located. The direct connection between revenue and disasters is due to the work of the Special Relief Organisation created in 1965 for a "relief and rescue operation during and after occurrence of various natural calamities" which as responsibility for dispensing compensation payments for the impacts of disasters. Nevertheless, because of the concern that the poor are affected most by natural disasters, the State Government does provide ex gratia payments to families for deaths caused by heat stroke or lightning although these are not officially "national calamities" funded by the national government although it argues for them to become so.

Due to the procedures of its donor agencies such as the World Bank, OSDMA has incorporated environmental and social risk assessment[25]. OSDMA only works indirectly on poverty but does help to ensure that the social protection payments due in the time of disasters do get paid out, and also uses schemes such as NREGA to get flood protection works undertaken. OSDMA has taken some steps recently to link livelihood support into disaster management through the NREGA programme by restoring natural buffers like rivers, lakes and others. OSDMA could however setup more dedicated mechanisms to ensure that new projects involving development and related programs adhere to creation of disaster-resilient livelihoods.

[25]World Bank- National Cyclone Risk Mitigation Project 2005

4. Assessment of the pillars: WORLP

Information on the Western Orissa Rural Livelihood Programme (WORLP) used here derives from the range of documentation produced in the programme. One major source has been the Working Paper 69, Synthesis Report, the Effects of Climate Change in WORLP, produced by the Consultants team to the OWDM from inputs by Dr Satyanarayan, Dr Bhabani Das, Mr Ashok Singha and Ms Lopamudra (WORLP, 2009a) referred to as WORLP WP69 and in addition, a short policy brief: Climate Change Adaptation in Western Orissa (WORLP, 2009b).

4.1 Pillar One: Tackle changing disaster risk and uncertainties

1A STRENGTHEN COLLABORATION AND INTEGRATION BETWEEN DIVERSE STAKEHOLDERS WORKING ON DISASTERS, CLIMATE AND DEVELOPMENT
The Western Orissa Rural Livelihood Programme (WORLP) was not constructed as a Climate Smart Disaster Risk Management approach formally at the outset, though it was focused on Districts in Orissa that were known to experience slow onset disasters. WORLP has been a long-term DFID supported project located within the Orissa Watershed Development Mission (OWDM), itself part of the State Department of Agriculture.

With increased awareness of climate change, the work of the programme has been assessed with a climate change lens[26]. It was hypothesised that WORLP would have increased the capacity of people to adapt to increased levels of climate-induced change and stress. Due to the monitoring and evaluation framework of WORLP, there has been documentation of the coping mechanisms and adaptation practices which have been adopted by local communities in WORLP areas in response to increased climate-induced vulnerability.

WORLP has developed a large number of partnerships during its operation principally with state government institutes, research organisations and training organisations with specialities in crops, agriculture, water, and rural development. Some of these have involved technology development such as the "surface treadle pump". In addition many NGOs have been engaged, including Project Implementing Agencies undertaking watershed management activities and social mobilisation.

WORLP has been focused on poverty reduction at the outset, selecting the poorest, (using statistical data) rain-fed western Districts, which are some of the poorest in India in which to work. It started from a sustainable livelihood approach (SLA), adding this to traditional watershed management, creating "Watershed Plus". There have been close connections with drought management, as WORLP's host institution Orissa Watershed Development Mission (OWDM), is part of the Department of Agriculture, which has responsibility for drought management and works with the Indian Metrological Department (IMD). The Agriculture Department coordinates with IMD department for the monsoon prediction for pre-monsoon planning. Although it was not designed with climate change considerations in mind, the SLA has been considered as a rational platform to provide an increased capacity of people to adapt to increased levels of climate-induced change and stress, as well as increase people's ability to deal with climate change – principally drought, a slow onset disaster in DRM terms – outside the work of the OSDMA. However, there are noticeable flash flood events so at this point the two approaches, SLA and potentially DRR, contribute.

1B PERIODICALLY ASSESS THE EFFECTS OF CLIMATE CHANGE ON CURRENT AND FUTURE DISASTER RISKS AND UNCERTAINTIES
See general comments on the lack of information on climate change at state level in section 1A above.

WORLP lies in an area of India where the mean temperatures are seen to be rising, and where the vulnerability profile places it among the highest risk areas in the country. Three key weather dimensions have been identified following analysis of 50 years of meteorological data as affecting vulnerability:
- Drought and dry-spells at an interval of every 2 years, with a major drought every 5-6 years;
- High variability of rainfall, leaving people with two peak periods of food stress in the

[26]Working Paper 69, Synthesis Report, the Effects of Climate Change in WORLP, produced by the Consultants team to the OWDM from inputs by Dr Satyanarayan, Dr Bhabani Das, Mr Ashok Singha and Ms Lopamudra (WORLP, 2009a) and Climate Change Adaptation in Western Orissa (WORLP, 2009b).

region;
• Flash floods during the rainy season[27].

For the WORLP WP69 climate change study (WORLP, 2009a), there were some methodology limitations recognised. Conventional studies on climate change are long-term and time consuming in nature, and such approaches were not available to the team. Secondly, the project had a sustainable livelihood focus as it starts when there was no systematic understanding of the technical variables which we now associate with climate change. Project baseline data is only available for the previous three years, and the data does not conform with the expected requirements of a climate change study. The methods employed were as robust as was possible in the circumstances and proper sampling procedures and controls were employed where appropriate and feasible.

The data for the WORLP WP69 study was gathered either from secondary sources (National Climate Centre) or through case studies from watersheds and local Block level data, although the reliability of such data is not very high. The work did not include a full cause and effect analysis of climate parameters, since it was decided that this would have entailed more time and resources than were available.

