



Getting Climate Smart for Disasters

The Cyclone Context

Project Report
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Abstract

The main objective of the project on “*Getting Climate Smart for Disasters*” is to research the barriers and opportunities for enabling action towards achieving convergence of cyclone related Disaster Risk Reduction and Climate Change Adaptation across varying scales - in the context of development, poverty and vulnerability reduction. The focus state is Odisha in the eastern coast of India which is cyclone prone. The project has been done in partnership between Intercooperation Social Development India, All India Disaster Management Institute and the Institute of Development Studies. The research has engaged institutions across the spectrum of governance in India at the National, state, district and local levels.

The “Climate Smart Disaster Risk Management (CSDRM)” an integrated social development and disaster risk management approach that promotes environmentally sustainable development in a changing climate has been applied towards developing policy briefs for institutionalising CSDRM at various levels of existing governance structures, policies and planning for managing disasters related to cyclones. It has analysed and suggested way forward for reducing the mismatch in CSDRM between the different priorities of DRR institutions and those of ordinary people in hazard-prone areas. The research project has assessed the means of introducing and scope for up-scaling non farm based diversified livelihoods towards enhancing climate resilience of the vulnerable population using a “reverse engineering” exercise for severe cyclones such as Aila and Phailin that struck the East Indian coast in 2009 and 2013 respectively. The project has also looked at the cost benefit analysis of adaptation services generally deployed immediately in the aftermath of severe cyclones vis a vis the long term investments for making choices of time line for deployment of such services.

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Abbreviation

ACWC	Area Cyclone Warning Centre
AIDMI	All India Disaster Mitigation Institute
ATI	Administrative Training Institute
BIS	Bureau of Indian Standards
CBDM	Community Based Disaster Management
CBO	Community Based Organization
CDM	Cyclone Disaster Management
CGWB	Central Ground Water Board
CII	Confederation of Indian Industry
CRC	Cyclone Review Committee
CRF	Calamity Relief Fund
CSDRM	Climate smart Disaster Risk Management
CWC	Central Water Commission
CWC	Cyclone Warning Centre
CZM	Coastal Zone Management
DM	Disaster Management
DMIS	Disaster Management Information System
DMP	Disaster Management Plan
DMU	Disaster Management Unit
DoE	Department of Environment
DoES	department of Earth Sciences
DRM	Disaster Risk Management
DRMP	Disaster Risk Management Programme
DSS	Decision Support Systems
DST	Department of Science & Technology
EEP	Emergency Evacuation Plan
EEZ	Exclusive Economic Zones
EIA	Environment Impact Assessment
EPA	Environmental Protection Act, 1986
EPI	Environment Performance Index
EWS	Early Warning System
GoI	Government of India
GPRS	General Packet Radio Service
GPS	Global Positioning System
IAY	Indira Awas Yojana
ICSD	Intercooperation Social Development
ICZM	Integrated Coastal Zone Management
ICZMP	Integrated Coastal Zone Management Plans
IDS	Institute of Development Studies
IMD	India Meteorological Department
IWD	Institute for Womens Development
MoA	Ministry of Agriculture
MoEF	Ministry of Environment and Forests
MoES	Ministry of Earth Sciences
NCRMF	National Cyclone Risk Management Facility
NCRMP	National Cyclone Risk Mitigation Project
NCZP	National Coastal Zone Policy
NDMA	National Disaster Management Authority

NDRF	National Disaster Response Force
NIDM	National Institute of Disaster Management
NSSO	National Sample Survey Organisation
OSDMA	Orissa State Disaster Mitigation Authority
OSDMA	Odisha State Disaster Management Authority
PRIs	Panchayati Raj Institutions
RNFE	Rural Non Farm Economy
S&T	Science and Technology
SDMP	State Disaster Management Plan
SWAD	Society for Womens Action and Development
ULBs	Urban Local Bodies
UNDP	United Nations Development Programme
VSS	Vana Samrakshana Samithies
VTF	Village Task Force
VVF	Village Volunteer Force
WMO	World Meteorological Organisation

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1. Introduction

1.1 Background Information and Scientific Significance

The theme of this project is *Getting smart to reduce disaster risk and thus adapting to climate change and build resilient development*. Inherent in this is the need to understand and justify the value of increasing the overlap between disaster risk reduction (DRR) and climate change adaptation (CCA). This is to achieve a form of development that is resilient to both hazard shocks and all types of impacts of climate change. It is therefore based on an understanding that at the moment there is insufficient integration of the three areas of DRR, CCA and development in policy and action. These three areas are sometimes thought of as operating in separate silos, or as ‘tribes’ of practitioners who may engage in a bit of barter, sometimes skirmish with each other, compete for scarce resources., and occasionally negate each other’s achievements .

The call for integration (but not full-scale merger) has been growing in recent years. In the 2000s it became clear that many institutions in two of the tribes (that deal with either development or DRR) realised that it was imperative to work on disaster prevention and preparedness in the wider context of development (UNISDR 2004; UNDP 2004; DFID 2004; Bhatt 2011b; World Bank 2007; IPCC 2011). Awareness of the need to integrate disasters with wider development efforts reflected long-existing and widespread learning in academia (e.g. Hewitt 1983; Blaikie et al 1994; Wisner et al 2004) in earlier decades. This was matched by the experience of many NGOs. However, bringing these two ‘silos’ together to work has not been so significant in practice. One key problem has been that a lot of work on DRR fails to acknowledge that people’s own priorities do not necessarily start with big hazard risks (Harris, 2011; Cannon 2008; Aalst et al, 2008).

Institutions with DRR remits do not always match their priorities with those of the people they aim to assist, whose own priorities are more aligned with what is normally called development (typical priorities include work, assets, health, housing, security and education). Realisation of the need for much stronger connections between the DRR ‘silo’ and adaptation have also been growing. But the links remain weak in the sense that many institutions have separate staff (or even departments) for CCA and DRR. While not all DRR is related to climate hazards, negative climate trends will increase poor people’s vulnerability to ALL hazards. There is also insufficient awareness of the need to prepare for the fact that climate change both increases climate hazard risks (through increased frequency and/ or intensity of extreme events), as well as increasing the number of vulnerable people (through negative livelihood impacts of changing trends in temperature and rainfall on farming). Combined forms of adaptation (to both shocks and trends) are not well understood, and the linkages with development (to reduce poverty and vulnerability, and strengthen livelihoods) are often missing.

Recent research from the Adaptive Social Protection (ASP) project at IDS shows that in South Asia there are very significant gaps in the integration of DRR, CCA and social protection (where social protection is taken as a subset of vulnerability reduction within development processes). The project analysed 124 rural livelihood and food security projects in five countries in the region. It showed that 42% of them had no integration at all beyond

their own immediate focus (i.e. they remained projects solely focused on disaster, climate or social protection), while a further 42% managed to link just two of the silos. Only the remaining 16% were integrated across all three areas (Davies et al. 2010). The report of a recent World Bank conference calls for greater integration between these three ‘tribes’ (World Bank 2012).

1.2 Objective

The Objective of this project is to research the institutional barriers and opportunities for enabling action towards achieving convergence of DRR and CCA across varying scales - in the context of development, poverty and vulnerability reduction.

It explores the policy innovations for achieving integration by utilizing the Climate Smart Disaster Risk Management (CSDRM) approach as a process through which selected Indian institutions at different scales can explore their own institutional constraints and opportunities and plan action towards the integration of climate change adaptation and disaster risk reduction.

It examines the barriers to effective integration through analysis of the mismatch between the different priorities of DRR institutions and those of ordinary people in hazard-prone areas,

Also the project examines the role of livelihoods diversification (assets and incomes included) as a means to reduce climate dependency and increase resilience to shocks and stressors.

In addition, the research conducts a “Reverse Engineering” exercise for a recent disaster will nuance the State level analysis by providing deeper understanding of the actions and behaviours of relevant institutions in the lead up to the disaster.

1.3 Approach for Integrating Climate in Disaster Risk Management

The Climate Smart Disaster Risk Management (CSDRM) approach has been developed in the past two years through a consortium of IDS with Plan International and Christian Aid, working in ten Asian and African countries, including India. With its own integral Monitoring and Evaluation system and integration pathways, the CSDRM approach provides a method for institutions to reflect on their own integration across the three silos. It enables them to assess whether their policies, programmes or projects are properly connecting DRR, CCA and development processes and the indicative pathways show potential integration across the silos to be more climate smart/resilient.

There is widespread interest in the approach, and this proposal is designed to support research into its effectiveness by examining the potential for such integration in several institutions in India, at different operational scales. The CSDRM experience will be used



in the research to uncover the institutional barriers to better integration, and to examine how such barriers can be overcome by these institutions by discovering new ways of working.

The research process has used the following tools for identifying the steps for integrating climate change in Disaster Risk Management in India focussing on cyclones.:

- Workshops
- Round table discussions
- Consultative meetings
- One to one discussions
- Data analysis

The stakeholders included the apex body on Disaster management in India i.e NDMA, the National Institute of Disaster Management, Ministry of Earth Sciences, India Meteorological department, Odisha State Disaster Management authority, Odisha department of Forests and Environment, Department of Agriculture Odisha, District Disaster Management Authority Puri, and UNDP Odisha. The local organisations conducted include SWAd and IWD. Other than this the bilaterals such as GiZ, SDC were involved in the discussions. Further NGOs like TERI, SEEDs, Lead India operating nationally also have participated in the discussions. The list of publications, namely, reports, papers, brochures etc. emanating from this research are listed in Annexure 11.

2. Expected Outputs and Activities Conducted

The expected outputs for the research are as follows:

Output 1: Getting Climate Smart For Disasters through Institutions, Plans, Programmes, Policies at Various Levels of Governance

Output 2 : Reverse Engineering - Case study briefing of Cyclones Aila & Phailin

Output 3: Understanding Conflicting Priorities between DRR Institutions and Communities

Output 4 : Linking Climate Adaptation and Disaster risk with Diversified Livelihoods

Activities carried out to achieve the expected outputs is listed in Table 1.

