



Training Needs Assessment on Disaster Risk Reduction and Climate Change Adaptation



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Prepared by All India Disaster Mitigation Institute (AIDMI) with support of
Odisha State Disaster Management Authority (OSDMA)

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Contents

Acknowledgement	vi
Executive Summary	vii
Abbreviations	ix
1. Introduction	1
1.1. General Profile of Odisha	1
1.2. Disasters: National Scenario	3
1.3. Disaster Scenario – Odisha	4
1.4. Major Disaster Events in Odisha	4
1.5. Institutional Mechanism – OSDMA and Relevant Departments (DRR and CCA)	6
1.6. DRM (Disaster Risk Management) Efforts by Odisha Government	8
1.7. State Action Plan on Climate Change	11
1.8. Training and Capacity Building for DRR in India	11
2. Training Needs Assessment (TNA): Background	15
2.1. Training Needs Assessment (TNA)	15
2.2. Objectives and Scope of the TNA	15
2.3. Steps of the TNA	16
2.4. Methodology and Approach	17
2.5. Tools used in the TNA	17
3. Recent Developments in Relation with Climate Change and DRR Integration	23
3.1. Climate Change in 21st Century – A Broader Context	23
3.2. Climate Change in Odisha – Present Scenario	23
3.3. Agriculture and Climate Change in Odisha	24
3.4. Health and Climate Change in Odisha	24
3.5. Climate Change, Water and Sanitation in Odisha	26
3.6. Housing and Urban Development	27
3.7. Education and Climate Change	27
3.8. Initiatives in Odisha	29

3.9. Sectorwise Important Findings from Studies	35
3.10. Way Ahead	40
4. Training Needs Assessment	41
4.1. Integration – DRR and CCA	41
4.2. Key Gaps and Needs	45
4.3. Awareness and Sensitization	49
4.4. Role of Key Stakeholder Departments	49
4.5. Strategic Approach	58
4.6. SWOT Analysis	60
4.7. Training Requirements Sector Wise	65
4.8. Sector Specific Training Requirements	74
4.9. Non-training Requirements	82
5. Lessons Learnt and Conclusion	85
Annexures	
1. TNA Summary Note	87
2. List of Contributions from Search Conference	94
3. Summary Report on District Level Search Conferences for Training Needs Assessment	100
4. Draft Outline of Training Module	104
5. Sample Datasheet for Evaluation of Trainees	137
6. Glossary of Terms	138
References	141

List of Figures

1.1	Location Map of Odisha	1
1.2	Map Showing Major Disaster Events	4
1.3	Multi-hazard Map of Odisha	5
2.1	Main Components of Training Needs Assessment Process	20
3.1	Impacts of Climate Change	26
3.2	Sectors Directly affected by Climate Change and Disasters	30
4.1	Integrating CCA and DRR into Development Planning	42
4.2	Institutional Setup for Training on DRR and CCA	68

List of Tables

1.1	Agro-Climate Zones on the Basis of Soil, Weather and other Relevant Characteristics	2
1.2	Summary of Data on Demographics, Agriculture and Irrigation Capacities	3
1.3	Capacity Building of Deferent Stakeholders	12
3.1	Overall projections on possible impacts of climate change on agriculture	25
3.2	Observed effects on precipitation of changes induced by climate change, and observed or possible impacts on water and sanitation services	27
4.1	Highlights the key differences between DRR and climate change adaptation measures and approaches	44
4.2	Sectorwise Gaps and Needs Analyses	45
4.3	Cross Cutting Issues to Both DMPs and OCCAP	48
4.4	SWOT analysis of different climate sensitive sectors as per the findings from OCCAP	61
4.5	SWOT Analysis of Institutional Mechanism at the State Level	64
4.6	Training requirements have been identified for capacity building of different stakeholders in Odisha SDMP 2013	66
4.7	Training related needs identified in OSAPCC	66
4.8	List of Institutions providing training on DRR and CCA in India	68
4.9	List of Institutions providing training on DRR and CCA in Odisha	72
4.10	List of proposed trainings	75
4.11	Policy Level Intervention	83

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Kamal Lochan Mishra

Odisha State Disaster Management Authority (OSDMA)

Executive Summary

The world today is experiencing some of the worst climate-induced disaster events. In the past decade, the frequency and intensity of such events has been on the rise. It is now becoming a necessity to understand the risks involved and to evolve suitable methods to cope with this changing scenario. Integration between Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) has become the need of the hour. Despite being closely aligned, these two themes are often viewed as disparate, with little or no scope of overlap. OSDMA, under the GOI-UNDP project on “Enhancing Institutional and Community Resilience to Disasters and Climate Change (2013-2017)”, initiated this Training Needs Assessment (TNA) programme to look into the current capacities of various departments and sectors which are directly affected by climate change induced disaster risks. The focus of this exercise was to identify ways to integrate CCA with DRR and ongoing development processes, so as to maximize the outcome of efforts being made towards reducing climate risks. This report is the outcome of the efforts done during the exercise, and it provides insight into the entire process involving different stakeholders and research work.

Chapter one starts with a profile of Odisha. Further details of the disaster scenario in Odisha are provided to map the increasing impact of climate-induced disaster events in the region. The remarkable efforts of OSDMA towards reducing loss of lives after its inception in 1999 are discussed. The institutional mechanism of the National Action Plan for Climate Change (NAPCC) which guides the DRR and CCA efforts at national and state level is discussed, and the Odisha Climate Change Action Plan (OCCAP) is referred to as a source for preparing the baseline information.

Chapter two covers information on the background study related to TNA; what the objectives are; scope, methodology and approach deployed, as well as the various tools and their relevance to the entire process. Several tools were used to incur the information which included questionnaire for consultations, outline of search conferences, reviews of existing documents, and research works.

The Hyogo Framework for Action (HFA) had been the prime guiding source for many international and national agencies for their efforts towards DRR. Consultations for the post- 2015 framework for disaster risk reduction (HFA2) are in progress. During the TNA exercise, a desk review of OSDMA's current training schedule was done to analyse the performance of these trainings on the priorities for action of HFA2. From the analysis further training requirements were also deduced, so that it will strengthen the efforts towards aligning it with key priorities of HFA2.

Recently, there have been numerous and substantial efforts for reducing climate change vulnerability and disaster risk reduction in Odisha initiated by government and humanitarian agencies. The focus of reviews from different documents and research work has been kept to the most climate sensitive sectors that have been given priority in OCCAP and Odisha's State Disaster Management Plan (SDMP). These sectors are agriculture, health, water resource, education, housing and urban development, forestry, fisheries and

animal husbandry, energy, and industries. Important findings from several documents were extracted that related to these sectors. The key priority efforts enlisted in OCCAP and SDMP have also been mentioned with their relevance to training needs.

This TNA exercise can be seen as a major effort towards aligning Climate Change Adaptation (CCA) with Disaster Risk Reduction (DRR). From the various consultations (search conference, district consultation, and integration workshops) many gaps in the current capacities of relevant stakeholders were revealed. Many contributors accepted that their current knowledge and skill is not good enough for future climate-related risks and issues. The role of different stakeholders towards reducing climate risks and associated disasters had been discussed in the light of eight national missions enlisted in (National Action Plan on Climate Change) NAPCC. A SWOT analysis of different sectors was carried out to check their current strengths, weaknesses, opportunities, and threats in the process of integrating CCA and DRR. Based on the consultations and SWOT analysis, sector wise training requirements are enlisted. Furthermore, a comprehensive list of sector wise trainings has been prepared that will ensure the best possible approach for strengthening the capacities of different stakeholders and design implementation programs.