As indicated elsewhere, the study shows that that the project has made a contribution in several areas relevant to climate change. The adverse effects of climate variability may have been lessened through natural resource interventions, where groundwater tables have risen, land use patterns have altered, and levels of crop diversification and production have increased. In the farm, off-farm and non-farm sectors, livelihoods have become increasingly diversified and thus more resilient. Much effort has gone into participatory planning and capacity building processes, and community level organisations mainly in the form of SHGs have grown in both number and strength, with increasing levels of federation. The increased stock of social capital that has thus been generated has seemingly gone a long way to ensuring quicker reactions, and responses, which are both better informed and more appropriate in stress situations.

In relation to the broader context of weather management for crops in Orissa, the plans of the State are largely linked to three different areas (1) Agriculture: Kharif and Rabi Planning[28]: annual; (2) Pre-Monsoon planning (with the Water Resources Department, several infrastructure departments including energy): annual; and (3) Crisis Management Plan[29] for some impending extreme weather event.

This planning starts at State level and after that the collectors interact with line department staff at the district level. However, systematic adaptive actions on varietal change and crop guidance to farmers are absent, except limited guidance of drought management. The District Agriculture department's lack the scientific research and the extension services to reduce the risk of climate change[30].

Drought management activities are primarily dealt with by the district agriculture department with technical collaboration of agriculture scientists and Indian Metrological Department (IMD). The Agriculture Department coordinates with the IMD for the monsoon prediction for pre-monsoon planning. The agriculture department in Orissa manages the uncertainties in weather by focusing on: flood resistant crops, alternative cropping; drought resistant short duration paddy and crop insurance with coordination from the Irrigation and District Rural Development Department.

In WORLP areas, a detailed cropping system planning process has been undertaken following participatory micro-shed planning methods, taking into account the change in climatic parameters from a watershed point of view. It has been largely focused on changes in the ground water recharge regime. The crops grown in aat land (upland) and medium land has changed and residual moisture has also provided scope for intercropping and additional crop. This has increased the cropping intensity in the area contributing significantly to increased income generation.

[27]Working Paper 69
[28]District Annual Plans
[29]District Contingency Plans
[30]Personal communication Dr Pattnaik, Agronomist OUAT Extension College Kalhandi 2010

1C INTEGRATE KNOWLEDGE OF CHANGING RISKS AND UNCERTAINTIES INTO PLANNING, POLICY AND PROGRAMME DESIGN TO REDUCE THE VULNERABILITY AND EXPOSURE OF PEOPLE'S LIVES AND LIVELIHOODS

The Sustainable Livelihoods Approach (SLA), underlying WORLP, illustrated and guided by a framework, was very much at the core of the design process. It hypothesised that enhancement of people's livelihood assets would, given supporting processes, lead to the development of effective strategies and eventually to positive livelihood outcomes. But it always recognised that these processes were prey to what was termed the vulnerability context, where shocks, adverse trends and seasonality – over which they had no control – had the capacity to drag people back into poverty if permitted to do so. In many ways, this model has proven to be a powerful one in the light of more recent climate change evidence

1D INCREASE ACCESS OF ALL STAKEHOLDERS TO INFORMATION AND SUPPORT SERVICES CONCERNING CHANGING DISASTER RISKS, UNCERTAINTIES AND BROADER CLIMATE IMPACTS
WORLP has not worked on this directly.

4.2 Pillar Two: Enhance adaptive capacity
2A STRENGTHEN THE ABILITY OF PEOPLE, ORGANISATIONS AND NETWORKS TO EXPERIMENT AND INNOVATE
WORLP was one of the first DFID projects to function and be housed within Government. This decision was controversial at the time[31]. Opinions were divided between those who felt it would be stifled within Government and those who felt that this would work better for replicability and scalability[32]. In fact the project was able to innovate and generate new knowledge and these lessons have been scaled up throughout the national watershed programme in the guidelines enshrined in the Integrated Watershed Management Programme (IWMP) – the "watershed plus concept has been widely accepted and replicated showing clear evidence of its success". In the first phase 290 blocks were covered and in the second a further 397 watersheds are being covered in four Districts. Within Orissa, the operation, structure and function of OWDM have been implemented and the approach was extended through Jeebika from 2007 to six other districts in the state with the additional 'livelihood component' would be provided to 460 ongoing watershed projects implemented under the Integrated Wastelands Development Programme (IWDP) and the Drought Prone Area Programme (DPAP).

The reason for WORLP's success is due to its institutional set-up, WORLP has been empowered through OWDM, which has allowed a high level of autonomy and flexibility. Activities which appear to be very beneficial in terms of increasing people's capacity to adapt to and cope with climate-related stress, have been implemented in a quick, effective and participatory way, and through a direct chain of command. This has allowed the project institutions, which were designed to operate in a highly participatory mode at all levels, to operate effectively and have an increased impact.

At the State level, the project is under the aegis of the Director, Watershed Mission; at the district level, PD Watersheds located in the project districts have independent offices; and Project Implementing Agencies (PIA) and Watershed Development Teams (WDT) are in place for implementing the project in a specified number of watersheds at Block level. The implementation and governance functions are clearly segregated at each level by the creation of Empowered Committees at the state level, District Watershed Development Committee (DWDC) at the district level and Block Review Committee at block level. OWDM have 30 professionals and within districts around 12 core people are employed.