Table 1: Activities conducted to achieve the expected outputs of the project:

Sr no.	Activity	Institutions involved	Outputs
Output 1: Getting Climate Smart For Disasters through Institutions, Plans, Programmes, Policies at Various Levels of Governance			
1	Self-Assessment Workshop	ICSD in collaboration with AIDMI and IDS	Workshop Report and Policy Brief shared at state level
2	Workshop on Training on FORIN and Monitoring and Evaluation of CSDRM actions	ICSD in collaboration with AIDMI and IDS	15 people trained on FORIN and M&E for CSDRM
3	National Workshop on Getting Climate Smart for Disasters in Coastal Zones	ICSD in collaboration with AIDMI and IDS	Policy Brief shared with all stakeholders at National level
4	Integrating CSDRM in a community based organisation	AIDMI	Project Report shared with Local Organisation and stakeholders at National and State level
5	Integrating CSDRM in National Guidelines, and State level Plans Policies and Projects	ICSD	Project Report- Shared with NIDM, NDMA and SDMA, UNDP, NCRMP in Delhi, ICZMP cell at MoEF , MoES, MoA, DST etc.
6	CSDRM of Village Water Security Plan	ICSD	Project Report Shared with MoA,MoES, DoA in Odisha and, DST, MoES
7	Cost benefit analysis for choosing adaptation action now to be climate resilient in the long term	ICSD	Being communicated for publication in a journal. Also shared with all stakeholders participating in the national workshop
Output 2 : Reverse Engineering – A specific disaster Case study briefing			
8	Reverse Engineering - Case study briefing of Cyclones Aila & Phailin	AIDMI	Study shared at various platforms

Sr no.	Activity	Institutions involved	Outputs
Output 3: Output 3 – Understanding conflicting priorities between DRR institutions and communities			
9	Understanding Conflicting Priorities Between DRR Institutions and Communities Policy Brief	AIDMI	Study shared at various platforms
Output 4: Linking climate adaptation and disaster risk with diversified livelihoods			
10	Linking Climate Adaptation and Disaster risk with Diversified Livelihoods – Case Study of Climate Resilient Livelihoods in Rajagopalpur in Odisha	AIDMI	Study shared at various platforms

The research activities have been undertaken by the Partner institutions Intercooperation Social Development India, All India Disaster Mitigation Institute and Institute of Development studies in association with three levels of Governance of Disaster Management in India.

At the National Level the following institutions directly participated in the research process:

- National Disaster Management Authority
- National Institute of Disaster Management
- Ministry of Earth Sciences
- India Meteorological Department
- Department of Science and Technology
- Ministry of Environment and Forests

At the Odisha State level, which is the focus state for our studies, the following institutions participated in the research process:

- Odisha State Disaster Management Authority
- District Disaster Management Authority- Puri
- Department of Forest and Environment, Odisha
- UNDP Odisha

Local Level Organisations who participated in the research directly and indirectly are:

- SWAD- Society for Womens Action Development, Puri District
- IWD – Institute of Womens Development, Gajapathy District

3. Brief Description of Research, Outcomes and Products

3.1 Output 1: 18Getting Climate Smart For Disasters through Institutions, Plans, Programmes, Policies at Various Levels of Governance

Investing in integrated and flexible institutional and policy frameworks is a first step towards creating a policy environment that can build resilience to climate and disaster risks. If organisations, policies and practices take climate change concerns into account, development interventions and disaster risk management will become more effective in reducing poverty and vulnerability to disasters. This CSDRM (Climate Smart Disaster Risk Management) approach provides policy makers and practitioners with ways to identify the processes needed to build resilience to climate and disaster risks. It identifies pathways for integrating how to tackle changing disaster risks and uncertainties; enhance adaptive capacity; and address poverty and vulnerability and their structural causes (these are the three “pillars” of the CSDRM approach) .

3.1.1 Self-Assessment by Institutions - Workshop

Self-analysis of the institutions and assess their degree of horizontal and vertical integration of DRR and CCA with development. The exercise leads to understanding the barriers and opportunities for integration to achieve resilient development. The exercise supports the design of an action plan as the goal of the CSDRM approach, using the indicators to enable them to develop reviews and reflect on the challenges of integration.

A Self-assessment exercise for institutions managing disasters at various levels of governance in the state of Odisha, a coastal state in India, vulnerable to recurrence of severe cyclones, storm surges, flooding, extreme rain was carried out through a workshop organised on March 18-19th at its state capital in Bhubaneswar. Stakeholders such as the OSDMA, UNDP Odisha office, district authorities of Puri, and local organization were invited for this activity. The participants were exposed to the CSDRM approach along with a presentation by OSDMA on vulnerability of the coastal region of Odisha to cyclones, sea level rise, and storm surges. Please see the presentations and workshop report in Annex 1a1, 1a2 and 1b respectively.



Outcome: Conclusions and further activities

- The government being the lead proponent of the majority of development, climate change and disaster risk reduction activities. It is particularly crucial that it should begin to consider adopting CSDRM approach in all of its work.
- Sharing existing knowledge amongst stakeholders is useful in order not to reinvent the wheel and move forward from lessons learnt. Organizations participating in the workshop agreed to share best learning practices.
- Each of the participating identified the entry points through which they can integrate CSDRM in their respective operations through the self-assessment carried out during the workshop and they are:
 - UNDP Odisha: Can use the CSDRM approach to reduce the disaster risk of their urban and rural management project making the project outputs climate resilient.
 - SWAD and IWD: CSDRM approach can help them to look into their own organisational approach for undertaking various activities towards disaster mitigation and make it a climate smart approach. Further they can use the CSDRM approach for integrating climate in their WASH and rural livelihood programmes
 - OSDMA: Can look at their disaster management plan which is to be launched soon in August and make it climate resilient by using the CSDRM approach
 - District Puri: CSDRM approach can be used to look at the community aspirations and needs to become climate resilient and use the information for developing district and village level disaster management plans

- It was agreed to undertake a case study of Cyclone Project in Odisha with FORIN method (also with World Bank and NDMA) to better understand the impacts and root causes to implement a tool that people can use easily to be better prepared for the disasters and mitigate risks.
- AIDMI and SWAD agreed to work on issues related to conflicting demands in developing the District Disaster Management Plan for Puri district in Odisha

Outcome: Policy brief

Based on this workshop, a policy brief was prepared and shared with all the stakeholders including OSDMA, DDMA Puri, UNDP, SWAD, and IWD. The policy brief explained the scope of CSDRM and its capacity towards aligning actions and management of each institution in a climate smart context. The policy brief concludes that the Self-Assessment is an excellent tool for understanding the opportunities for becoming climate smart vis a vis their organizational set up and their activities related to disaster risk management. However, given the complexity and range of issues involved with disaster risk reduction, climate change adaptation, and development; a lot more needs to be done to support and strengthen the government authorities' efforts especially at the ground level. To start with, the participants concluded that there needs to be capacity building on undertaking self assessment. Therefore it was suggested that

- **A module on Self-Assessment** needs to be introduced in the training programmes of the Odisha Administrative Training Institute (ATI). The module must include examples of climate smart approaches.
- **A training module for Monitoring and Evaluation of CSDRM for ATIs and National Institute of Disaster Management (NIDM).** This will help both the Government of Odisha and India to evaluate the sensitive they are climate change in their current activities and projects; and what measures can be taken for future projects.

See Annexure 1a, 1b and 1c for the workshop details and Policy Brief.

3.1.2 Workshop on Training on FORIN and Monitoring and Evaluation of CSDRM actions

The FORIN tool is a “reverse engineering” tool used for understanding the actions and behaviours of relevant institutions in the context of disasters that have happened. It enables one to assess where linkages between institutions were weak and what potential there is for improving these for future hazard impacts.

The specific aim of this workshop was to involve academics, organizations (CBOs, NGOs, INGOs, international organizations) and

- Analyse the disastrous effects of cyclones
- Analyse the root causes of those impacts, especially in the forms of vulnerability of poor and other groups of people in relation to economic, political and cultural conditions;
- Understand the steps towards reducing root causes
- Assess the value of preparedness measures such as warnings, shelters;
- Evaluate the potential for partial updation of data, especially in resurveying respondents in earlier surveys;
- Assess the participants interest to be involved in the process
- Identify M&E Indicators in programmes that are using the CSDRM approach

Outcome: Participants developed the capacity for analysing the underlying causes of the Hazards that lead to the Disasters and could identify the steps to ameliorate the same. The institutional mechanisms handling the cyclones, the NGO response were the focus of the workshop. The participants also got trained in developing M&E for the actions that they suggested for reducing the impacts of the disasters.

The minutes of the workshop, workshop announcement with background of the workshop, agenda, list of participants and presentations is given in Annexure 2a, b, c, d, f, g and h.



3.1.3 Workshop on Getting Climate Smart for Disasters in Coastal Zones

ICSD in collaboration with AIDMI and IDS, organised a one day workshop on managing disasters in coastal zones 10th Dec 2013, in New Delhi under the aegis of the project “Getting Climate Smart for Disasters”, supported by START-CDKN, to explore the opportunities for integrating the changing nature climate in development in coastal region susceptible to cyclones. The workshop had representation from the highest policy levels such as from NDMA,

MoEF, NIDM, MES, DST, IMD, and Delhi government. In addition the bi-laterals such as GIZ and SDC along with prominent research institutions such as IDRC, NGOs such as ISET, SEEDS and TERI, and Consulting companies participated in the event.

The workshop was addressed by the Vice Chairman NDMA, Shri Shashidhar Reddy. Remarks on the ICZMP was made by the Project Director Dr Harapan Halli who is also the advisor, MoEF.

Executive Director NIDM, Dr Satendra, recounted NIDM's efforts towards building capacity amongst government officials for undertaking disaster management due to cyclones. Shri Anil Gupta, associate Professor, NIDM talked about the role of eco-level approach for disaster risk reduction. Additionally, presentations were made by ICSD and NIDM on the various research activities carried out in the project. Further, a round table discussed the opportunities of integration of climate in disaster risk reduction.