The findings from the entire TNA process can be summarised by recommendations based on the feedback of stakeholders and assessments of awareness level from SWOT analysis. A better level of co-ordination amongst various stakeholders at all levels is expected for better integration of CCA and DRR in development processes. A knowledge-intensive, rather than input-intensive, approach shall be adopted for developing adaptations to climate change induced disaster risks. Trainings should be more focused towards building knowledge and skill for catering to future development expectations. Involving the community in the planning process will make it not only knowledge oriented, but financial considerations can also be addressed more efficiently from the bottom up, making the process sustainable. The key training intervention areas identified were: knowledge and skill development, awareness and sensitization, capacity development of various stakeholders, and increasing community participation. Involving the secluded sections of society like the elderly, children, the physically challenged, minority groups, tribal groups, etc., was also identified as an important step for strengthening resilience. A detailed list of training is provided in chapter five.

Most importantly, the administrative and academic entities of the state of Odisha have a rich experience of different actions related to DRR. The institutions based in Odisha have contributed actively to reach to this level. However, the OSDMA should have a platform for effective knowledge management and facilitation between these entities. This is especially important at the current stage, as OSDMA is planning for long-term capacity building. This gap can be filled by a separate group or programme related to knowledge management (may be a learning centre targeting different universities and training institutions). This will make the training and capacity building efforts more strategic.

Abbreviations

AIDMI	All India Disaster Mitigation Institute
ANM	Auxiliary Nurse Midwifery
APR	Armed Police Reserve
ASHA	Accredited Social Health Activist
ATI	Administrative Training Institute
AWW	Anganwadi Workers
AYUSH	Ayurveda, Yoga & Naturopathy, Unani, Siddha & Homoeopathy
BDO	Block Development Officer
BPL	Below Poverty Line
CBO	Community Based Organization
CCA	Climate Change Adaptation
CCD	Climate Compatible Development
CCESD	Climate Change Education for Sustainable Development
CSDRM	Climate Smart Disaster risk Management
CSMMC	Cyclone Shelter Management and Maintenance Committee
CSO	Civil Society Organizations
CSSR	Collapsed Structure Search and Rescue
DDMA	District Disaster Management Authority
DM	Disaster Management
DRR	Disaster Risk Reduction
DSS	Decision Support System
EOC	Emergency Operation Centre
FGD	Focussed Group Discussion
FRI	Forest Research Institute
GP	Gram Panchayat
HFA	Hyogo Framework for Action
IAG	Inter Agency Groups
IAY	Indira Awas Yojana
ICZMP	Integrated Coastal Zone Management Project
IMAGE	Institution on Management of Agricultural Extension
IMD	Indian Metrological Department
IOTWS	Indian Ocean Tsunami Warning and Mitigation System
IPCC	Inter-governmental Panel on Climate Change
ISDR	International Strategy for Disaster Reduction
IWRM	Integrated Water Resource Management
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
MCS	Multipurpose Cyclone Shelters
MFR	Medical First Responder
MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme

NAPCC	National Action Plan on Climate Change
NCC	National Cadet Corps
NCRMP	National Cyclone Risk Mitigation Project
NDMA	National Disaster Management Authority
NDRF	National Disaster Response Force
NGO	Non Government Organization
NIDM	National Institute of Disaster Management
NIRD	National Institute of Rural Development
NRHM	National Rural Health Mission
NSS	National Service Scheme
OCCAP	Odisha Climate Change Action Plan
ODRAF	Odisha Disaster Rapid Action Force
OSAP	Odisha Special Armed Police
OSDMA	Odisha State Disaster Management Authority
OUAT	Odisha University of Agriculture and Technology
PDS	Public Distribution System
PRI	Panchayati Raj Institutions
RITE	Regional Institution on Training and Extension
SAT	Systematic Approach to Training
SDMA	State Disaster Management Authority
SDMP	State Disaster Management Plan
SEC	State Executive Committee
SEOC	State Emergency Operation Centre
SHG	Self Help Group
SIRD	State Institute of Rural Development
SRC	Special Relief Commissioner
SREX	Special Report on Extreme Events
SSA	Sarva Shiksha Abhiyan
SWOT	Strength Weakness Opportunity and Threat
TNA	Training Needs Assessment
TOT	Training Of Trainers
TVET	Technical and Vocational Education and Training
ULB	Urban Local Bodies
UNDP	United Nations Development Programme
WRI	World Resources Institute

1 Introduction

1.1. General Profile of Odisha

The state of Odisha lies on the eastern seacoast, located between 17°49' and 22°36' North latitudes and between 81°36' and 87°18' East longitudes. It spreads over an area of 1,55,707 sq km. The coastline of Odisha extends to a length of 480 kms. The total population of Odisha as per 2011 census is 41,974,218 of which 21,212,136 are male, and 20,762,082 are female. The state is divided into 30 districts, 58 sub-divisions, 314 blocks (administrative units in descending order to geographical area and population) and 103 urban local bodies for administrative divisions.

The geographic divisions of Odisha are broadly categorised as the northern plateau, central river basins, eastern hills, and coastal plains. The areas of the state north of latitude 20°N have an elevation up to 500m above sea level. However, on average, and particularly in the south western districts, they rise to 1500-1600m above sea level.

The climate is predominantly characterized by hot summers and mildly cold winters. Humidity is high year-round. The state receives rainfall from the Bay of Bengal branch of monsoons starting from May to September. The State can be divided into ten agro-