2B PROMOTE REGULAR LEARNING AND REFLECTION TO IMPROVE THE IMPLEMENTATION OF POLICIES AND PRACTICES
WORLP has operated as a learning institution at various levels and in various ways:
• Overall, as indicated it has transformed national and state policy on watershed management and produced innovations relevant to climate change adaptation and slow onset disasters.
• WORLP staff have been trained and worked closely together in supportive ways to

[31]Personal communication Dr Peter Reid
[32]NR International, OWDM and WORLP Policy Brief: Sustainable Livelihoods and Climate Change Adaptation in Orissa, 2009.

develop new approaches. At district and block level, staff have met regularly.

- Communities have been empowered with a range of community-based organisations; almost 6,000 self help groups (SHGs) have been formed. These groups have been sensitised to develop norms for functioning and participatory processes and group management creating social capital.
- WORLP has continuously facilitating decentralised and institutionalised capacity building with natural resources management, livelihoods, micro-enterprise and other related developmental programmes.
- A pool of resource persons (RPs) have been developed at the cluster (10-15 watersheds).
- Cluster Livelihoods Resource Centres have also been promoted with 20 standard training kits prepared by different resource organisations specialised in the thematic areas.
- Best practices of successful innovations have been documented in various formats and disseminated throughout the project. WORLP has developed a communication strategy to meet all the client groups from the community, including the donor and international community: there is a bi-monthly Oriya newsletter, 52 short Oriya films, dramas, and 20 training kits.
- High-level workshops have been held, for example on social exclusion in 2009 and sustainable livelihoods and rural development in 2010.

2C ENSURE POLICIES AND PRACTICES TO TACKLE CHANGING DISASTER RISK ARE FLEXIBLE, INTEGRATED ACROSS SECTORS AND SCALE AND HAVE REGULAR FEEDBACK LOOPS
There are no specific practices in place here.

2D USE TOOLS AND METHODS TO PLAN FOR UNCERTAINTY AND UNEXPECTED EVENTS
There are no specific practices in place here.

4.3 Pillar Three: Address poverty and vulnerability and their structural causes
3A PROMOTE MORE SOCIALLY JUST AND EQUITABLE ECONOMIC SYSTEMS
Changes to social and economic systems are being addressed at state and national level.

3B FORGE PARTNERSHIPS TO ENSURE THE RIGHTS AND ENTITLEMENTS OF PEOPLE TO ACCESS BASIC SERVICES, PRODUCTIVE ASSETS AND COMMON PROPERTY RESOURCES
This aspect of the CSDRM goes to the heart of the WORLP approach. The goal of WORLP is to reduce the population below the official poverty line by 30 per cent by the year 2010. The project has ensured targeting of poor households by defining poverty on absolute and relative terms, i.e. on the actual numbers moving out of poverty, but also on the basis of community perceived well-being indicators. The information below derives from WORLP's Management Information System (MIS) and the Impact Assessment of WORLP by Sambodhi/ Winrock Consortium undertaken in March 2009. Community Link Workers (CLWs) appointed by the project are important agents for providing information.

Under the DFID project management system, WORLP has been periodically reviewed and the evidence base for its outcomes in several areas is well tested. The adverse effects of climate variability may have been lessened through natural resource interventions, where groundwater tables have risen, land use patterns have altered, and levels of crop diversification and production have increased. In the farm, off-farm and non-farm sectors, livelihoods have become increasingly diversified and thus more resilient. Crucially, much effort has gone into participatory planning and capacity building processes, and community-level organisations mainly in the form of self-help groups have grown in both number and strength, with increasing levels of federation. The increased stock of social capital that has been generated has seemingly gone a long way to ensuring quicker reactions, and responses, which are both better informed and more appropriate in stress situations.

People in the programme 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.

The programme is unique in its design and approach as it has less of the technical confines seen in other, previous watershed programmes. "Watershed Plus" is a term which has been

coined during the design of this project, and refers to the additional focus on people's livelihoods, introduced as part of the project. This dimension has now been mainstreamed throughout water management in Orissa State and taken up at national level.

Some more precise details on what WORLP has achieved:

Natural Resource Management (NRM) interventions - these appear to have successfully increased the adaptive capacity of the community during climate stress, especially in areas where the land and its holding capacity are more marginal. A large number of NRM activities are being implemented in the four concerned districts, typically aimed at managing and checking runoff from different catchments and reducing the sediment load in water bodies, with a view to enhancing water resources and improving the productivity of land. Many NRMs were provided through NREGS, such as farm ponds (4,300), block plantations (550 has) and ring wells (141). The WORLP project was able to access 50 years of weather data for the study areas.

Groundwater - NRM interventions have had marked effects on the groundwater table. Although from a limited dataset, the water table in monitored watersheds was raised in both upland and lowland situations, combined with a reduction in the intra-annual fluctuation. The water table in one watershed sampled had risen over six metres over the project life. 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 may be concluded are at least in part an outcome of project NRM interventions..

Agricultural production - increased groundwater tables in turn have had quite a significant impact on crop production cycles. In the watersheds indicated above where data was maintained by OWDM, water tables were not only maintained but also improved during October (the rabi season), which was previously a water stress period. Crop diversification has occurred on a widespread scale (an 80 per cent increase in area), and yields are reported to have substantially improved, with increases of 50-100 per cent not uncommon, slightly less for paddy at around 30 per cent. Seed exchange is another effective mechanism that is evolving for adapting to change, and the practice has increased by nearly 100 per cent over the project life, and again farmers report increased yields resulting from this practice of at least 50 per cent. Livestock and aquaculture activities have also increased, as have returns from these, often 20-30 per cent more than in control villages.