Outcome: Policy brief on two key questions:

Q1. How can disaster risk mitigation in a climate change context be integrated in planning?

- By including an assessment of current and future climate risks and associated vulnerabilities in the “Response and Mitigation section” of the cyclone guidelines issued by the NDMA
- By integrating disaster preparedness as an indicator within the Planning Commission’s Environment Performance Index. The PC-EPI is a tool for the government to disburse central funds.
- By disseminating easily understood and appropriately simplified communications on long term observed trends and projections to state and district level departments, BDOs, ULBs, village Panchayats, Banks, and insurance companies for them to plan their activities and investments accordingly. The information can be made available through an interactive web portal of the Ministry of Earth Sciences.
- Imparting training on extraction of climate projection data including recurrence frequency and threshold levels of extreme events and GIS to district and state level officials from each department enabling them to extract the data directly from the portal and undertake risk assessments.

- Include Climate Change risk assessment as a part of Environment Impact Assessments (EIAs).
- Creation of a dedicated programme with central funds for Climate Smart Disaster Readiness which will be over and above National and State Disaster Response Funds (NDRF, SDRF) and will be dedicated to reducing risks in the long term
- Using the Corporate Social Responsibility (CSR) funds for climate readiness in corporate investments
- Creating community based micro insurance mechanisms for disaster risk management which are over and above the Modified National Agricultural Insurance.
- Instituting the concept of People first campaign to provide training to communities for mobilize themselves to help each other to reduce morbidity, mortality and loss of assets in times of impending disasters.

Q2.What can be the steps towards ensuring food security in cyclone prone coastal areas?

Given the fact that the cyclone are likely to be less frequent but more intense, the most viable window for agriculture available for the coastal zone then becomes the dry season. The full productivity potential of the dry season can be harnessed by augmenting water resources for irrigation (enabling ground water recharge and having more surface structures for storing water), and by introducing varieties that are salt tolerant, as salt concentration in the soil during dry season is more in coastal areas that are flooded. Further as the Kharif is getting shorter due to frequent delayed onset of monsoon and so is the Rabi season in coastal district are shortening as the cyclones are also happening in December as well, short duration varieties of rice can be introduces that can be harvested fast in these seasons.

Q3. How are the choices to be made for long term sustainable adaptation?

According to the experience of the people participating in the round table, it was seen in the Ganjam district, the most affected district by cyclone Phailin, five adaptation demands were requested immediately after cyclone Phailin, and they are, (i) restoration of damaged dwelling houses, (ii) compensation for loss of livelihood, (iii) compensation for crop loss and (iv) avoidance of threat to food security. These services are provided/subsidised recurrently year after year as the cyclones strike. However, one time investments on housing could reduce substantial long term investments. Livelihood diversification would be another area through which dependence on agriculture /fisheries can be reduced. A cost benefit analysis of various adaptation services in the short and long term, needs to be carried out to prioritise the same and hence allocate funds in consecutive 5 year plans for long term disaster risk reduction causing the exchequer to incur less costs in comparison to its recurrent spending on low hanging fruits.

See background of the workshop, agenda, policy brief and presentations in Annexure 3a and 3b, 3c respectively.

3.1.4 Integrating CSDRM in a community based Organisation

Puri based Community organization **Society for Women Action Development (SWAD)** showed interest in the CSDRM'ing of their operations. It has been involved in various activities towards upliftment of marginalised and vulnerable communities.



The priorities and needs of both the rural and urban communities, and the projects implemented by the governmental and non-governmental organizations must be aligned and the main focus should be on creating a climate smart livelihood resilient society in Odisha. This is important and we want to institutionalise the CSDRM approach at our organisation”

-Ms Binapani Mishra, Secretary of SWAD

The thematic areas of intervention by SWAD involve women empowerment, disaster risk reduction linked to sustainable livelihood and development, income generation and micro-credit support, water sanitation programme amongst others. The intervention of SWAD resulted in tangible achievements like 4000 rural women involved in the process of development through Self Help Groups (SHGs) network, federate bodies and cooperative; communities involved in 76 villages for disaster preparedness and response initiative; school students and communities of 50 villages have taken initiative locally, 1000 women engaged in production and remunerative marketing through micro credit support. Water sanitation programme conducted in 60 villages to benefit 20,000 people.

Table 2: Steps for CSDRM of SWAD

Steps	Actions
<p>Step 1&2:</p> <p><i>Where are we now?</i></p>	<ul style="list-style-type: none"> • Self Assessment Exercise (Reflecting back on organization's activities, capacities and limitations through)
<p>Step 3&4:</p> <p><i>'Where do we want to be?'</i> <i>and 'What do we need to do differently?'</i></p>	<ul style="list-style-type: none"> • Identifying potential entry points to apply the CSDRM approach • Map out integration pathways • Develop action points and • To select indicators to measure progress.

<p>Step 5:</p> <p><i>The CSDRM Journey – ‘Are we moving towards integration?’</i></p>	<ul style="list-style-type: none"> • Monitoring & Review of the progress • Understanding the internal and external factors that enable or constrain integration efforts.
<p>Step 6:</p> <p><i>Looking back – ‘What has changed, why and how?’</i></p>	<ul style="list-style-type: none"> • Evaluations • Reflections for way ahead

Outcome- A set of Recommendations:

- i. Involve communities in understanding the uncertain situations due to climate change which not only increases the awareness but helps to gain support of the community to implement future actions to mitigate the risks.
- ii. Enhance adaptive capacity of farmers through horizontal and vertical integration
- iii. Essential to understand the local knowledge and their perception about the adaptation strategies.
- iv. It is vital to communicate the CSDRM approach and disaster related information in the user friendly format.
- v. Involve government helps reaching a great number of people.
- vi. Community members have been responding to climate change by modifying their traditional methods. Therefore, it is important to know and understand their adaptation techniques before introducing them to new methods.
- vii. Some adaptive techniques such as relocation of village is easier in theory, however very difficult to implement where the lives of people are heavily dependent on the coastline or land or river.
- viii. Develop climate awareness at local level become first step towards becoming climate smart for institute working with local communities that prone to climatic hazards. People may aware about impact of climate change but not with the root causes of climate change and contribution actions that they could make to mitigate.
- ix. It is important to understand how the local community perceives meaning of different climate related terms.
- x. The existing local capacities and adaptive capacities should be studied for better implementation of CSDRM with local communities.

See Annexure 4 for the full report.

3.1.5 Integrating CSDRM in National Guidelines, State level Plans, Policies and Projects

Management of disasters in India is done through a three tier approach (see figure). Its complex and involves multiple agencies, even to handle a single disaster. Almost all departments of the government and civil society organisations are engaged in this. The NDMA has prepared guideline for all hazards including Cyclones.

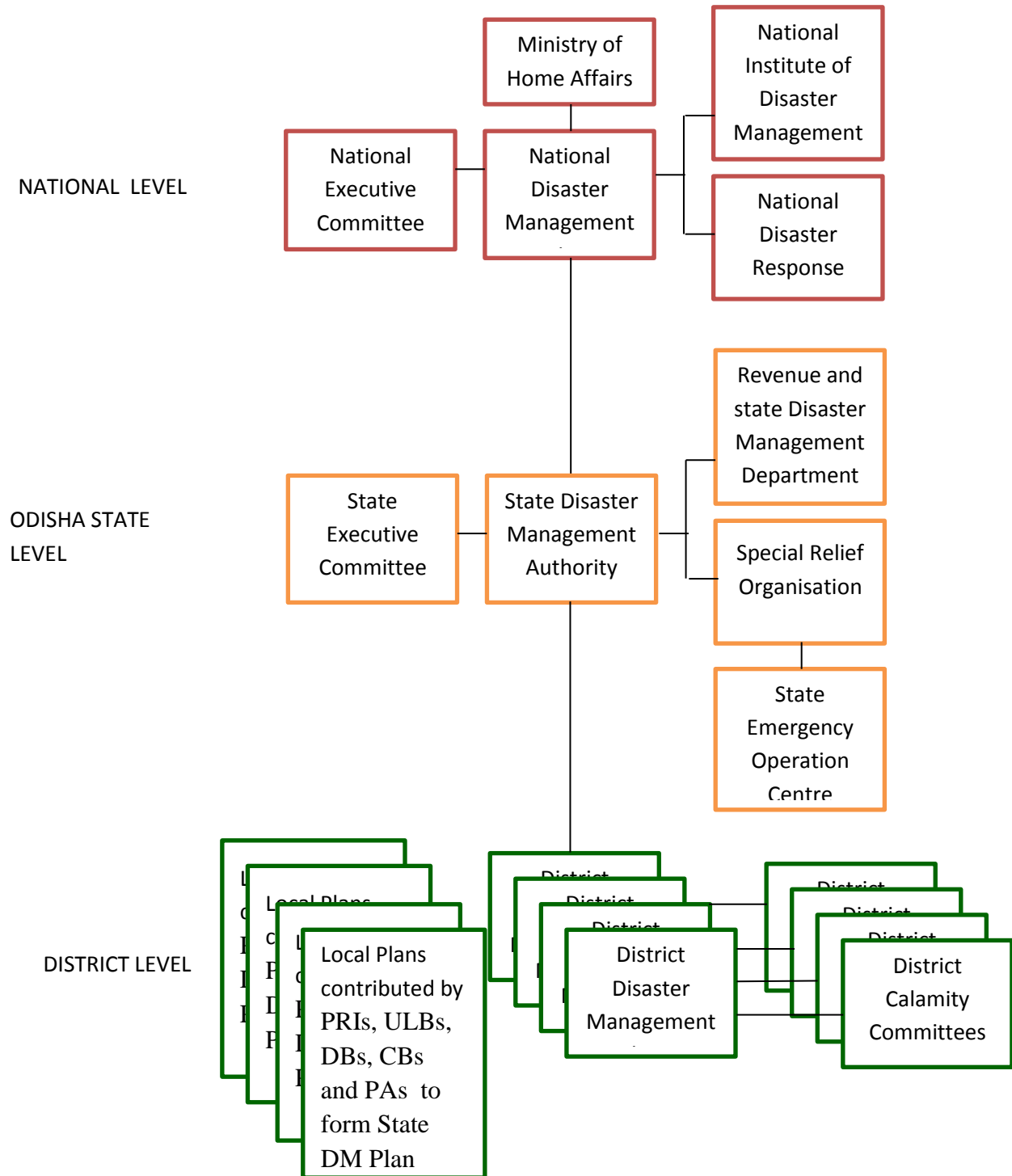


Figure 1: Institutional Arrangement for Disaster Management in India

The National Level Guidelines on Cyclones is a comprehensive document prepared by the NDMA. However, there exist gaps in making it Climate smart. And these include

- Steps towards reducing uncertainties due to climate change
- Enhancing adaptive capacities of people and systems in the context of climate change and
- Steps towards reducing vulnerabilities and inherent structures that create these vulnerabilities.