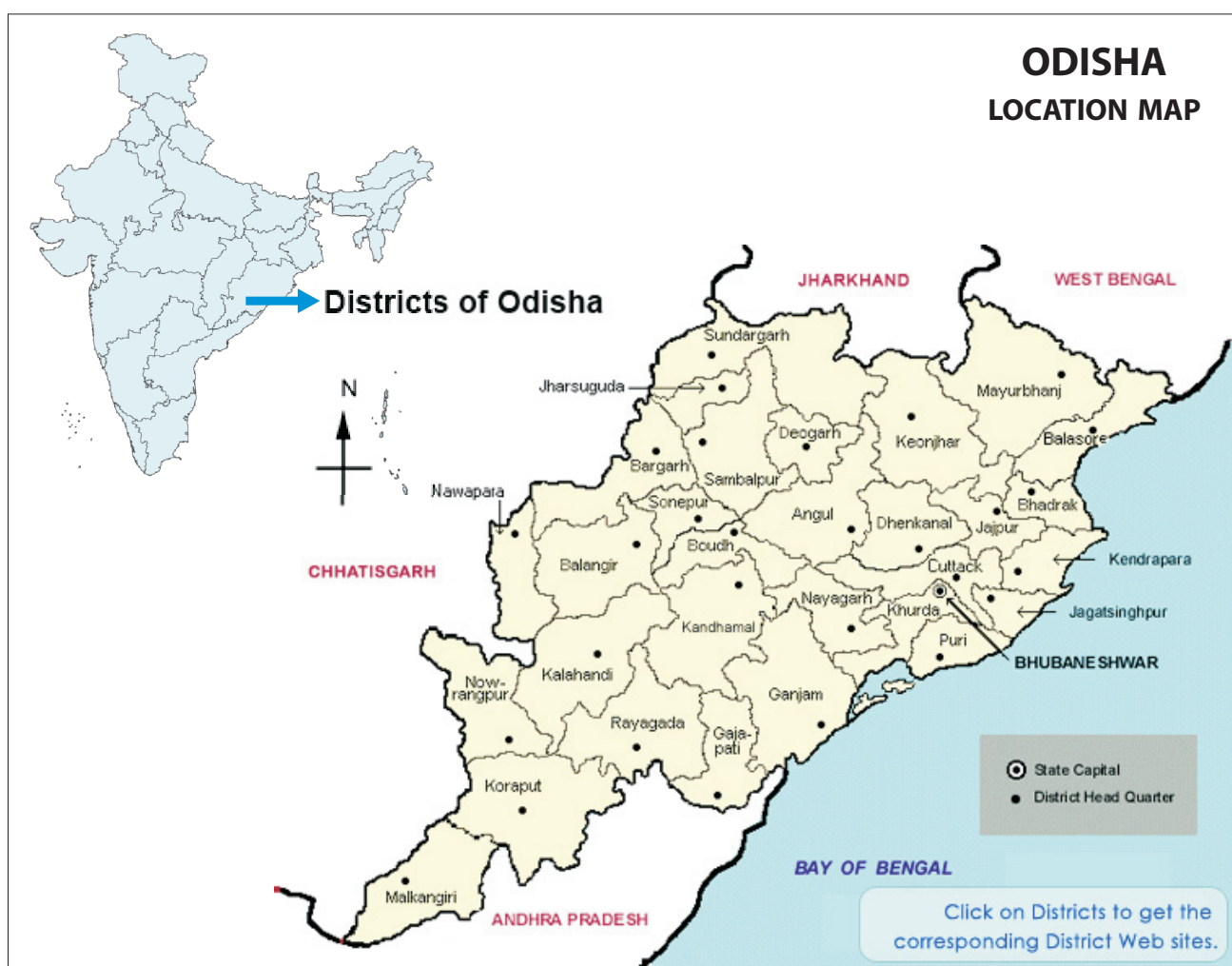


Figure 1.1: Location Map of Odisha

(source: <http://www.mea.gov.in/india-at-glance.htm>, <http://www.odisha.gov.in/portal/dist.asp>)

climatic zones on the basis of soil, weather, and other relevant characteristics.¹ **Table 1.1** showing ten agro-climatic zones:

Sl. No.	Agro-climate zone	Climate	Mean annual rainfall (in mm)	Soil group
1	2	3	4	5
1	North western plateau	Hot and moist	1648	Red and yellow
2	North central plateau	Hot and moist	1535	Red loamy
3	North eastern coastal plateau	Hot and moist sub-humid	1568	Alluvial
4	East and south eastern plateau	Hot and humid	1449	Costal alluvial saline (near the coast line
5	North eastern ghat	Hot and moist sub-humid	1597	Laterite and brown forest
6	Eastern ghat high land	Warm and humid	1522	Red
7	South eastern ghat	Warm and humid	1522	Red, mixed red and yellow
8	Western undulating	Warm and moist	1527	Black, mixed red and black
9	West central table land	Hot and moist	1527	Red, heavy textured colourous
10	Mid central table land	Hot and dry sub-humid	1421	Red loamy, laterite mixed red and black

1 OSDMA, State Disaster Management Plan, August 2013, available at http://www.osdma.org/Download/State_Disaster_ManagementPlan_Aug2013.pdf



Flora and Fauna

The forests of Odisha are home to many useful plants such as, various timber species, orchids, medicinal plants, and aromatic plants. The main species of trees available here are *sal*, *teak*, *piasal*, *bandhan*, *kangada*, *kasi*, *sisu*, *asana*, *karuma*, and *dheura*.

Rivers and Drainage System

All rivers in Odisha are peninsular and non-perennial. They originate from three main regions: Chhota Nagpur plateau in Jharkhand, Amarkantak plateau in Chhattisgarh, and the Eastern Ghats within Odisha. The main rivers flowing through the state are Mahanadi and its tributaries (which form the largest drainage system on eastern coast), Subarnarekha, Brahmani, Baitrani, Dhamra, Budhabalanga, Salandi, Rushikulya, and many more smaller streams. Near the sea, river waters become tidal.

Table 1.2: Summary of Data on Demographics, Agriculture and Irrigation Capacities²

General

Total Area (Sq. km.)	1,55,707
No. of Sub-division	58
No. of Districts	30
No. of Tahasils	316
No. of Blocks	314
No. of GPs	6,234
No. of Villages	51,349
No. of Municipalities and Corporations	36
No. of NACs	67

Demography of the State (Census 2011)

Total Population	4,19,47,358
Male	2,12,01,678
Female	2,07,45,680
Sex ratio (Female for '000 Male)	978
Rural Population	3,49,51,234
Urban Population	69,96,124

Literacy in percent

Male	82.40
Female	64.36
Total	73.45

Land use pattern during 2009-10 (in lakh hectare)

Total Cultivable Area	61.80
High	29.14
Medium	17.55
Low	15.11

Irrigation Potential (Area in '000 hectare)

Major and Medium-Kharif	1349.50
Major and Medium-Rabi	616.72
Minor (flow)-Kharif	561.81
Minor (flow)-Rabi	74.53
Minor (lift)-Kharif	507.55
Minor (lift)-Rabi	285.72

Size of Operational Holdings as per Agricultural Census 2001 (No. in lakh / Area in lakh - hectare)

Marginal (Below 1 ha.)	22.94 / 11.55
Small (1.0 to 2.0 ha.)	11.14 / 15.44
Semi Medium (2.0 to 4.0 ha.)	5.01 / 13.44
Medium (4.0 to 10.0 ha.)	1.45 / 8.17
Large (10.0 ha. and above)	0.13 / 2.21
Total No. of Cultivators	40.67 / 50.81

1.2. Disasters: National Scenario

India is vulnerable to a large number of natural as well as man-made disasters. Moderate to high intensity earthquakes are at risk of happening over 58.6% of the landmass; over 40 million hectares (12% of land) is prone to floods and river erosion; close to 5,700 km of the 7,516 km long coastline is prone to cyclones and tsunamis; 68% of the cultivable area is vulnerable to drought; and hilly areas are at risk from landslides and avalanches. Vulnerability to disasters/ emergencies of Chemical, Biological, Radiological and Nuclear (CBRN) origin also exists. Heightened vulnerability to disaster risks can be related to expanding population, urbanisation and industrialisation, development within high-risk zones, environmental degradation, and climate change³.

² Source: Census of India, 2011, available at: <http://www.census2011.co.in/census/state/orissa.html>