Poverty reduction - the goal of the project is to reduce the population below the official poverty line by 30 per cent by the year 2010. The project has ensured targeting of poor households by defining poverty on absolute and relative terms, i.e. on the actual numbers moving out of poverty, but also on the basis of community perceived well-being indicators. The recently conducted Impact Assessment has calculated that by using both of these indicators, the project has had a substantial impact on poverty, with respectively 28 per cent and 30 per cent reduction in the number of poor households. This, translated into real numbers, means that some 72,000 households have moved above the poverty line, and assuming a household size of five, this means that around 360,000 poor people have been moved out of poverty[33]. Much of this can be attributed to enhanced levels of livelihood assets, in particular financial, natural and social. Non-refundable grants either for consumption or assets have been available to those households that communities regard as "very poor", and there is a revolving fund for loans for micro-enterprises.

[33]Impact Assessment of WORLP: Sambodhi/Winrock Consortium, March 2009.

As many as 91 per cent of the very poor and poor households (HHs) have reported that access to information has improved over the three years; 75 per cent of the very poor HHs have reported access to information on government schemes/livelihood activities through Village Information Centers (VIC). MIS data indicates that 94.6 per cent of the very poor HHs have benefitted from government schemes during the last three years, key ones being MGNREGS, MDM and Swarnajayanti Gram Swarozgar Yojana (SGSY).

Social capital - WORLP has made substantial investments in capacity building, which translates into an increase in the social capital of the community – regarded as possibly the project's greatest contribution to increasing people's capacity to adapt in crisis – as they have ready access to better information and more appropriate responses to stress situations. The increased number and strength of Self Help Groups (SHGs) (some 65,000 members in over 5,000 SHGs) has significantly increased the stock of social capital, and this has immediate impact on reducing people's vulnerability, cushioning the effects of climate-related shocks, and ensuring a better ability to cope. Through the groups' exposure to participatory planning processes, they are better able to manage common property resources, and are more prepared for crises than in areas where such groups are either non-existent or weak.

Gender effects - project initiatives appear to have had a positive effect on women, which in turn has increased their capacity to adapt to climate-induced stress and to cope in situations of crisis. This has happened to a large extent through a large number of increasingly strong SHGs, where women are able to share resources and ideas, and thus reduce their inherently high levels of vulnerability. Migration and the associated stress, which is particularly acute in women, have been very substantially checked by project activities (from almost 50 per cent incidence to under 15 per cent). In addition to these positive effects of increased social capital, some of the effects of enhanced natural capital may be seen as favouring women, such as improved food security, improved health status including child nutrition, and reduced drudgery.

A gender empowerment index was developed and time budgeting of household activities was calculated for men and women to identify key drudgery reduction activities (access to water, fuel and other agricultural activities). Enhanced access to drinking water in the project area with almost 84 per cent of the HHs accessing a safe drinking water source within 100 meters of the household was identified as a drudgery reduction activity. Other initiatives include low cost energy devices like smokeless stoves and treadle pumps, which have also reduced drudgery for women. MIS data shows that 230 villages have been adopted under the Total Sanitation Campaign through convergence with Rural Water Supply and Sanitation (RWSS) and Gram Vikas.

3C EMPOWER COMMUNITIES AND LOCAL AUTHORITIES TO INFLUENCE THE DECISIONS OF NATIONAL GOVERNMENTS, NGOS, INTERNATIONAL AND PRIVATE SECTOR ORGANISATIONS AND TO PROMOTE ACCOUNTABILITY AND TRANSPARENCY
The development of strong institutions in particular at community level is one of the key achievements of WORLP, and there is concern that continued strengthening of these institutions should be maintained including proper handing over of all resources and responsibilities at the end of the project. Empowerment of communities starts by devising the appropriate structure at the top and then is focused from the district level.

The WORLP programme has a defined structure at the district level that supports the implementation of the watershed and watershed plus activities. The District Project Director (PD) heads the watershed activities in a district with support of Assistant Project Directors. The PD's office also has the CBT (Capacity Building Team) consisting of four members specialising on livelihoods, micro-enterprise, NRM, and monitoring and evaluation. A three member Livelihood Support Team (LST) constituting of specialists from agriculture, micro-enterprise and social development sectors are attached to the PIA to support the implementation and monitoring of watershed plus activities in the intervention areas. The LST-Social Development is specifically responsible for the gender and community organising activities. The firm front line contact is made by the Watershed Development Team (WDT) at the village level with support of community link workers who are village volunteers who facilitate activities, with a basic honorarium as stipend.

Micro-planning ▪ all micro-plans that are prepared should in future keep in view the variability of the climate in the region with regard to each planning component, and the finances that will support each activity, particularly those designed to strengthen any NRM measures. Concerns regarding equity and gender may particularly be addressed while preparing action plans for development of livelihoods as well as for development of natural

resources. This may essentially be achieved through increased involvement of women's SHGs, and men's SHGs from resource poor families.

Capacity building - the project has accomplished a huge amount on the capacity building front, both in terms of project beneficiaries and project staff. This has been achieved at least in part through the Cluster Livelihood Resource Centres, which are distributed in each district of the project area. It is important at this stage of the project that courses increasing awareness about climate change and developing people's capacity in adapting and coping are developed and implemented. Capacity building interventions should cover both structured and informal training, orientation, and sensitisation on climate events, their causes and sustainable climate management practices.