In view of the above all the elements of the guidelines have been examined and some steps towards making it climate smart have been worked out. See Table below.

Table 3: Steps towards climate smart Cyclone guidelines

	Tackling Changes in disaster risks & uncertainties	Enhance Adaptive Capacities	Address Poverty & Vulnerability & their structural causes
Implementation of rehabilitation, reconstruction and recovery post disaster	Share CC projections with all departments and undertake impact and vulnerability assessments	Prepare guidelines for risk reduction , preoare M&E framework and undertake M&E at regular intervals	Create Special Central and State funds for long term disaster preparedness
Observations and data processing for Early warning	All possible observation platforms provisioned for. Installation of the same to be monitored	SDMI/SIDM to be formulated that forms the nodal agency for developing products for DSS	--
Warning dissemination	Biennial International workshops to be organized by MoES on this subject to exchange learning's across the nations	IMD to produce warning products for direct dissemination by broadcasters to all levels of governance including establishment of a dedicated weather channel	--
Structural mitigation	norms for infrastructure development, buildingsto be revisited and changed in view of cyclones with windpeeds in excess of 300 km/hr	Review and change -BIS norms -IAY housing norms -Urban housing norms -Power transmission and Disribution -Cell phone tower strengths Develop M&E to review implementation	Make available subsidsed loans for housing Explore avenues for livelihood diversification that are non frm based

Coastal zone management	ICZMP to extend to all districts along the coast line and reviewed in the context of climate change	Training and capacity bld of line departments to implement ICZMP plans	Integrate ICZMP elements in village development plans, ULB plans, and in Industries,
Awareness Generation for community preparedness	Audience specific communication to be prepared	--	--
Disaster Risk Management and Capacity Development	Th results of Mapping, Cyclone modeling etc to be shared with all line departments to enable them integrate them into planning and at at various levels of givernance	Cyclone risk reduction ackages to be developed for all concerned stakeholders operating at various levs of governance	Design gender spefic village level plans on ensuring agri security, water security, livestock and fisheries management, livelihood diversification in a climate change context
Response	Urgently look at the agriculture management of the region given that cyclones are ntensifying and rabi and kharif seasons are dhortening	Make the dry season viable for agriculture by increasing irrigation cover Encourage short duration varieties Encourage salt tolerant varieties	Provide seed money for starting new forms of livelihood in villages Create opportunities for microinsurance based on their own resources and managed by them

Very detailed planning guidance exists in Odisha, through its State Disaster Management Plan Released in August 2013 for pre and post cyclone disaster management.

For a sustainable long term climate smart plan which takes into account the climate concerns, it is concluded that the following elements need to be included at

- State and
- District levels

And they are:

- Assessments of impacts of intensification of cyclones in a warming scenario on all economic sectors for future planning
- Assessment of extent of vulnerabilities of the population due to these impacts
- Participation of all concerned departments/ institutions at district and state level in developing respective climate smart plans
- The information on climate change projections which will come from MoES to the NDMA to the SDMAs need to be shared with all these departments. The institutional arrangement can be through the formation of a State Disaster

Management Institute (SDMI) which have all the expertise and infrastructure to extract climate data from given gridded data set, have access to all socio economic data, can make impact and vulnerability assessments based on climate projections at required levels of governance

- Undertake a public consultation of these plans as well on a regular basis to ensure all risks have been covered
- Formulate an M&E Framework for assessing achievements and for indicating mid course corrections if any
- Additionally, projects being implemented such as the ICZMP and NCRMP etc. need also to consider these aspects on the elements they are addressing.

See Annexure 5 for the full report

3.1.6 CSDRM of Village Water Water Use Master Plan

Water Use Master Plan (WUMP) is an exercise in village planning around water. By getting people to understand, map and plan to improve their water resources WUMP empowers them with an understanding about their rights, responsibilities, and government schemes and how to approach frontline bureaucrats. Through WUMP people learn the following aspects

- Projection of water availability for current and future use upto 10 years
- Learn how to prepare water balances
- Learn about source sustainability
- Learn how to assess other natural resources
- Learn how to conduct a needs assessment
- Training for needs assessment and planning
- Execute an integrated water use master plan that included a capping mechanism to control the use of water, for example through changes in cropping patterns or alternative livelihoods
- Steps to integrate sanitation into water use plans and understand the link with hygiene, health and the use of toilets, as well as giving money for making toilets where necessary

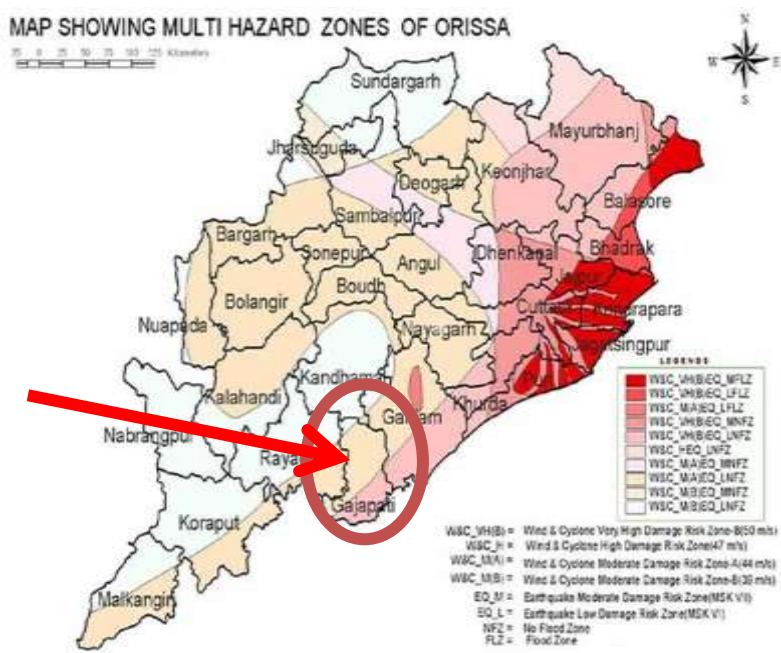


Figure 2: Location of Gajapati district within the Multihazard zone map of Odisha

The WUMP was applied to the Sobara Panchayat under Gosani block in Ganjam district in Odisha. It has a population 3,543 of which 55% is into farming. All the lower slopes of the hills in the Panchayat have been planted with a monoculture of cashew. No inter-cropping is done in the cashew plantations, unlike elsewhere in the district where some people inter-crop with pineapple, bananas, ginger and turmeric; inter-cropping helps improve soil moisture and reduce soil runoff. Gajapati district is one of Odisha's main cashew producing districts and the state agriculture and industry policies aim to develop this further.

WUMP elements	CSDRM entry points
Projection of water availability for current and future use upto 10 years	<p>Make available to the villagers the easily understood projections of water availability upto next 30 years enabling them to develop a climate resilient water use planning</p> <p>The Rural development department and soil and water department need to talk to the villagers and facilitate the integration of CC in their village plans</p>
Learn how to prepare water balances	<p>The water balances then can take into account the future projections, and estimate the future demand of water given the population projection for the village and other economic activities it envisages to pursue in the future that require water</p> <p>The Rural devlp department and soil and water conservation departments respectively need to understand the future demands for water conservation and hence prepare plans to create infrastructure for the same</p>
Learn about source sustainability	<p>Steps towards water augmentation, water recharge can be integrated, by undertaking a geomorphological mapping of the area. Further as the rainfall becomes more extreme and intense and infrequent, learning about techniques of augmentation in such conditions is necessary as the runoff will be high, especially in the region of the study where the physiography is undulating.</p> <p>The rural devlp department, soil and water conservation department, the irrigation deptt need to come together to ensure sustainability of irrigation and drinking water in this area</p>
Learn how to assess other natural resources	<p>In the context of climate change the changes required in agriculture practices also needs to be understood by the farmers especially in terms of frequent shifts in onset of monsoon beyond scheduled date in late June and extension of cyclonic activities in the area upto December</p> <p>Develop advisory on agriculture and facilitate handholding with agriculture extension</p>
Learn how to conduct a needs assessment	This is in the context of climate change
Training for needs assessment and planning	--
Execute an integrated water use master plan	Introduce the concept of payment for ecosystem services to ensure efficiency of use
Steps to integrate sanitation into water use plans and understand the link with hygiene, health and the use of toilets	In a warming scenario, water needs to be allocated for sanitation as well. Further drainage plans need to be revisited to ensure smooth drainage- may require trenching of drainages including that of farm channels

The Public Health Deptt also needs to work on this aspect.
--

Table 4: Points of integration of CSDRM in the WUMP plan of Sobara village in Gajapathi district of Odisha to make it water secure

Well and hand pumps were main resources for these villagers. In spite of the fact that there are four large and countless small streams and the average annual rainfall is 1,400 mm, the villagers were facing water shortage in summer. It has been learned that ground water levels have been declining gradually as well. The reasons are jhum cultivation, extensive monocultures of cashew plantations, increase of paddy cultivation and increase in population. The Panchayat has 62 wells spread across the 11 hamlets. The Panchayat has 28 tubewells, of 21 are inside a village. These are less reliable than wells as only nine provide good water during summer. All 21 ponds in the Panchayat are situated outside villages, and only one is protected. Only three have usable water in summer and all communities can use water from 17.