³ NDMA, National Policy on Disaster Management, 2009

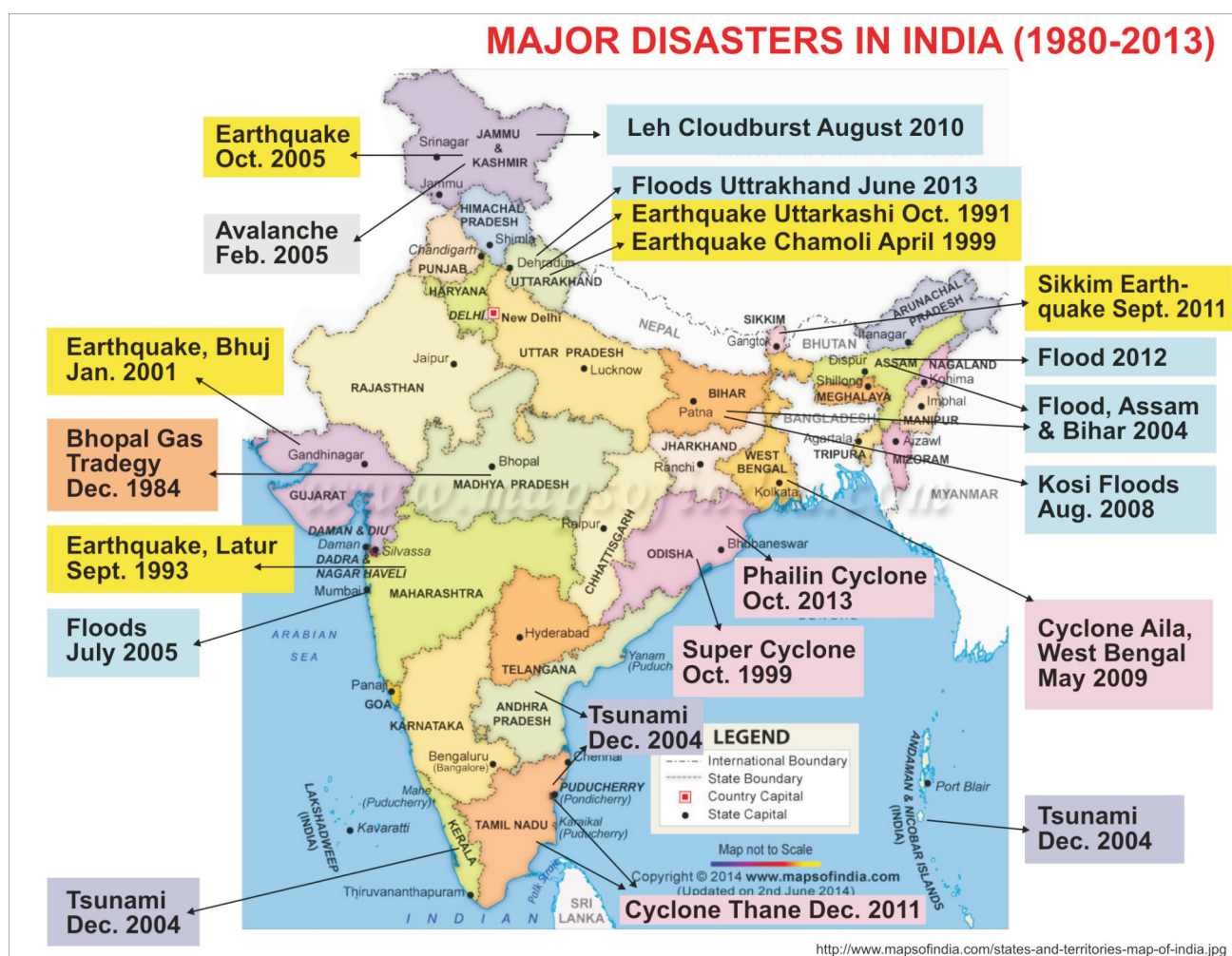


Figure 1.2: Map showing major Disaster Events

1.3. Disaster Scenario – Odisha

The location and climatic conditions of Odisha make it one of the most vulnerable states to natural disasters. The 480 km long coastline is frequently affected by tropical storm surges arising from the Bay of Bengal. This results in an inundation of most of the coastal area. Similarly, Mahanadi and its tributaries, one of Odisha's major rivers, has the potential of causing very severe flood damage.⁴ Odisha has 10 other major river systems which cause floods at regular intervals. Out of a geographical area of 15, 571 lakh hectares, 1.40 lakh hectares are very flood prone. The state is also vulnerable to flash floods and landslides. The frequency and intensity of droughts in the state is also on a rise, leading to crop failures, decline in surface and groundwater levels, increasing unemployment and under-employment,

migration, and indebtedness. Odisha's densely populated coastal plains are alluvial deposits of its river systems. The rivers in these areas with large amounts of silt have very little carrying capacity. This results in frequent floods, which is further compounded by breached embankments. Though a large part of the state comes under Earthquake Risk Zone-II (Low Damage Risk Zone), the Brahmani Mahanadi graben and their deltaic areas come under Earthquake Risk Zone-III (Moderate Damage Risk Zone) covering 43 out of the 103 urban local bodies of the state.⁵

1.4. Major Disaster Events in Odisha

1.4.1. Cyclone

Odisha had witnessed several cyclones in the past few decades which are increasing in frequency and

4 OSDMA, State Disaster Management Plan, August 2013, available at http://www.osdma.org/Download/State_Disaster_ManagementPlan_Aug2013.pdf

5 <http://www.osdma.org/ViewDetails.aspx?vchglinkid=GL001&vchplinkid=PL003>

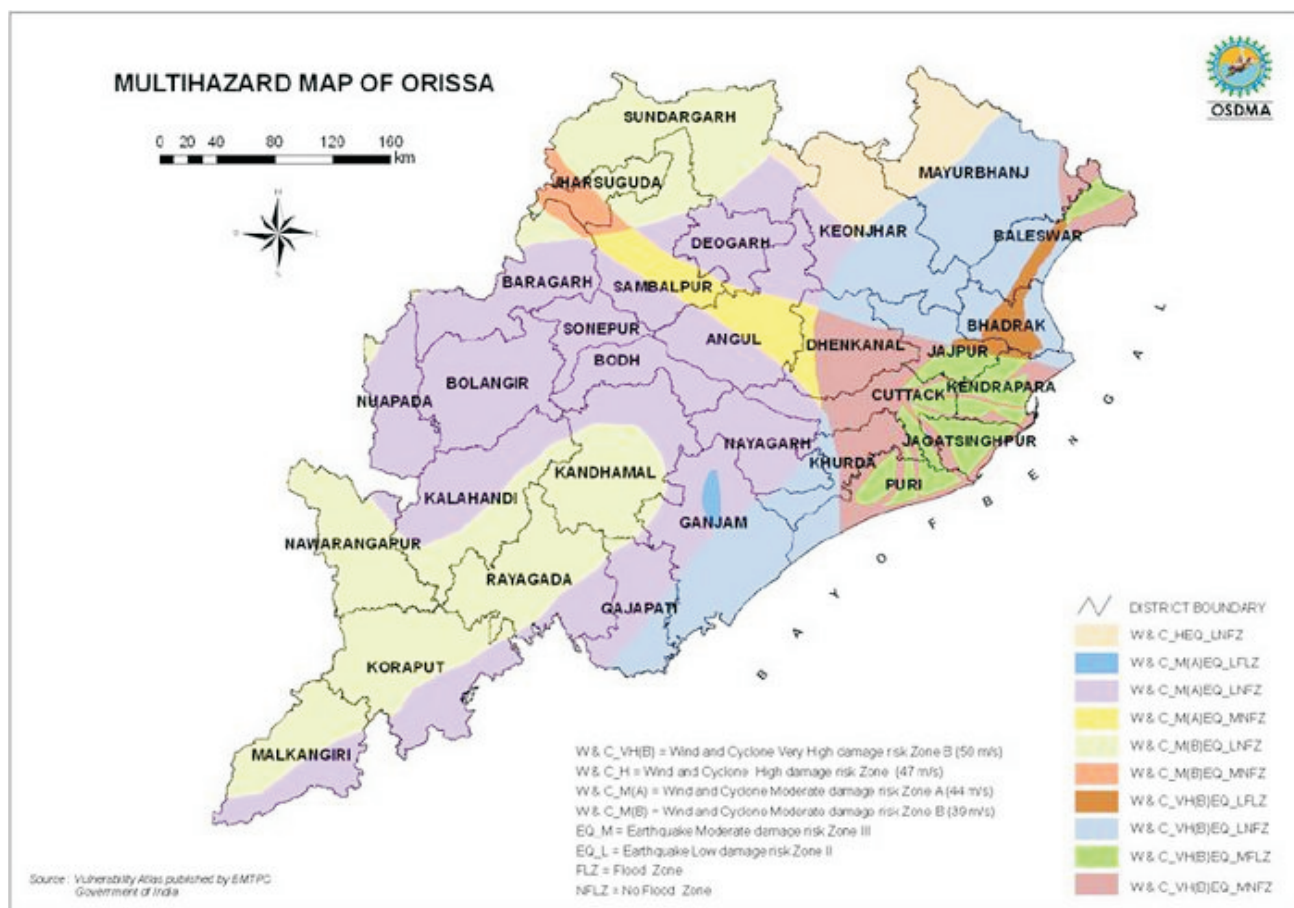


Figure 1.3: Multi hazard Map of Odisha (Source: osdma.org)

magnitude. In 1999, it witnessed the devastating super cyclone, which affected 14 Districts including 2399 Gram Panchayats from 128 Development Blocks. As per the official figures, 8913 people lost their lives, while 1.89 Crore population were affected (SDMP-2013).