Diversification of livelihoods - the project has made a huge contribution to the capacity of communities to adapt to climate-related shocks through promotion of sustainable livelihoods and livelihood diversification. This work should be continued, consolidated and scaled up, both in a farm, off-farm and non-farm context. The Revolving and Grant Funds are playing a major role in this regard. The use of agro-forestry systems is an economically feasible way to protect crop plants from extremes in microclimate and soil moisture and should be considered a potential adaptive strategy for farmers in the project. This may be achieved with tropical crops such as coffee, cashew, and mango.

Participatory monitoring - one of the major strengths of WORLP is participatory monitoring of the implementation of activities by the community and mid-course corrections. Four tools are currently used:
• Participation index;
• Group self assessment for SHGs, UGs and WDCs;
• Measurement of livelihoods;
• Simplified micro-credit and accounting systems.

3D PROMOTE ENVIRONMENTALLY SENSITIVE AND CLIMATE SMART DEVELOPMENT
Many of the natural resource management interventions detailed above, are fundamental to securing the sustainable component of the SLA.

There are several activities in this WORLP that have been helpful in reducing abetting the production of green house gases (especially CO_2, N_2O and Methane). These have been carefully identified within the Working Paper 69, Synthesis Report, The Effects of Climate Change in WORLP. Overall it has been calculated that around 800,000 tons of Co_2 have been reduced[34].

Table 1 Project activities and GHG mitigation

Project activities	GHG gases mitigated	Key Impact
Plantations	CO2	Sequestration
Vermi-compost	CH4	Nutrient Management and NO2 reduction
Distribution of low energy consuming pumping devices like surface treadle pumps	CO2	Low energy intensity
Distribution of smokeless chullah, solar lanterns	CO2	Low energy intensity
SRI Method-less water and hence less pumping	CO2	Low energy intensity

[34]NR International, OWDM and WORLP Policy Brief: Sustainable Livelihoods and Climate Change Adaptation in Orissa, 2009.

The statistics for various energy saving devices that have been promoted by the project are listed below.

Table 2 Low energy consuming devices				
Activities	Details	Unit of Measurement	Cumulative Up to April-March 07	Cumulative Up to April-March 08
Surface treadle pump	Installed	Total number	1260	1464
Rope and washer pumps	Installed	Total number	31	41
Pressure pumps	Installed	Total number	17	24
Drip irrigation systems	Installed	Total number	47	49
Others, if any (specify)	Specify	Specify	0	1

(Source: MIS of WORLP)

These devices ensure that communities are better able to cope by reducing drudgery. They also have low carbon emission because of clean energy use, and hence help in mitigation of CO_2. The composting and vermi-compost activities help in mitigating the methane emission from the field, which has a more potent warming potential. The potential co-benefit has been estimated in a separate section (Section 6).

Table 3 Composting for methane emission reduction				
Activities	Details	Unit of Measurement	Cumulative Up March 07	Cumulative unto to March 08
Composting	Type of compost	Type	3 to 4	3 to 4
	Farmers involved	Total number	6537	802 4
Others	Vermi Compost pit		449	933

(Source: MIS of WORLP)

In addition WORLP, with support from NR International is seeking to reduce its emissions directly from its offices and in its working practices. A series of recommendations covering behavioural change, equipment procurement and building improvements have been put together and imparted to the staff and managers.

5. Assessment of climate smart disaster risk management approach from Orissa case study

From examining the actions of OSDMA and WORLP in relation to the CSDRM approach – see summary table below – several points arise.

Both programmes have current activities which accord strongly with the institutional dimensions of the CSDRM in relation to coordination of agencies and partners and enabling their capacities to innovate (1A and 2A). Both programmes have been given priority by the State Government and donor organisations, are resourced to deliver, and given space to innovate.

DRM has been reconfigured in a proactive mode around a new institution. WORLP has been a long-term project which acted as a laboratory for its host and changed water basin management practices. However, this study has not been able to assess the full extent of the reach and effectiveness of broader coordination at state, district and panchayat level. Independent assessments have been made of WORLP but any on OSDMA are not accessible.

Some facets are strong in one programme and weak in another. For example OSDMA has capacities on public awareness (1D) whilst WORLP focuses on empowerment and participation (3B and 3C). Establishment of a CSDRM approach therefore should be able to select strong points from the "best" programme and draw these together. Yet because rapid and slow onset disasters are institutionalised separately this is unlikely to take place without an integrated vision.

Both programmes have components that provide crucial know-how, which can be marshalled for CSDRM. For example OSDMA works with national and international specialist forecasting agencies to pick up potential cyclone and storm events. WORLP works within the technology of water basin development, using a variety of land and water management techniques, to identify, plan and implement locally workable solutions. However, neither OSDMA or WORLP and OWDM are currently working with tools and methods around climate risk assessment. OSDMA has capacities on sudden onset disasters (floods and heat waves) and WORLP on slow onset disasters (drought). Both work to some extent with natural resource management for sustainability.

Both programmes suffer from gaps in knowledge (1A and 1C). Neither is systematically assessing the effects of climate change on disaster risk and uncertainties so they cannot apply this knowledge to tackle the vulnerability and exposure of people's livelihoods and the physical environment to changing disaster risks and uncertainties.

Both programmes are targeted in specific geographical areas and do not cover the state as a whole; OSDMSA is focused on the on the coastal communities and districts and WORLP on Western Orissa, although the practices are now being replicated in ten other districts.

It is also clear from the presentation of the Orissa CCAP that working from a state plan basis there is a tendency to perpetuate existing organisational boundaries and activities and that it will be a challenge to create a seamless approach to climate change adaptation and disaster risk management, although the new planning process has created the potential for this to happen.