The Gajapati district is Cyclone prone, however as the Soraba Panchayat is located in the hilly areas, it is only susceptible to cyclonic winds and rain fall and not storm surges and flooding. The Location of the district is shown along side.

Outcome: A report entitled ‘ Revisit Water Use Management Plan Through CSDRM Framework- A case study of Sobara Panchayat, Ganjam, Odisha’ outlining the above mentioned steps for CSDRM of Wate Use Master Plan for villages.

See Annexure 6 for the detailed report

3.1.7 Cost Benefit Analysis For Choosing Adaptation Action Now for Long Term Climate Resilience

The recent Cyclone Phailin in November 2013, affected 19 districts in Odisha of the state killing 21 people and affecting 11.9 million people. While loss of life could be kept at a minimum due to advanced evacuation operations carried out by local administration prior to Phailin's landfall, dwelling houses and over 0.11 million hectares of standing crops were damaged in Odisha. Roads, electricity, telecommunications and water supply were severely affected. Loss of property has been estimated at Rs 217.66 billion. The worst affected districts were Ganjam, Gajapati and Khordha.

Despite the immense loss to property, Phailin underscored the benefits of proactive disaster risk management strategies that were effective in saving millions of life in the state. The state government undertook a well coordinated rescue and relief operation prior to and immediately after the disaster. Some of the anticipated adaptation measures undertaken involved:

- Deployment of state of the order Dopplar radar technology to continuously monitor the exact location, intensity and geographical spread of the cyclone.
- The early warning system helped in alerting all vulnerable communities to take adequate safety measures.
- The pre alert system aided the central, state and local governments to organize a well coordinated and efficient evacuation and rescue operation and government employees were kept on red alert
- Special cells were established to monitor the situation, helpline numbers were opened and advance teams were deployed to cyclone prone Ganjam, Gajapati, Khordha, Balasore, Kendrapara and Jagatsinghpur districts to help with the evacuation operations.
- Pre-designed cyclone shelters as well as schools and college buildings were used to shelter evacuated stakeholders and their livestock. Food and other essential commodities were arranged to be served to the evacuees while dry relief packets were air dropped to inaccessible and flood affected areas.



House Damaged in Phailin In Ganjam District



Cashewnut plantation damaged in Phailin



In the aftermath of Phailin, proactive adaptation strategies involved:

- Restoration of communication through clearance of debris thereby ensuring the smooth movement of essential commodities to affected areas.
- Restoration of power supply and telecommunication lines in the affected areas.
- Distribution of relief materials in cyclone shelters (cooked food served upto 7 days in these shelters) and air dropping of relief items in areas affected by severe rain in the immediate aftermath of Phailin.
- Ensuring supply of potable water and medical essentials in affected zones to prevent epidemics.
- Announcement of various subsidy and assistance schemes by government departments like the Department of Horticulture, Department of Agriculture, Department of Rural Development, Department of Health, etc.
- Involvement of local stakeholders in relief distribution and other operations.

The well coordinated and planned disaster risk management strategy of the authorities during Phailin did full justice to its ‘zero loss of life’ approach and helped save about a million human lives. However, certain breaches in the preparedness plan could still be identified. For example, a survey undertaken in 15 villages spread over four blocks in the cyclone affected areas of Odisha **in selected villages of Ganjam, Khordha and Gajapati districts** by ICSD and IWD indicate huge losses (See Table 5). The survey was conducted as a part of another project that ICSD is doing on value chain of cashew nuts with IWD, in an agricultural zone where all stakeholders are directly dependent on agriculture for livelihood and income generation.

Table 5: Impact of Phailin in Survey Areas in Gajapati

Affected Category	Ganjam & Khordha Project Area	Gajapati Project Area
No. of households affected	500	300
No. of dwelling houses damaged	300	150
No. of cashew trees uprooted	40000	8000
Financial loss due to damage to cashew trees (in Rs. millions)	12	2.4
Area of cropland with standing crops like paddy, millet, etc. damaged (in hectares)	350	172

Source: Field Survey Report by ICSD & IWD

The survey highlighted the severe damages to property and resources in the three districts covered under the survey. Besides major crop damage, the stakeholders also reported damage to power supply lines, financial losses due to closure of cashew processing units, closure of educational institutions and loss of resources in the form of uprooting of trees like teak, mango and cashew. The loss of man days due to the closure of cashew units and the considerable damage to standing crops have severely affected the income generation opportunities of the affected community while simultaneously threatening the future food security of the area. Appreciating the government relief work carried out in response to cyclone impacts, the stakeholders identified certain lacunae in the government risk management operations. These gaps in the relief work included:

- Delay in the availability of relief materials in many places. Further, materials made available are often inadequate.
- Inefficient public distribution systems resulting in uncontrolled price rise of essential commodities.
- Poor repair and restoration of power supply.
- Lack of drinking water supply in most places thereby increasing the probability of epidemics.
- Gap in coordination between various line departments. Data, facts and figures varied at each level resulting in misallocation of relief materials. Further, mis-utilization of relief materials has also been reported.

Analysis of the risk management strategies adopted by the local and state authorities reveals that most of the **measures adopted are simply relief and rescue measures offering immediate benefits to the vulnerable stakeholders**, e.g. evacuation to cyclone shelters; air dropping of relief materials like dry food, polythene sheets; providing drinking water tankers in affected areas; etc.

The nature of adaptation in response to extreme events impact has often mostly been reactive and failing to build long term resilience capacity of the stakeholders. Apart from deployment of a state-of-the-art early warning system, the Phailin experience highlights the general lack of long term adaptive capacity building that integrates climate impacts into development priorities of providing shelter, housing, education, poverty alleviation, etc. It is possible to identify several barriers to long term adaptive/resilience capacity development in the incumbent disaster management scenario. These involve:

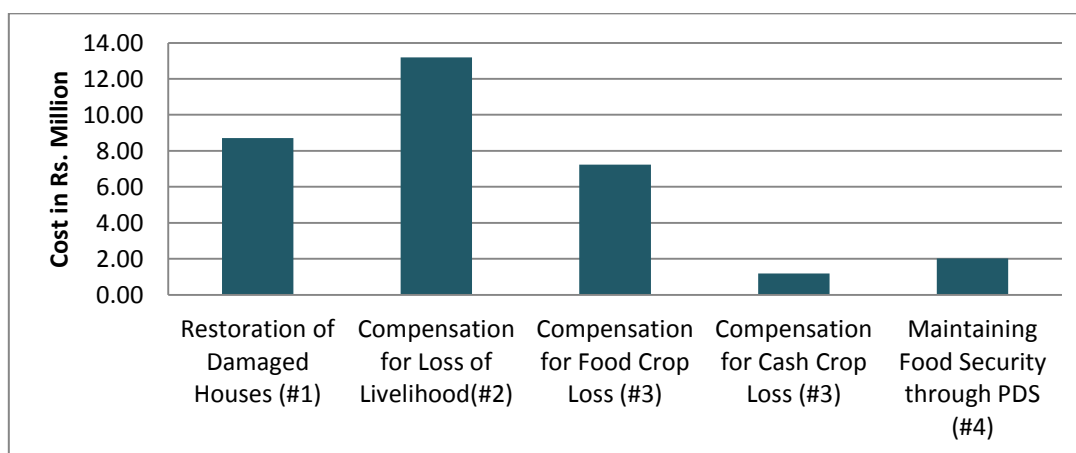
- Prioritizing costs while selecting strategy options to reduce vulnerability.

- Financial constraints as the immediate investible funds required for planned and sustainable adaptation is comparatively higher than reactive relief aid.
- Non-availability of an integrated institutional arrangement necessary to implement sustainable adaptation strategies.

According to the views expressed by the vulnerable population, five adaptation demands have been identified and ranked according to priorities as assessed by the stakeholders (table 3)

- Restoration of damaged dwelling houses,
- Compensation for loss of livelihood,
- Compensation for crop loss and
- Avoidance of threat to food security).

The costs of providing for these services demanded by the surveyed stakeholders has then been assessed from the list of assistances stated in the State Disaster Response Fund and the National Disaster Response Fund of the Government of India for the period 2010-2015 (Ministry of Home Affairs (Disaster Management Division), Government of India, 2013). See Figure 3.



:Figure 2: Meeting Adaptation in Survey Area - Costs and Ranks

Prioritizing policy options is often based on the cost efficiency of strategies. The rule of cost minimization generally guides policy makers in making strategy choices. In accordance to this rule if decision are left to a command and control system, there is a high probability of implementing those adaptation options that involve lower costs in lieu of those that provide higher benefit. Thus the most demanded strategies of livelihood protection and repairing of damaged houses have a lower probability of being the first choice for adoption by policy makers than upgrading the PDS system. Thus a top down approach to adaptation policy design and implementation often undermines the stakeholders' perception of welfare maximization leading to suboptimal capacity creation. The same can be analyzed through an adaptation service curve that matches the cost of adaptation service supply against the demand for adaptation services by affected stakeholders. See Table 6.