Cyclone Phailin in 2013 was the second-most severe cyclone recorded in Odisha's recent history. The cyclone prompted India's biggest evacuation in 23 years, with more than 10,00,000 people moved up from the coastline. The direct casualties reported this time were very low, however. The official count is at around 25.

1.4.2. Floods in Odisha

The state experienced severe floods in the years 2006, 2007, 2008, and 2011. In 2006, July and August experienced very heavy rainfall which caused floods in 27 districts. A total of 18912 villages were affected, along with 73 Urban Local Bodies covering a population of 67.30 Lakhs. During this flood, 130460 houses were damaged. (OSDMA; SDMP, 2013)

The floods of 2007 affected Odisha in different phases. In July, August, and September, 1865, 4865, and 5677 villages, were affected, including 5, 20, and 12 Urban Local Bodies respectively. A total of 91 lives were lost in these floods.

The 2008 floods set a new record for Odisha. They were spread over two phases, occurring in June and in September. The total number of districts affected for the entire stretch came to be 21. The Ministry of Home Affairs, Government of India reported the floods of September 2008 as an "Unprecedented Flood Situation" on 20th September 2008, vide their letter No.11011 / 2008 MHA-DM-I Dt.20.09.08. While 110 lives were lost, 45,190 and 212965 houses were damaged in June and September respectively.

September of 2011 saw another severe flood. The first phase saw massive flood damage in the Mahanadi river system due to heavy rainfall in the upper catchment areas. The inflow into the Hirakud reservoir was more than twice its capacity. During the first phase of floods in September, 102 blocks of 19 districts were affected, covering 4897 villages of

1067 GPs, with a population of 34.44 lakh. During the second phase of floods in September, 71 blocks of 10 districts were affected covering, 4060 villages of 890 GPs, with a population of 25.32 lakh. Cumulatively, 21 out of 30 districts were affected due to this flood.

1.5. Institutional Mechanism – OSDMA and Relevant Departments (DRR and CCA)

1.5.1. Odisha State Disaster Management Authority

Odisha State Disaster Mitigation Authority (OSDMA) was set up by the Government of Odisha as an autonomous organization vide Finance Department Resolution No. IFC-74/99-51779/F dated the 28th December 1999 (in the intermediate aftermath of the Super cyclone in 1999). It was registered under the Societies Registration Act, 1860 on 29.12.1999 as a non-profit making and charitable institution for the interest of the people of Odisha, with its headquarters at Bhubaneswar, it has jurisdiction over the whole state.

OSDMA is responsible not only for mitigation activities, but also for relief, restoration, reconstruction, as well as other measures. These activities cover the gamut of disaster management. In addition to preparedness activities, they include:

- Coordination with the line departments involved in reconstruction,
- Coordination with bilateral and multi-lateral aid agencies,
- Coordination with UN Agencies, International, National, and State-level NGOs,
- Networking with similar and relevant organizations for disaster management.

The Disaster Management Act of 2005 lays down guidelines for institutional setup regarding disaster management at the National, State, and District level. The National Policy on Disaster Management specifies the role of these institutions. Under the guidelines of DM Act 2005 and NPDM-2009, the following institutions were created at the state and district level.

1.5.2. Revenue and Disaster Management Department

The Department shoulders the responsibility of providing immediate relief to the people affected by various calamities such as floods, droughts, cyclones, hailstorms, earthquakes, fire accidents, etc. It also takes initiatives for relief, rescue, rehabilitation, and restoration work. The Department is headed by the Principal Secretary/Addl. Chief Secretary, Revenue and Disaster Management Department who exercises all administrative and financial powers of the Department.

1.5.3. Special Relief Organization

The Organization was formed in 1965-66 for relief and rescue operations during and after a disaster event. Now it deals with versatile operations in disaster management ranging from prevention, mitigation, preparedness, response, relief, and rehabilitation in connection with natural disasters. The formation of State Emergency Operation Centre (EOC) marks the leveraged role of SRO in field of disaster preparedness and response. The Organisation is headed by the Special Relief Commissioner (SRC) who exercises all administrative and financial powers. He is assisted by a group of experienced officers and staff. During any natural disaster, the office functions around the clock in an emergency mode.

1.5.4. State Disaster Management Authority (SDMA)

The State Disaster Management Authority (SDMA) has been constituted by the Government under sub-section (1) and (2) of section 14 of Disaster Management Act 2005 (53 of 2005) vide notification no.42370 dated 20th October 2010. The Honourable Chief Minister of Odisha is the ex-officio Chairperson and the Honourable Minister, Revenue and Disaster Management is the Vice-Chairman. Other members are

1. Hon'ble Minister, Revenue and DM
– Member-cum-Vice Chairperson
2. Hon'ble Minister, Agriculture
– Member
3. Chief Secretary
– Member-cum-Ex-Officio, Chief Executive Officer

4. Development Commissioner
Addl. Development Commissioner
– Member
5. Secretary, Home Department
– Member
6. Secretary, Department of Water Resources
– Member
7. Secretary, Agriculture Department
– Member
8. Secretary, Revenue and DM Department
– Member

The Chief Secretary is the Member-cum-Ex-Officio CEO of the SDMA. The office of the Special Relief Commissioner has been designated as the secretariat of the SDMA. The Special Relief Commissioner has been declared as the additional CEO. The State Disaster Management Authority has the responsibility of laying down policies and plans for disaster management⁶.

1.5.5. State Executive Committee

The State Executive Committee (SEC) has been constituted by the Government under subsection (1) and (2) of section 20 of the Disaster Management Act, 2005 to assist the SDMA in performance of its function and to coordinate action.

- Chief secretary
– Chairperson, Ex-officio
- Development Commissioner /
Addl. Development Commissioner
– Member
- Agriculture Production Commissioner
– Member
- Secretary, Revenue and DM Department
– Member
- Special Relief Commissioner
– Member

The State Executive Committee has the responsibility for implementing the state plan, acting as a coordinating and monitoring body for the management of disasters in the state, and is in charge of the State Disaster Response Fund.

1.5.6. District Disaster Management Authority (DDMA)

District Disaster Management Authorities (DDMAs) have been constituted in all districts by the State Government under the sub-section (1) and (2) of section 25 of Disaster Management Act 2005 to oversee Disaster Management activities at District level. The Collector is the Chairperson of DDMA where as the Chairman, Zilla Parishad is the Co-Chairperson.

Collector and District Magistrate

– Chairperson, Ex-Officio

1. Chairman, Zilla Parishada
– Co-Chairperson, Ex-Officio
2. Superintendent of Police
– Member, Ex-Officio
3. Chief District Medical Officer
– Member, Ex-Officio
4. Executive Engineer in charge of Embankments
– Member, Ex-Officio
5. ADM in charge of Emergency
– Chief Executive Officer, Ex-Officio
6. Executive Engineer Rural Development Department
– Member
7. Project Director, DRDA
– Member
8. Dy. Director, Agriculture
– Member

Administrative Arrangement: The Department of Revenue and Disaster Management is the administrative department for management of disasters. The Special Relief Commissioner (SRC) is in charge of the response phase of disasters, whereas, the OSDMA deals with preparedness and mitigation aspects. OSDMA provides support to SRC during the response phase. At the district level, the Collector is the District Relief Officer and Disaster Manager. A Block is the lowest unit of relief administration. A Block Development Officer and Tahasildars jointly manage relief administration at the lowest level. A state level Natural Calamity Committee functions under the chairmanship of the Chief Minister for

⁶ OSDMA, State Disaster Management Plan, August 2013, available at http://www.osdma.org/Download/State_Disaster_ManagementPlan_Aug2013.pdf

overall supervision and monitoring. At the district level, District Natural Calamity Committee along with DDMA functions with representation from district level officers and people's representatives under the chairmanship of the district Collector for supervision and monitoring.