There are embedded drivers in both the work of OSDMA and WORLP, which emanate from concerns central to politicians at national and state level concerning poverty reduction and the safeguarding of communities from the impact of "natural calamities". Day-to-day operational practice works to deliver on these concerns. However some facets of the CSDRM approach, such as 3A, and at national or State Government political level, for example, and the promotion of more socially just and equitable economic systems.have to be addressed at national level.

5.1 Learning points and recommendations

Applying the framework has revealed the strengths and weaknesses of current approaches to climate-related disasters in Orissa. Clearly whilst there is some exemplary practise from which to work there is not yet a CSDRM operative in Orissa. It makes sense to construct CSDRM out of a range of existing institutions and programmes. Consolidation will require strong leadership from above to tackle departmentalism and constraints associated with the sectoral/departmental organisation of policy. Approaches to slow onset disasters (droughts) and rapid onset disasters (floods and cyclones) are currently institutionalised separately and mainstreaming climate change within them could perpetuate sectoralism and may lead to complication rather than simplification. A much broader approach to disasters needs to be defined, which includes all climate risks.

There is also learning for the CSDRM framework from Orissa. To deliver climate smart disaster risk management, it is necessary to create coherence in delivery across scales of governance – the framework could be expanded to recognise this dimension more explicitly. National policy enables action and provides crucial resources, the state (sub-national) level frames delivery, real convergence takes place at District level across government departments and, NGOs work with the local/panchayat organisations to make things happen. There is an opportunity for policy change with the State Action Plan on Climate Change and this report can help inform the work of the new state CC Agency.

- Both OSDMA and WORLP have strong practice from which to build but neither delivers everything that is needed. It makes sense to construct CSDRM out of a range of existing institutions and programmes, which themselves have taken many years to develop. Full CSDRM will need time to establish outside a project level: it will need to support the development of adaptive capacity and social resilience to address different aspects of the package of increased risks associated with climate change. It will also need to be able to assess these changing risks as more knowledge becomes available.

- There will also be a need to tackle some constraints associated with the sectoral/ departmental organisation of policy and need strong leadership from above to tackle departmentalism. Approaches to slow onset disasters (droughts) and rapid onset disasters (floods and cyclones) are currently institutionalised separately and mainstreaming climate change within them perpetuates sectoralism. There is also a need to scale up from projects, pilots and geographically targeted areas, presenting challenges when different programmes need to be integrated across sectors, institutions and scales. Climate change could provide the driver and the new Orissa Climate Change Agency should step up to drive the momentum.

- What has worked for emerging CSDRM in Orissa has been bureaucracy-independent agency status for key organisations giving flexibility for rapid innovation, but also providing links into the official government structures to provide authority and access to resources.

- From overviewing DRM policy and the Watershed Plus approaches in relation to the approach, the principal gap that arises is the use of tools and methods to effectively manage the uncertainties related to climate change. This is principally because the there are some significant uncertainties about climate change in India as a whole and there has been as yet very little downscaling of global climate scenarios – what has been done is basically confined to the national science institutes. This has meant that state level institutions like universities are as yet unable to perform effective intermediary roles. Once science capacities are accessible, there are several models for training and information dissemination to set up coherent and robust systems from state to panchayat level, including farmers' schools which can deliver access to and manage unfolding knowledge.

- Climate change is increasingly seen as relevant to both OSDMA and WORLP and becoming a driver for development in their activities. The new CC Agency should help consolidation rather than fragmentation. Whilst there is already recognition there are cross-cutting themes, this may lead to complication rather than simplification. A much broader approach to disasters needs to be defined, which includes climate risks. This would mean that there would be a drive to integration and linkage across sectors.

CSDRM approach pillars	Assessment on OSDMA	Assessment on WORLP
1a Strengthen collaboration and integration between diverse stakeholders working on disasters, climate and development	DRM a priority, switch into proactive mode, new institution OSDMA and coordination improved. CC increasingly seen as a relevant factor.	WORLP has focused on delivery in target groups in some watersheds – here it has had a coordinated impact. It Has also developed the necessary links at state level.
1b Periodically assess the effects of climate change on current and future disaster risks and uncertainties	Not yet tackled – lack of information at state level emanating from national specialist institutions.	Awareness of CC as a driver, no specialist analysis undertaken on changing future risk.
1c Integrate knowledge of changing risks and uncertainties into planning, policy and programme design to reduce the vulnerability and exposure of people's lives and livelihoods	Not yet done.	WORLP supports people to cope with current climate variability.
1d Increase access of all stakeholders to information and support services concerning changing disaster risks, uncertainties and broader climate impacts	Good and innovative systems developed on communication of disasters.	Not on CC and disaster risk – good communication support – see below.
2a Strengthen the ability of people, organisations and networks to experiment and innovate	OSDMA itself a major innovation and has been given space outside the official state bureaucracy to operate effectively, and it is creating new ways of working for NGOs etc.	WORLP is a major innovation and has worked in innovatory ways transforming its partners and institutional framework at state level.
2b Promote regular learning and reflection to improve the implementation of policies and practices	OSDMA leads training down to Panchayat level. Capacity building being supported by external donors.	WORLP operated as a learning organisation in several ways.
2c Ensure policies and practices to tackle changing disaster risk are flexible, integrated across sectors and scale and have regular feedback loops	Not done.	No specific practices in place.
2d Use tools and methods to plan for uncertainty and unexpected events	Good systems in for extreme events but this is not yet accounting for increased risks due to climate change.	No specific practices in place, but whole methodology of WORLP has worked from careful field analysis before new actions started including analysis of weather records.
3a Promote more socially just and equitable economic systems	Not relevant – a national and state government responsibility.	Not relevant – a national and state government responsibility.
3b Forge partnerships to ensure the rights and entitlements of people to access basic services, productive assets and common property resources	Good provision made for micro-level DRM in coastal zone and many procedures officially put in place – effective working not clear.	WORLP has been fundamentally about poverty reduction and used NRM interventions, micro-credit cash support for self help groups and developed social capital.
3c Empower communities and local authorities to influence the decisions of national governments, NGOs, international and private sector organisations and to promote accountability and transparency	No further material here.	Strong institutions been developed at community level and participatory monitoring tools are used.
3d Promote environmentally sensitive and climate smart development	Some environmental works undertaken for DRM and working with NREGA.	NRM been critical to sustainable watershed management and plantations established through NREGA.