Table 6: Calculations for Adaptation Cost Curve

Adaptation Service	Immediate Compensation Cost (Rs Million)	Priority Rank by Stakeholder	% Cost	% Cumulative Cost	% Rank	% Cumulative Rank
Input subsidy + de-silting of land: Cash	1.19	3	3.68	3.68	23.08	23.08

Crops						
PDS upgradation	2.02	4	6.24	9.92	30.77	53.85
Input subsidy + de-silting of land: Food Crops	7.23	3	22.35	32.27	23.08	76.92
Compensation for house damage	8.71	1	26.92	59.20	7.69	84.62
Income generation Strategies	13.2	2	40.80	100.00	15.38	100.00

Note 1: Adaptation Cost Curve Calculations made on the basis of Table earlier

Note 2: % Cost = (Adaptation Service Cost/ Total Cost) x 100

Note 3: % Rank = (Adaptation service Rank by Stakeholders/ Total rank) x 100

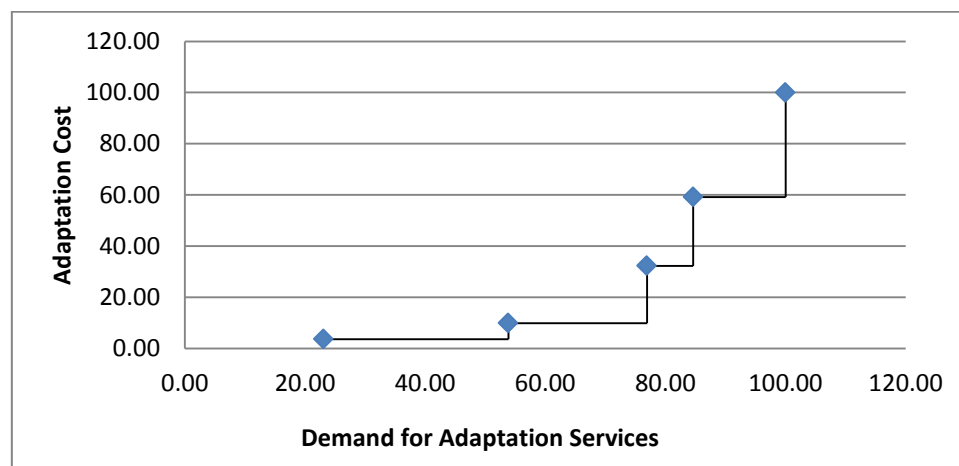


Figure 4: Adaptation Services - Cost vs. Demand

Note: The step diagram starts at the bottom left hand corner (i.e. the first lowest data point from left) with the service that requires least investment cost, i.e. input subsidy and land de-silting for cash crops. Each higher step represents the next higher cost of investment and so investment for PDS up gradation is followed by input subsidy and de-silting of land for food crops The fourth lowest data point from left indicates house damage compensation and finally by income generation strategies.

In the Adaptation Services – Cost vs. Demand Curve (ASCD) diagram (fig. above), the risk intensity of impacts denoted by the cumulative percentage ranks of the adaptation services demanded is measured along the horizontal axis. Along the vertical axis, the cost for supplying the adaptation services and hence improving the coping capacity of the stakeholders is measured. The cumulative percentage cost is used as a measure for the increasing financial burden of adaptation service supply. A low increase in the cumulative rank between two adjacent adaptation services (measured along the horizontal axis) indicates a high risk impact which if addressed immediately will greatly improve the coping capacity according to the stakeholders' perceptions. The cost outlays for each service supplied are already arranged in the ascending order of cost. The ASCD curve therefore indicates the efficacy of adopting a cost effectiveness strategy for choosing adaptation policy options from the direct stakeholders' points of view.

From the curve it can be analyzed whether a low cost strategy is actually the best option for maximizing stakeholder benefit or not. It may be argued that the prioritization of services by stakeholders may not be the best ranking for accruing the maximum benefit to them. However,

if such an optimum prioritization can be made then the cost benefit correspondence for any service can be obtained from the ASCD.

Further assuming for stakeholder involvement in prioritizing adaptation strategy options is accepted, the chance for unsustainable adaptation still remains. The compensations offered in the event of cyclone impacts under the various government schemes, ensure the rebuilding of the community resources as per the business as usual (BAU) guidelines. Thus a damaged house is replaced by a house of same design and built, while crop compensation does not involve creating capacity that incentivizes investment in agricultural practices that would minimize crop loss in the event of any similar natural hazard in the future. Schemes to generate alternative livelihood options supplementing the existing income from agriculture are also required if maladaptation due to unsustainable adaptation has to be avoided. However, such schemes would require an initial investment that is often greater than the investment required under the BAU scenario.

A quick estimation of costs involved in constructing cyclone resistant houses instead of repairing the existing structures in the survey region corroborate this observation (table 7). The cost estimates for cyclone resistant houses has been approximated as Rs. 105000.00 for a 170 sq. ft. house as per a similar exercise carried out in Bangladesh under a UNDP project in 2012 (UNDP, 2012). The outlay for creating capacity to ensure the long term sustainability of livelihood in the event of extreme events, has been estimated through the minimum cost required to provide primary education and vocational training over a period of 15 years to the affected stakeholders (IDFC Foundation, 2013). In both cases, the initial investment costs are more than five times the costs involved under the existing schemes. However, it has to be realized that in the long run the returns to investments under a sustainable system far outweighs the high initial investment costs, thereby making sustainable adaptation options more economically viable.

Table 7: Estimates of Cost of Sustainable Adaptation Services

Adaptation Service Demanded	Supply of Sustainable Adaptation Services Suggested	Service Demanded Ranked according to Priority of the affected Stakeholders	Cost of Sustainable Adaptation Services (in Rs Million)	Immediate Compensation Cost (in Rs. Million)*
Restoration of damaged houses	Building cyclone resistant houses	1	47.25	8.71
Compensation for loss of livelihood	School education + vocational training	2	72.00	13.2
Compensation for food crop loss	Input subsidy + de-silting of land	3	NA	7.23
Compensation for cash crop loss	Input subsidy + de-silting of land	3	NA	1.19
Maintaining food security through PDS	PDS upgradation to avoid threat to food security	4	2.02	2.02

Note: NA – Not available. Cost for strategizing for flood and storm surge resistant crops and disseminating knowledge and training on the same is yet to be estimated

Outcome: See Full Draft Paper in Annexure 7. Paper Communicated to Journal of Disaster and Development, published by NIDM, India

3.2 Output 2: Reverse Engineering: A Case study briefing of Cyclones Aila & Phailin

Cyclone Phailin: Tropical cyclone Phailin, a category IV cyclone made its landfall in Ganjam district in Gopalpur on October 12, 2013. The Central government of India along with Indian Meteorological Department (IMD) and Odisha state government war footed against one of the strongest tropical cyclones. Cyclone Aila and Phailin have faced similar fate post-landfall.



Phailin 2013

The major losses incurred post Aila cyclone was not caused by the cyclone itself but due to the floods post cyclone. Similar is the case with cyclone Phailin – the heavy rains and the breach of embankments have left several villages inundated under water. The post flooding will slow down the recovery of Odisha; thus reconstruction and repair of the embankment should be prioritized to help people return to their homes.

Efficient planning of preparedness activities in the pre-disaster state is perhaps the greatest reason behind the minimal loss of life after the cyclone. Other reasons include the constant monitoring of weather patterns and warnings, clear instructions to district authorities, positioning of relief materials and teams well in advance, coordination with the central government for defence and other agencies' assistance, and most importantly, the evacuation of a large number of vulnerable citizens to safe locations.

Cyclone Aila: A category I cyclone caused enormous loss of lives and livelihoods in 11 coastal districts in Bangladesh and parts of West Bengal in India.

The Cyclone Aila had adverse effect on the Satkhira and Khulna Districts of Bangladesh, entrancing immediate death of approximately 300 lives, leaving 7,100 injured. In all, it affected over 3.9 million people and caused massive infrastructure damage including 1,742 kilometres breach in the embankment network. Embankment network is the only protection available to people along the coast against cyclones and storms¹.

The cyclone hit the East Coast of India on the 25th of May, leaving many people homeless, loss of their most valuable assets, livestock and the devastation further worst damaged their main source of livelihood, their paddy fields and cultivable lands. The most affected regions are the 24 South Parganas and 24 North Parganas which are at the Sunderban region.



The Objective of the study is:

- To examine the behavior of relevant institutions in relation to a recent disaster, through a process of ‘reverse engineering’ to assess the social, economic and cultural factors affecting the survivors of the disaster
- To understand what needs to be done in the future- we should step back and reflect on what was done and achieved

Based on the above two experiences the immediate recovery services and the long term planning requirements are listed below.

Table 8: Immediate recovery services and the long term planning requirements assessed through reverse engineering

<p>Immediate Recovery</p>	<ul style="list-style-type: none"> ● Immediate Relief (Shelter, clothes, food) ● Cash for Work: programs were introduced at initial phase that aimed for quick recovery ● Emergency Repair: To stop sea water inundation, particularly in high tide. ● Education: Several educational institutes and centers due to poor construction were damaged by the cyclone Aila ● Livelihood recovery and diversification NGO’s worked parallel with the national government to help repair the infrastructure such as local roads and embankments.
<p>Long Term Recovery</p>	<ul style="list-style-type: none"> ● Early Warning System Mobile phone network provider like Grameenphone (private) and Teletalk have initiated to use Interactive Voice Response (IVR) to support the early flood and cyclone warnings in Bangladesh Pole Fitted Megaphone Siren has been installed in various districts of both India and Bangladesh. ● Awareness Bangladesh has been organizing several training, awareness and research programs at local and national levels. The same pattern can be followed in India as well ● Education Development of graduate courses at universities and training institutes; National Institute of Mass Communication has organized training on DRR for Media personnel. ● Gap: Transfer of knowledge from theory to practical ● Embankment Repair

Main Findings:

- i. Systematic integration of disaster risk reduction and climate change adaptation into development planning and programming at all scales is necessary.

- ii. Technical capacity must be developed to manage risks and disasters within the government system at all levels including having courses at university level to strengthen the flow of information between scientific institution and practitioners.
- iii. There should be a special focus on the needs of women before, during and after natural disasters. The main idea is to empower women so that they can take decisions in formal as well as informal political decisions.
- iv. Improvement of governance infrastructural and resource management.
- v. River management is an integral part to remove siltation on the river bed that will reduce the risks of drainage congestion
- vi. Implementation of agricultural and fishery risk reduction strategies: research on the development of improved and saline tolerant crop for coastal region in terms of salinity tolerance and yield.
- vii. Most of the people lose their primary source of livelihood that is agriculture or fishing post disaster, thus measures should be taken to generate alternative disaster resilient livelihood options in the area.
- viii. Risk transfer mechanism should be promoted at large scale in relation with recovery. For example, introduction of micro-insurance against disasters for the poor will help them to recover their losses quickly.