1.6. DRM (Disaster Risk Management) Efforts by Odisha Government

The Odisha State Disaster Management Authority (OSDMA) has made long strides towards improving disaster preparedness and response standards of the state through a culture of capacity building. Apart from preparedness, OSDMA has initiated number of efforts and response mechanism to meet both natural and manmade disasters (SDMP-2013).

1.6.1. Multipurpose Cyclone Shelters (MCS)

To date, OSDMA has constructed 135 Multipurpose Cyclone Shelters in 06 coastal districts of the state, stretching from Ganjam to Balasore. The Cyclone Shelter Buildings are designed to withstand a wind speed of 300 km per hour. The plinth level has been fixed above the high tide level to prevent inundation

by possible storm surges or high floods. Most of these buildings have been constructed within school premises for use as schools and for other community activities during non-disaster periods. All the shelters have been provided with generator sets for alternative power supply; disruption in power supply being a known phenomenon during cyclones.

The Community-based Cyclone Shelter Management and Maintenance Committee (CSMMC) constituted at the shelter level is responsible for the sustainable maintenance and management of these shelters by generating resources on putting these buildings in income generating use. The MCS buildings have been handed over to the respective CSMMC. Task Forces have been constituted at each shelter, and are trained on Search & Rescue, First Aid, and use of basic search and rescue equipment provided to the cyclone shelters. Another 163 multipurpose cyclone shelters are being constructed with road connectivity under the World Bank - assisted National Cyclone Risk Mitigation Project (149) and Integrated Coastal Zone Management Project (14).



1.6.2. Multipurpose Flood Shelters

The construction of 50 multipurpose flood shelters in 9 flood prone districts has been taken up with funds sanctioned in the 1st phase out of Chief Minister's Relief Fund.

The Chief Minister's Relief Fund funded shelter construction. During the first phase, 50 multipurpose flood shelters in 9 flood prone districts have been sanctioned to be built. Out of these, 16 are completed. During the second phase, 38 more shelters were sanctioned, whose construction is currently under progress.

1.6.3. Odisha Disaster Rapid Action Force (ODRAF)

The Odisha Disaster Rapid Action Force (ODRAF) has been formed in 10 units. Seven units have been formed out of Odisha Special Armed Police (OSAP) Battalions and three units have been formed out of the District Armed Police Reserve (APR). These ODRAF units are located at ten different locations in the state based on vulnerability profiles to reduce response deployment times. These units are at Cuttack, Chatrapur, Balasore, Jharsuguda, Koraput, Bhubaneswar, Paradeep, Bolangir, Rourkela, and Baripada. All ten units are equipped and trained to combat multi-faceted operations like Water-related Search and Rescue, Relief Line Clearance, Collapsed Structure Search and Rescue (CSSR), and Medical First Responder (MFR). Further, these units are also equipped with 92 different types of emergency equipment, which includes communication equipment. The ODRAF has not only responded in various operations related to natural and manmade disasters to save the lives, but is also facilitating awareness and operational level training to government officials, urban and rural volunteers, school students, and Task Force members of the Cyclone Shelter Maintenance and Management Committee (CSMMC) for capacity building of the stakeholders to mitigate and minimize disaster risks.

1.6.4. Capacity Building of Fire Services Units

All the fire stations of the state have been strengthened with the provision of search and

rescue equipments as the second line of the Multi-hazard Response Force.

1.6.5. Disaster Risk Reduction (DRR) Programme:

The GoI-UNDP Disaster Risk Reduction (DRR) programme was implemented by OSDMA. It is envisaged to support Central and State government initiatives by providing critical inputs that would enhance the efficiency and effectiveness of the efforts in DRR. The programme was designed to strengthen the institutional structure to undertake DRR activities at various levels, including addressing increased risk from climate change, and developing preparedness programmes, policies, and practices in order to minimize the risk to life and property. The programme had two components;

1. Institutional Strengthening and Capacity Building for Disaster Risk Reduction.
2. Urban Risk Reduction.

Institutional Strengthening and Capacity Building for the DRR project was implemented in the three districts of Bolangir, Ganjam, and Kendrapara and the Urban Risk Reduction Project was implemented in the urban areas of Bhubaneswar, Angul, and Talcher.

1.6.6. National Cyclone Risk Mitigation Project (NCRMP)

The National Cyclone Risk Mitigation Project (NCRMP) is being implemented in Odisha with assistance from the Government of India and the World Bank. OSDMA has been identified as the Nodal Agency for implementation of the project in the coastal districts of Balasore, Bhadrak, Kendrapara, Jagatsinghpur, Puri, and Ganjam. The Government of India with World Bank assistance will provide 75% of the project cost as a grant, while state government bears 25% of the project cost. The construction of 149 cyclone shelters and 6 godowns, construction of all weather approach road to 143 cyclone shelters, and raising and strengthening of saline embankments are major structural interventions sought under the project. The project period is from 01.01.2010 to 31.12.2015.



1.6.7. Integrated Coastal Zone Management Project (ICZMP)

The Government of Odisha, with assistance from Ministry of Environment and Forests, Government of India and the World Bank, is implementing an integrated project called the Integrated Coastal Zone Management Project (ICZMP) to coordinate activities of various agencies and departments for the sustainable management and usage of coastal resources. The OSDMA is executing construction of 14 Cyclone Shelters in two coastal stretches i.e. Gopalpur to Chilika and Paradeep to Dhamara.

1.6.8. Establishment of Doppler Weather Radar Stations

OSDMA, in association with India Metrological Department (IMD), has taken up steps for the establishment of Doppler Weather Radar (DWR) Stations at Gopalpur, Balasore, Sambalpur, and Paradeep. The construction of the building at Paradeep is now finished. IMD will provide the DWR equipment. The DWR is specially designed for

cyclone tracking, detection, and forecasting. Once the Radar Stations are commissioned, facilities for tracking events of extreme weather condition will be locally available.

1.6.9. Making the Schools Disaster Resilient

The school safety initiative is an endeavour of OSDMA to protect young lives and provide them with a safe learning environment. This involves training children on life saving skills and effective response, strengthening schools buildings to withstand natural disasters, hunting hazards in schools through non-structural mitigation measures, and developing school safety plans.

1.6.10. Capacity Building Activities under 13th Finance Commission Grant

Effective disaster response requires trained manpower to deal with complex situations where effective and speedy handling can reduce the impact of a disaster on human life and property. From the grant received under the 13th Finance

Commission grant, OSDMA has initiated a number of measures for building capacity within the administrative machinery for a better handling of disaster response.

1.6.11. Mock Drill

The Mock drill is an essential attribute for testing preparedness planning at different levels. OSDMA organizes mock drills at different levels. Every June 19th, mock drills are carried out at the cyclone shelter level. These drills raise preparedness awareness among the local population. A mock tsunami exercise was organized simultaneously in 20 Indian Ocean countries, including India, in 2011. The exercise in which Odisha participated aimed to test the Indian Ocean Tsunami Warning and Mitigation System (IOTWS) as well as to evaluate the system's operational capacity, the efficiency of communications among the stakeholders, and the level of preparedness of emergency services. Table Top exercises and joint mock drills are also conducted with external agencies like East Coast Railways and National Disaster Response Force (NDRF).