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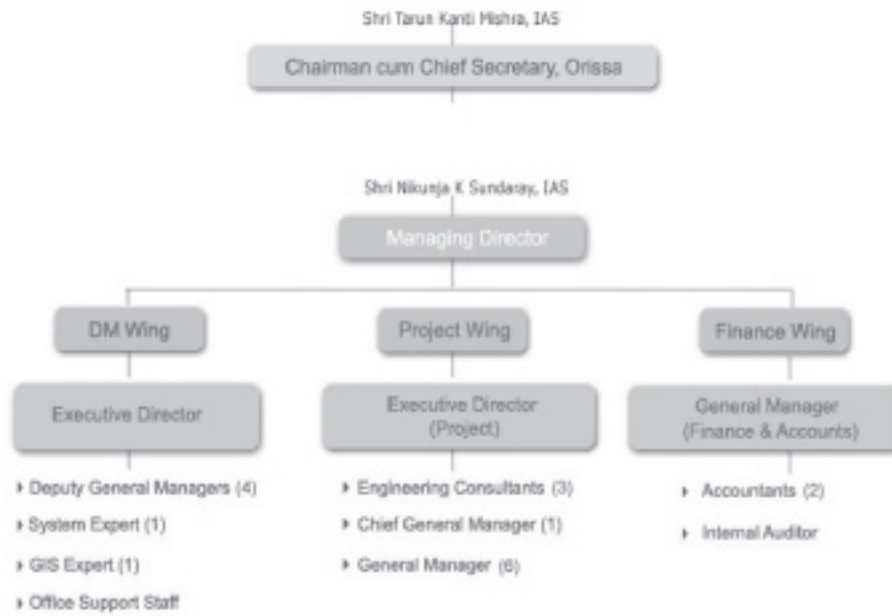
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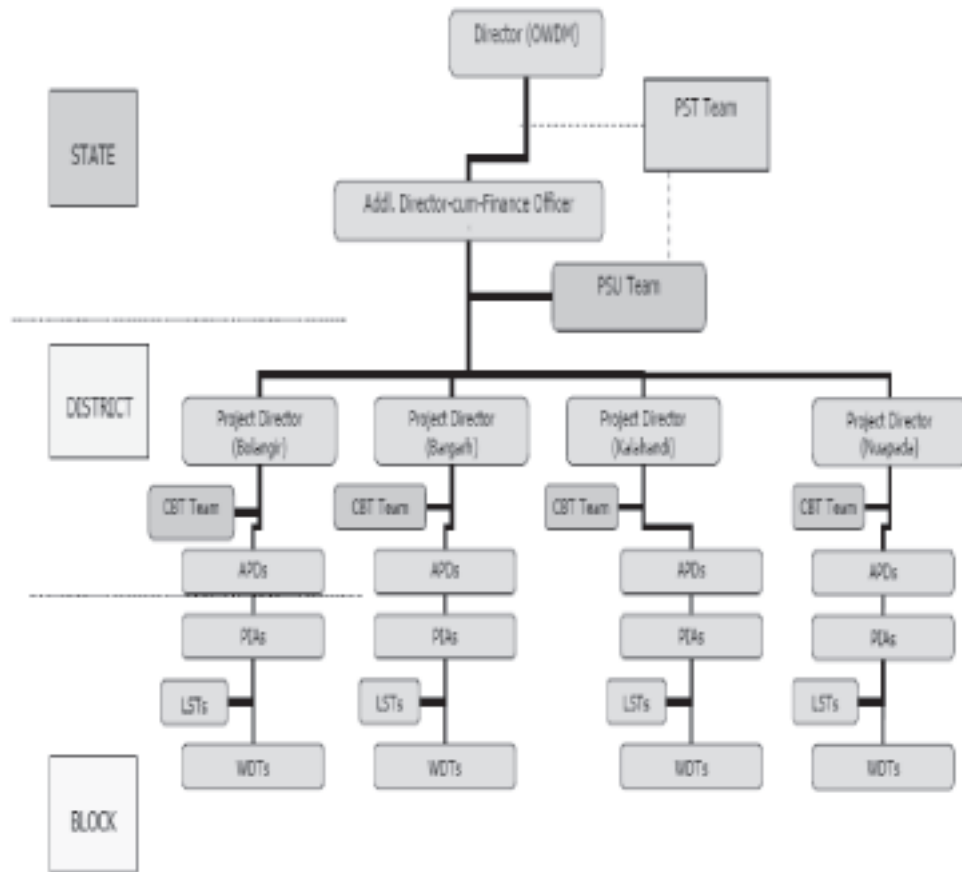
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6. Annex 1: Organogram of OSDMA