See Annexure 8 for the Full Report

3.3 Output 3: Understanding Conflicting Priorities Between DRR Institutions and Communities

Case Study: Cyclone *Phailin* (2013) and Mismatch in Priorities

Tropical Cyclone *Phailin* made landfall in Odisha, India on Saturday, but advanced warnings and evacuations saved hundreds of thousands of lives. In a statement made by Odisha Revenue and Disaster Minister S.N. Patro to the Press Trust of India, 14,514 villages in 12 districts were affected by *Phailin*, which had impact on a population of 853,620. The cyclone damaged and flooded many homes and other structures. Cyclone *Phailin* displaced hundreds of thousands of people since making landfall in Gopalpur, Ganjam district.

It was evident in rapid assessment post cyclone *Phailin* that accountability of loss and damage suffered by women and law that covers women's right to property do not match. Similar problem is faced by people employed under informal sector. From policy point of view, there is a high need to cover nonfarm livelihoods in loss and damage assessment for not only supporting affected people but will accurately assess the impact of any climate related disasters. In addition, a risk transfer mechanism such as Afat Vimo (disaster insurance) must be implemented

Many people do not give priority to risks of disasters, even when they face significant risks they have already experienced, or that have been predicted such as in Sundarbans where people continue to be at risk in spite of the area being continuously vulnerable



The Aim of this study is to understand

- Why is knowledge created is not being used and why is learning not happening in DRR?
- What are the barriers to learning, and why is knowledge ignored or played down?

Disaster Risk Reduction is divorced from Reality:

- There is a significant gap between what DRR aims at, and the willingness and ability of people to respond as people do not behave in the way that disaster managers expect them to behave, or want them to behave.

Why so? Because of different Risk Perceptions:

- Risk perception is '*the judgment made by any community towards any hazard and the severity associated with the hazard*'. It depends upon the knowledge, experiences, values, feelings and the level of exposure of the community to any hazard. Therefore, each

community, village, city or state has different perception to risks depending on their experience.

Table 9: Examples of mismatch

Example: Influence of culture	Women should stick to strict code of conduct and modesty to protect themselves from natural disasters. Hojjat ol-islam Kazem Sediqi, the acting Friday prayer leader in Tehran, explained that “Many women who do not dress modestly lead young men astray and spread adultery in society which increases earthquakes” (http://news.bbc.co.uk/2/hi/8631775.stm)
Example: Lack of Alignment	Post Gujarat earthquake in 2001, large amounts of clothes donated to the victims were dumped along the highway “to be spirited away by the Rabaris (nomadic people)” because the trucks sent too much to certain locales, and as a result the trucks just dumped their supplies along the side of the road. INGOs are well known for their ability to assess and respond to humanitarian crises precipitated by several disasters.
Example: Trade off	Several organisations have conducted Hazard, Vulnerability and Capacity Assessment (HVCA) and concluded that it is risky to live in locations such as Sunderbans. However, people are trading the risks of a place and a hazard for the livelihood benefits, shared culture & social capital of that location

Table 10: Main Reasons for Mismatch in the Priorities of Local People & Humanitarian Agencies

Risk Transfer	<ul style="list-style-type: none"> • Local context based development of micro insurance policy with focus on extreme events • The people working in the informal sector often lack the important documents that are needed to buy insurance policies
Cultural Sensitivity	<ul style="list-style-type: none"> • It is essential integrate scientific knowledge with local and culture specific • Studying culture on surface will not be successful
Lack of Coordination	<ul style="list-style-type: none"> • Various non-governmental organizations, governmental organizations, civil society and military forces often lack synchronization
Project Based Organizations	<ul style="list-style-type: none"> • Organizations tend to be project based. The community struggles to continue the development work without organization’s tutelage • Very few organizations conduct monitoring and review • Some organizations tend to impose their agendas over people’s needs • Changeover between different set of agencies – Relief vs. Development
Loss and Damage	<ul style="list-style-type: none"> • Legal rights of women to property may vary and are not equal to men. Therefore, women may be left out, that is, losses and damage suffered by women may not be fully and equally accounted for in most situations. • Informal Sector: <ul style="list-style-type: none"> ▪ Majority of population in developing countries are is employed under the ‘informal sector’. ▪ These informal sectors are not acknowledged by humanitarian agencies, thus loss incurred are not recognized ▪ Greater vulnerability of informal workers due to <ul style="list-style-type: none"> ○ Lack of basic social protection • Lack of representation and voice in social life

See Annexure 9 for full Report

3.3 Output 4: Linking Climate Adaptation and Disaster risk with Diversified Livelihoods

A Case Study of Climate Resilient Livelihoods in Rajagopalpur in Odisha

Tropical cyclone “*Phailin*” made its landfall in Gopalpur in Ganjam district in Odisha on October 12, 2013; affecting more than 9 million people and killing approximately 44 in Odisha. Several hundred thousands of homes were washed away when wind-driven tidal surges up to 3 meters destroyed the coastal belt. The storm brought additional rainfall to inland areas that have already borne the brunt of an overly active monsoon season. Many areas of the affected districts are inundated; houses, roads and embankments were damaged; drinking water ponds are contaminated; and crops worth 2,400 crore was destroyed.

Cyclone *Phailin* provides a strong evidence that it is inevitable to promote and strengthen livelihood diversification in rural (coastal) India for a balanced income at family level, as a strong adaptation strategy and for safer recovery options. It was observed that involved in climate dependent activities.

A recent visit to Rajgopalpur – a handicraft village in Puri district of Odisha post cyclone *Phailin* made it clear that less dependence on climate for their livelihood has made them disaster resilient and sustainable. ‘The only loss we incurred is the loss of foreign customers for same time period due to the cyclone’ said Akshay Kumar Barik, a patachirta artist.



Context

The research explores:

- The possible need for and role of the Rural Non Farm Economy (RNFE)
- Whether and how adaptation funding should have a role in supporting the emergence of the RNFE as a way to enable adaptation.
- To understand if the existing knowledge on RNFE and livelihood diversification provide basis for reducing climate dependency in rural India

What is Rural Non farm Economy?

The RNFE can be defined as the array of livelihood activities (including employment and self-employment, formal and informal, legal and illegal) based in rural areas or pursued by people who are from households that are mainly rural-based, which do not involve direct agricultural production in crops or livestock.

Livelihood Diversification & Disasters

Livelihood diversification has an important role to play to mitigate the effects of disasters. It seeks to offer protection to communities which lose their livelihood on account of the disruption caused due to disaster. However, such diversifications are also subject to the local natural endowments, geography and policies prevalent. There is a positive correlation observed between livelihood development and diversification which can be worked upon to develop disaster resilient livelihood practices.

Why Diversify?

1. To reduce risk and overcome shocks
2. As a Coping strategy
3. Respond to failure in factor market
4. Seasonality
5. Flexibility
6. Complimentarity
7. Location

Challenges faced by communities when diversification:

1. Diversity across Rural India
2. Access to Credit and infrastructure
3. Small Firm Size
4. Co-ordination issue among authorities
5. Education
6. Role of Women and Social Groups
7. Rising Inequalities
8. Risk and Vulnerability
9. Land Issues

Lessons Learnt:

1. In developing countries like India, there are clear distinction between the activities that are taken by people
2. Forces like globalization and urban led rural transformation are powerful actors in India and other developing countries
3. Developing countries do not use their resources efficiently – example countries can specialize in tourism by developing museums and conserving heritage
4. Employment opportunities must be given to people living in rural areas by starting the projects that can make rural areas look attractive for business
5. Migration (due to distress) leads to destruction of assets, farm-livelihood and education which limit scope for diversification.

Recommendations for policy uptake:

1. Both income and nonfarm employment must be growing if nonfarm growth is to contribute effectively. This growth in non farm economy will require investments in productive activities and infrastructure. For development of rural non farm sector, it is inevitable to develop good road transport. This will open up many avenues for both

marketing of goods and services produced by rural enterprises and procurement of raw materials.

2. Upgrading the traditional techniques of production that is used by the rural population will reduce the dependency on the climate and natural resources; and would improve the efficiency of rural enterprises and agriculture.
3. Improvement in the quality of goods will boost sales.
4. The government must provide employment opportunities in the rural areas; and ensure that the posts are filled by rural populations.
5. Post disasters the conditions of the people in the rural areas are usually very bad; government must ensure that training programs are held to develop new skills to reduce the dependency on climate.
6. Greater focus on improving educational standards in rural areas which can help the principle players understand the challenges and therefore adapt.
7. Developing an environment that can help small enterprise to grow and flourish.
8. Market distance and related transport costs are major factors and act as an obstacle in livelihood development and sustainability of livelihood.

For details see Annexure 10.

4 Conclusions

The research process in this project indicates that the government is making all out efforts to have an efficient Disaster Management System including that for Cyclones in the country, with state of the art disaster warning, communication and system of governance for disaster preparedness and recovery. It is supported by national research institutes, training institutes, NGOs, CBOs, bilaterals and multilaterals. However, there exists gaps in governance and in the operations which still lead to loss and damages, though learning's from good practices are being continuously taken on board. Our research constituting of a systematic evaluation of the disaster management arrangements for cyclones through the Climate Smart Disaster Risk Management approach (CSDRM) approach has identified entry points and interventions at national, state, district and local levels that can lead to a long term disaster risk aversion and hence climate change adaptation that is sustainable.