1.7. State Action Plan on Climate Change

The Government of India (GoI) initiated the National Action Plan on Climate Change (NAPCC) in June 2008, and 8 national missions were finalised to be developed in greater detail. One of the proposed initiatives from the process was the formulation of state level action plans. Responding to the urgency of CCA, the State of Odisha constituted the High Level Co-ordination committee for the formulation of State Climate Change Action Plan. Key priorities consistent with those of the National Action Plan on Climate Change (NAPCC) were identified (Agriculture, Coastal Zones and Disasters, Energy, Fisheries and Animal Resources, Forestry, Health, Industry, Mining, Transport, Urban Planning and Water Resources).⁷

High-Level Coordination Committee

- Chief Secretary
– Chairman
- Development Commissioner
– Member

- Agriculture Production Commissioner
– Member
- Principal Secretary, Finance Department
– Member
- Principal Secretary, Housing and Urban Department
– Member
- Principal Secretary, Fisheries and ARD
– Member
- Principal Secretary, Steel and Mines Department
– Member
- Commissioner-cum-Secretary, Agriculture Department
– Member
- Commissioner-cum-Secretary, Commerce and Transport Department
– Member
- Commissioner-cum-Secretary, Health and Family Welfare Department
– Member
- Commissioner-cum-Secretary, Revenue and Disaster Management Department
– Member
- Commissioner-cum-Secretary, Energy Department
– Member
- Commissioner-cum-Secretary, Industry Department
– Member
- Commissioner-cum-Secretary, Water Resources Department
– Member
- Managing Director OSDMA
– Member
- Principal Secretary, Forest and Environment Department
– Member Convenor

1.8. Training and Capacity building for DRR in Odisha

At different levels and on different DRR themes, training and capacity building with respect to all administrative requirements for DRR are coordinated by OSDMA since its establishment. The Gopabandhu Academy of Administration is the main technical institute for the design and implementation of training on different technical

⁷ Govt. of Odisha, SAPCC(2010-2015), available at: <http://www.moef.nic.in/sites/default/files/sapcc/Odhisa.pdf>

and administrative requirements along with DRR. The Academy has established “Disaster Management Centre” for Organizing trainings on DRR. The State Institute of Rural Development (SIRD) – Disaster Management Cell, Institution on Management of Agricultural Extension (IMAGE), Regional Institution on Training and Extension (RITE), Centre for Environmental Studies, Panchayati Raj Training Institute, Fire Training Institute, Utkal University Departments of Climate Concerned

Studies, Odisha University of Agriculture and Technology, Odisha Space Application Centre are some other premier Institutes within Odisha dealing with training and capacity building on DRM and climate change related issues.

The present study brought new alignment in the direction of training and capacity building. The study examines the existing training provisions with future requirements.

The following training requirements have been identified for capacity building of different stakeholders (Odisha SDMP 2013).⁸

Table 1.3

No.	Broad Groups	Departments/ Agencies to be involved
1	Policy and Planning	All MLAs, Secretaries and HODs
2	Construction/ Public Works Sector	PWD, R&B, Rural Works, Tourism, Urban Development, Irrigation, Water Resources
3	Search and Rescue, Law and Order	ODRAF, Civil Defense, Home Guards, Police, Fire and Emergency Services
4	Social Sector	Social Justice and Empowerment, W&CD, ICDS, NGOs
5	Management and Coordination Sector	Revenue and DM Department, SDMA, District Administration
6	Industrial Sector	Industry
7	Health Sector	Health Department, CDMO, Red Cross, Animal Husbandry, NGOs
8	Livelihood Sector	Agriculture, Horticulture and Forest
9	Communication	BSNL and other private Network Operators, Police, Home Guards, Forest, Electricity
10	IEC and Media	I & PR
11	Voluntary Sector	NCC, NSS, Women and Youth Organisations, CSO, CBO, Market Organisations, VDMTs, Youth Services and Sports, etc.
12	Service Sector	Food and Civil Supplies, Forest Corporation, Transport, Health
13	Public Representative Sector	Elected Representatives of Panchayati Raj, and Urban Local Bodies
14	Forest Sector	Department of Forest and Environment
15	Tourism and Civil Aviation Sector	Department of Tourism and Civil Aviation, OTDC
16	Education Sector	Universities, Higher and Elementary Education

⁸ Odisha State Disaster Management Plan, August 2013.

The following are training related issues identified under the Odisha State Action Plan on Climate Change – 2010–2015.⁹

No.	Sector	Needs related to training
1	Agriculture	Capacity building for better management of land and water in the context of climate risks. Continuous capacity building support to CBOs, extension officers and farmers.
2	Coasts and Disasters	Setting up an integrated training and capacity building protocol. Raising awareness of community and stakeholders on the coping mechanisms.
3	Energy	Training of the members of working group or their representatives of different departments and organizations on sector specific climate change issues.
4	Fisheries and Animal Resources	Training on fodder production, fodder conservation, rotational grazing, rain water harvest technology, methane gas harvesting technology, biogas tanks management. Reorient livestock keepers to more responsible practices.
5	Forestry	Capacity building of PRIs/ communities/ JSM institutions to adapt to climate change
6	Health	Sensitization of the health service providers – ANMS, ASHA, AYUSH, Doctors, AWW); general training cum awareness campaigns reaching local communities in vulnerable areas (especially coastal and floodplain).
7	Industry	Training on climate change issues needs to reach all organisations involved with promoting industrial development and industrial enterprises in the large, medium, and small-scale sectors.
8	Mining	Training on the clean development mechanism, cleaner production/ low carbon/ efficient technologies and climate abatement measures.
9	Urban Planning	Need to orient and sensitize the stakeholders at all levels of the urban local bodies. Training with practical orientation with field/ exposure visits.
10	Water Resources	Raising awareness with <i>Pani Panchayat</i> through farmers' training programme. Adaptation to scientific crop management in the context of varying water availability.

⁹ Odisha Climate Change Action Plan 2010-2015. <http://orissa.gov.in/portal/occap.pdf>





2 Training Needs Assessment (TNA): Background

2.1. Training Needs Assessment (TNA)

The training needs assessment (TNA) that seeks to define an action framework. This framework is meant to ensure that human resources within organizations are nurtured to meet the growing challenges and needs of every job profile.

Climate change and its associated uncertainties have bottlenecked service providers and receivers. To address these challenges, capacity building must be both broad and dynamic.

The National Training Policy 2012¹ lays emphasis on the 'Systematic Approach to Training' (SAT), which ensures a strategic process map for identifying the training requirements of various departments and sectors. It emphasizes the systematic training of government officials, with increased participation from all levels.

The GOI-UNDP project on "Enhancing Institutional and Community Resilience to Disasters and Climate Change (2013-2017)" aims to strengthen capacities of government, communities, and institutions for disaster risk reduction, including risk-enhancement due to climate change, and to develop preparedness. The project has accorded a very high priority to training and capacity building in particular. Effective disaster response and risk reduction requires trained manpower to deal with complex situations. Based on the importance of training and capacity building in the project, a TNA becomes important process for effective design and implementation with different stakeholders and institutions in the Odisha state.

This TNA aims to promote and strengthen climate smart risk reduction, in addition to DRR measures that are linked with adaptation to climate change from local to state level. The approach is user-

oriented. It focuses on planning tools and methodologies. The TNA report integrates the exigencies of CCA with those of DRR in the trainings of OSDMA, so that a long-term and climate-compatible capacity development programme for the OSDMA may be evolved.

2.2. Objectives and Scope of the TNA

The overall objective of the Training Needs Assessment (TNA) was to identify existing knowledge and skills gaps in the State of Odisha with regard to disaster mitigation, preparedness, response, recovery, and climate change adaptation so that a long-term capacity development plan may be developed.