Shri Tarun Kanti Mishra, IAS

Chairman cum Chief Secretary, Orissa

Shri Nikunja K Sundaray, IAS

Managing Director

DM Wing	Project Wing	Finance Wing
Executive Director	Executive Director (Project)	General Manager (Finance & Accounts)

DM Wing
- Deputy General Managers (4)
- System Expert (1)
- GIS Expert (1)
- Office Support Staff

Project Wing
- Engineering Consultants (3)
- Chief General Manager (1)
- General Manager (6)

Finance Wing
- Accountants (2)
- Internal Auditor

7. Annex 2: Organogram of WORLP

8. Annex 3: List of meeting participants

Name	Job Title	Organisation
Bidisha Pillai	Communications Adviser	DFID
Supriya Pattanayak	State Representative	DFID
Upendra N. Behera	Principal-Secretary	GoO Forest & Environment Department
Dilip Das	Director	Anthodaya
Kailash Das	Executive Director	RCDC (NGO)
Saroj Das	Dean	SIDM (NGO)
Alison Dembo Rath	Team Leader	TMST 4 Orissa Health
Bhagirathi Behera	Director Environment	GoO Forest & Environment Department
Bhaskar Sarma	Director of Agriculture & Food Production	GoO Agriculture Department
B.Mishra	Manager	AFC (NGO)
Deepak Mohanty	Programme Director	Orissa Tribal Empowerment & Livelihoods Programme
B.P. Singh		GoO Forest Department
Mishra, Kamal Lochal	DGM	OSDMA
Er. N.K. Mohapatra	Director, Hydrology & Water Planning	GoO Water Resources Department
Dr Pattnaik	Agronomist	OUAT Extension College Kalhandi
Peter Reid	Technical Consultant	WORLP: DFID project
Bhaskar Sarma	Director, Agriculture & Food Production	GoO Agriculture Department
Nirinjan Sahu	Coordinator	WORLP:DFID project
Raju Sharma, Raju	Director	DAPTA (NGO)
Bijayanand Seth	District Emergency Officer	Kalahandi District
N.K.Sundraya	Managing Director	OSDMA
Sunil	Director	Parivarthan (NGO)

The Climate Smart Disaster Risk Management Approach
Strengthening Climate Resilience

The questions in the approach are suggestions only and there may well be others

1. Tackle changing disaster risks and uncertainties

1a
Strengthen collaboration and integration between diverse stakeholders working on disasters, climate and development

To what extent are climate change adaptation, disaster risk management and development integrated across sectors and scales? How are organisations working on disasters, climate change and development collaborating?

1b
Periodically assess the effects of climate change on current and future disaster risks and uncertainties

How is knowledge from meteorology, climatology, social science, and communities about hazards, vulnerabilities and uncertainties being collected, integrated and used at different scales?

1c
Integrate knowledge of changing risks and uncertainties into planning, policy and programme design to reduce the vulnerability and exposure of people's lives and livelihoods

How is knowledge about changing disaster risks being incorporated into and acted upon within interventions? How are measures to tackle uncertainty being considered in these processes? How are these processes strengthening partnerships between communities, governments and other stakeholders?

1d
Increase access of all stakeholders to information and support services concerning changing disaster risks, uncertainties and broader climate impacts

How are varied educational approaches, early warning systems, media and community-led public awareness programmes supporting increased access to information and related support services?

2. Enhance adaptive capacity

2a
Strengthen the ability of people, organisations and networks to experiment and innovate

How are the institutions, organisations and communities involved in tackling changing disaster risks and uncertainties creating and strengthening opportunities to innovate and experiment?

2b
Promote regular learning and reflection to improve the implementation of policies and practices

Have disaster risk management policies and practices been changed as a result of reflection and learning-by-doing? Is there a process in place for information and learning to flow from communities to organisations and vice versa?

2c
Ensure policies and practices to tackle changing disaster risk are flexible, integrated across sectors and scale and have regular feedback loops

What are the links between people and organisations working to reduce changing disaster risks and uncertainties at community, sub-national, national and international levels? How flexible, accountable and transparent are these people and organisations?

2d
Use tools and methods to plan for uncertainty and unexpected events

What processes are in place to support governments, communities and other stakeholders to effectively manage the uncertainties related to climate change? How are findings from scenario planning exercises and climate-sensitive vulnerability assessments being integrated into existing strategies?

3. Address poverty & vulnerability and their structural causes

3a
Promote more socially just and equitable economic systems

How are interventions challenging injustice and exclusion and providing equitable access to sustainable livelihood opportunities? Have climate change impacts been considered and integrated into these interventions?

3b
Forge partnerships to ensure the rights and entitlements of people to access basic services, productive assets and common property resources

What networks and alliance are in place to advocate for the rights and entitlements of people to access basic services, productive assets and common property resources?

3c
Empower communities and local authorities to influence the decisions of national governments, NGOs, international and private sector organisations and to promote accountability and transparency

To what extent are decision-making structures de-centralised, participatory and inclusive? How do communities, including women, children and other marginalised groups, influence decisions? How do they hold government and other organisations to account?

3d
Promote environmentally sensitive and climate smart development

How are environmental impact assessments including climate change? How are development interventions, including ecosystem-based approaches, protecting and restoring the environment and addressing poverty and vulnerability? To what extent are the mitigation of greenhouse gases and low emissions strategies being integrated within development plans?

This publication is part of the Strengthening Climate Resilience Discussion Series, which aims to elaborate concepts and application of the Climate Smart Disaster Risk Management approach. All papers are available free to download through the Strengthening Climate Resilience (SCR) website: www.csdrm.org

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