Self Assessment is a powerful tool by way of which institutions can orient their activities in such a way so as to become climate smart. For example, discussions during the self assessment workshop lead to the conclusion that UNDP Odisha can use the CSDRM approach to reduce the disaster risk of their urban and rural management project making the project outputs climate resilient. SWAD and IWD indicated that their organisational approach for undertaking various activities towards disaster mitigation can be made climate smart through the CSDRM approach. Further they can use the CSDRM approach for integrating climate in their WASH and rural livelihood programmes. OSDMA suggested that they can look at their Disaster Management Plan which was ready in August 2013 and make it climate resilient by using the CSDRM approach. Further, the Puri District officials indicated that the CSDRM approach can be used to look at the community aspirations and needs to become climate resilient and use the information for developing district and village level disaster management plans.

Integration of CSDRM approach is possible within village level Plans in retrospect by analysing them and identifying the entry points for CSDRM and thereby developing the actions for CSDRM. For example, the WUMP – a water and sanitation project undertaken by ICSD in earlier years was relooked at and all elements of the WUMP could be linked to CSDRM, and action points identified.

Integration is possible through guidelines for disaster management, in ongoing projects and develop guidance's on development of disaster management plans. For example, an attempt has been made to identify the CSDRM steps that need to be taken to make the elements of the "National Cyclone guidelines" more climate resilient. This also forms the basis for development of the "Odisha specific Cyclone Disaster Management Plan:", which is advised to be formed by the government though an overall "Odisha Disaster Management Plan" which exists. Similarly, a critical look at the projects focussed entirely on cyclone mitigation such as the "National Cyclone Mitigation Project" and the "Integrated Coastal Zone Management Plans", indicates that all the components of these projects have the need to reduce uncertainties vis a vis climate change impacts, they need to orient their actions to establish long term adaptation, which in turn can reduce the vulnerabilities due to climate change as well as the vulnerability due to poverty in the region.

Integration is possible by making policy makers aware of the steps needed to make disasters climate resilient through Policy Briefs. For example the policy brief on Getting Climate Smart on Coastal Zones (annexure 3b), has led to discussions with concerned officials of the Planning commissions on the possibility of inclusion of the Climate Resilient Disaster Management Plans as an indicator in the commissions Environment Performance Index. A paper on this is being drafted for a larger discussion including all other stakeholders. Similarly the CII has called for a meeting with its stakeholders on finding ways of exploring the use of CSR funds for climate resilient disaster risk management in their operations as well as population they cover. The Odisha government has been informed about the policy it needs to integrate while developing its Agriculture Policy for the coastal region, which is shortly to be published. The suggestion of simplified and understandable climate projections for use in planning for disaster risk management in the long term at various levels of governance have been well accepted by the concerned institutions that generate the primary information such as the MoES and IMD which has shown interest in formulating such products.

Action research and testing can lead to integration of CSDRM. SWAD- the Society for Women's Action and Development in Puri district in Odisha actually self assessed itself at the institutional level and could identify the ways it can make its vision and mission more climate resilient which includes facilitation of development of marginalised communities, reducing poverty and improving quality of life of the poor and ensuring environmental sustainability. For institutionalising CSDRM, SWAD is using participatory tools to build their knowledge in the CSDRM approach and making their activities climate smart. They have come up with short and long term plan of actions in the line of ongoing campaign and activities. For ensuring livelihood security through their projects SWAD has decided to advocate vertical or horizontal diversification of crops, propagating disaster resilient crop varieties, by introducing climate smart disaster risk preparedness in School Safety Programmes, and for promoting economic recovery of the poor by making villagers aware of the processes involved in availing the Disaster risk insurance scheme and micro insurance packages. Further, appropriate development of Monitoring and Evaluation (M&E) indicators and testing the projects through these criteria while they are operational can lead to mid course correction if required.

Cost benefit analysis of adaptation actions is a powerful tool for prioritising the same for long term disaster risk reduction: Conclusion: The best adaptation policy implies maximisation of coping capacities and minimisation of vulnerabilities. Such a policy may or may not be economic cost efficient, but are however damage cost efficient and therefore prioritizing adaptation actions is necessary. The rules of cost minimization within the government system, generally guide policy makers in making strategy choices that are lower in costs in lieu of those that provide higher benefit. Thus the most demanded strategies of livelihood protection and making climate resilient housing have a lower probability of being the first choice for adoption by policy makers than upgrading the PDS system. It is concluded that though the climate resilient adaptation such as climate resilient housing and implementing climate resilient agriculture policy in the region will cost higher in the short term, but implementation of the same at today's costs will lead to avoidance of incurring higher costs cumulatively year after for repairing houses or for debris cleaning from agriculture land and will ensure human well being and higher returns for the communities dependent on natural resources.

5 Future Directions

The Hyogo Framework (2005-2015) emphasizes that disaster risk reduction has to be a national and a local priority with a strong institutional basis for implementation; Nations have to identify, assess and monitor disaster risks and enhance early warning; Knowledge, innovation and education to be used to build a culture of safety and resilience at all levels; Efforts need to be made to Reduce the underlying risk factors and Disaster preparedness to be strengthened for effective response at all levels. However, integrating climate change in disaster risk reduction is imperative due as the nature hydro-meteorological hazards are changing due to climate change .

Our research shows that there are multiple paths through which climate change concerns can be integrated in disaster risk reduction and this is not one shot process. It will require continuous evaluation of actions being carried out, identification gaps, plugging in of required interventions and moving ahead towards a sustainable disaster risk reduction in a climate change context.

In view of this it is perceived that the future directions for a more sustainable adaptation of measures for long term disaster risk reduction, necessarily has to start from the bottom of the pyramid and move to the top. These will be supported by the pillars of

- Awareness on the impacts and vulnerabilities due to hazards in a changing climate scenario
- Training to plan for long term preparedness
- Technical innovations for plugging gaps and Identifying opportunities for disaster risk reduction
- Developing adequate policies
- Engaging with right stakeholders for implementation of interventions

The future directions for making cyclone disasters climate smart can be as follows:

Integrating climate change in disaster risk reduction in school curricula would

go a long way in developing citizens who are aware of the needs and through their lives they will concously or unconsciously integrated actions that are climate resilient

Developing training modules for integrating climate in disaster risk reduction for training of officers in the NDMA, SDMA, DDMA, ULBs, PRIs, various line ministries and their departments at state and district levels.

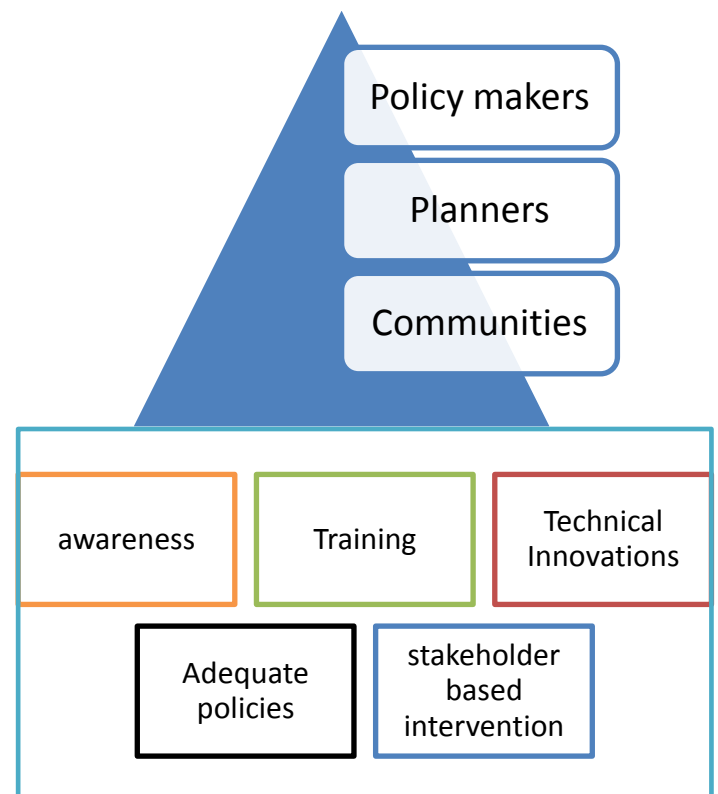


Figure 5: Merging action and governance for integrating CSDRM in Disaster Risk Reduction

Developing easy to understand climate projection advisory for planners to integrate it within their plans for developing climate resilient Agriculture, Water resources, Energy, Infrastructure such as housing, roads, shelters, power infrastructure, industries etc susceptible to recurrent hydro-meteorological hazards.

Engaging with planners to propagate climate sensitive policies. For example at the national scale the ministry of agriculture and at the state level, department of agriculture can assess the vulnerability of agriculture due to enhanced intensities of hydro meteorological events in a changing climate scenario and develop policies towards amelioration of the same. In this context integration of our advocacy on using short duration varieties as kharif and rabi season are offering narrower windows as frequently onset of monsoon gets delayed and severe cyclones are occurring even in December; and using the dry season to obtain the potential production in coastal zones.

Towards non-farm diversified livelihoods. Engaging with communities to understand the possible non-farm livelihoods that a particular community can take up sustainably in the coastal region and simultaneously engaging with rural development department, small scale industries, and other departments towards developing programmes on non-farm diversified livelihoods.

Supporting the state and district level governments to develop climate resilient cyclone disaster management plans. As a national cyclone guideline is available, and through this research steps have been identified to make it climate sensitive, it is possible to develop such a plan in consultation with all concerned stakeholders, right from community level institutions, to ULBs, departments etc.

Engaging continuously with the communities to understand their needs for long term adaptation and seeking support of the government by helping them to develop policies and programmes accordingly

Lobbying with the government to put in place special funds in mission mode for building climate resilience, which supports prioritized adaptation actions required to make the population prone to hazards more resilient in the future as the climate changes. This fund will be for long term preparedness rather than reactive in nature such as the State and National Disaster Relief Funds which are already in place.

Engaging with the industry to access their CSR funds for reducing the risk of changing nature of hydro-meteorological hazards in industries and for reducing vulnerability of the population that it is serving or is surrounded by around its installations.

These are only a few suggested steps forward but in no means are comprehensive. Further discussions will lead to a more comprehensive list.

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