From August 27, 2014, The All India Disaster Mitigation Institute (AIDMI), in collaboration with the OSDMA and other stakeholders – DDMA, NGOs, Government departments, has conducted a TNA on DRR and CCA for achieving the following objectives:

- a) Identify stakeholders of DRR and CCA with their respective roles at policy and planning, supervisory/middle, and operational level;
- b) Identify the key issues related to disaster risks and climate change in the state, its vulnerability to such events/ changes;
- c) Analyse the institutional set up for DM within the state, roles, and functions of stakeholders at various levels and look at the required competencies for each (as per the DM act 2005);
- d) Conduct a TNA workshop to assess the level of the current understanding among identified stakeholders on DRR and CCA;
- e) Identify the specific areas/ themes for learning identified by practitioners/ stakeholders;
- f) Identify gaps in terms of knowledge, skills, aptitude, and the needs of key sectors for DRR and CCA (required as per the DM Act 2005 and

¹ National Training Policy 2012, available at: persmin.gov.in/otraining/NationalPolicy.pdf



for effective implementation of the State Action Plan on Climate Change, especially the CCA aspects;

- g) Review currently available trainings/ learning opportunities for DRM practitioners as well as those in identified sectors/ departments, within the state and outside;
- h) Identify and review agencies, institutions, collaborations, and networks for developing contextualized DRR/CCA learning tools/ modules; and
- l) Provide recommendations on how to address the capacity gaps (human, financial, and others) that will inform the preparation of a capacity development plan for DRR and CCA in the state.

The present TNA exercise is to identify the requirements related to trainings that defines close links between DRR and CCA.

Climate change is predicted to impede poverty alleviation programmes in Odisha both directly and indirectly, compromising the current growth strategy. The direct impacts could include loss of life, livelihoods, assets, infrastructure, etc., from climatic extreme events. Indirectly, climate change could affect economic growth. Continuing climate change

variation is predicted to alter the sectoral origins of growth, including the ability of the poor to engage in the non-farm sector. This could nullify the pro-poor potential of macroeconomic policies, as well as trade and private sector investment. Substantive capacity building will be required for primary and secondary stakeholders for better risk reduction and adaptation.

2.3. Steps of the TNA

The entire process of conducting the TNA included several precisely designed steps. Each step is oriented so that the exercise achieves its goals. The following steps have been taken to conduct the TNA.

- 1. Literature Review:** This step involved review of targeted documents and information available online related to DRR and CCA, and prepared by/for OSDMA, departments, and UNDP. From the study of various documents and literature available, different perspectives about the knowledge of subjects and level of preparedness is understood and incorporated in the report.
- 2. Design and finalization of methodology and tools:** This step covers design, development,

and methodology followed in making the different tools and their use at different events. It is very important to have a participatory approach towards designing and developing tools, as the process is context specific and particular needs of participants are to be addressed during the exercise.

- 3. Meetings with OSDMA:** Preparatory meetings with OSDMA officials at several stages regarding further planning and the way ahead. Feedback from officials of OSDMA played a vital role in shaping the process from time-to-time, and helped to achieve the desired outcome from the process.
- 4. Search Conferences:** District level consultations with government officials, DDMA, practitioners, and NGOs with a focus on capturing training requirements in relation to DRR and CCA. This step was aimed at getting insights from various stakeholders at the district level that helped in framing the final outcome of the exercise. This also helped in analyzing the gaps and training needs.
- 5. Workshop:** A workshop covering major stakeholders like officials from DDMA, OSDMA, government departments, and non government institutions was conducted under the TNA. The idea behind conducting this integration workshop was to bring all the stakeholders to the same platform and have feedback from each of them about the TNA findings. The workshop helped in identifying the needs for integrating different departments and their efforts towards DRR and CCA.
- 6. Draft report:** Incorporation of findings from all processes, consultations, and workshops into the final report. Each event during TNA has a specific outcome towards integration of DRR and CCA efforts.
- 7. Update of report and review process:** Incorporation of comments and changes suggested by OSDMA, UNDP and internal review.

2.4. Methodology and Approach

The TNA strives to define what trainings are required to fill the existing knowledge gaps in the field of

disaster risk reduction so that it can integrate better to CCA from the district to state levels in Odisha. With the help of different tools, the TNA envisions to identify the levels of the present situation with stakeholders in the field of DRR. Efforts have been made to indicate problems that can be translated into training needs based on the existing gaps between the present status and desired status. There would be a special focus on selective sectors like Agriculture, Health, Education, Urban Development, Housing, Water and Sanitation, Women and Children, etc.

The TNA process has been designed to shed light on implied organisational (involved stakeholders) needs that could be met by conducting training. This TNA process will help stakeholders (including training providers and receivers) to address the knowledge requirements that exist in the form of gaps and requirement of current time – climate-smart and integration of CCA in DRR.

Cross-cutting issues are addressed in the report. In terms of CCA integration – gender (women as a key contributor in adaptation and promotion of climate change mitigation); and economic (aspects related to cost of adaptation and income of livelihood resources) are two key cross-cutting issues. The TNA tools have raised the discussion on these issues. The literature review of them and their linkages with DRR are reflected in the report.

2.5. Tools used in the TNA

Different tools – **questionnaires, interviews, search conferences, literature review, and workshops** – were applied to collect necessary information. During consultations, the focus was given on integrating DRR and CCA, climate sensitive sectors, and vulnerable locations. The interviews had taken place at different times (with support from OSDMA team) to cover district and state level stakeholders, as well as government officials, UNDP, and humanitarian agencies.

The **Hyogo Framework for Action (HFA)**, the seminal framework that has guides and informs global disaster risk policy and practices, is set to be completed in 2015. For the post-2015 framework for

Disaster Risk Reduction, four key areas on which to focus in order to improve DRR have been identified for the South Asia region. As the Post-2015 Framework for DRR is being drafted to globally address DRR, it would be worthwhile for OSDMA to orient its trainings so that they address the four areas of this framework. These areas are:

1. Understanding disaster risks
2. Strengthening governance to manage disaster risks
3. Preparedness for response, recovery and reconstructions "building back better"
4. Investing in social, economic and environmental resilience

During TNA exercise, the findings were linked with these four key areas of HFA2.

Proposed Trainings and Global DRR Frameworks

The growing interface between CCA and DRR has led to a rethinking of priorities and goals by several humanitarian actors. The ideal of climate compatible development (CCD) has lately emerged as an enshrined goal to be pursued by governments and humanitarian agencies at various levels. This change in priorities and objectives also manifests in various humanitarian frameworks geared at achieving sustainable development. The post-2015 framework for DRR (commonly referred to as HFA2) and sustainable development goals (SDGs) also reflect the importance that CCD has come to acquire. For instance, according to the pre-zero draft of the HFA2, the explicit purpose of this framework is to *'manage disaster and climate risk in development at local, national, regional and global levels for resilience of people, communities and countries'*.²

Governments, policy makers, and humanitarian agencies now realize that addressing the needs of DRR necessitates addressing the needs of CCA. In this regard, the Odisha State Disaster Management Authority (OSDMA) which has done some seminal work in the Indian state of Odisha to build up its resilience against disasters, and has also come to

acknowledge the importance of a climate risk sensitive approach. Previously, the OSDMA had tried to institutionalize preparedness against disasters in the state through an array of capacity building measures like trainings, workshops, mock drills, emergency management exercises, etc., and structural measures like district disaster management plan (DDMP) audits. Now, to further the agenda of effective disaster risk reduction (DRR) in Odisha, the OSDMA has decided to hold a TNA to re-evaluate the priorities of the disaster risk reduction (DRR) capacity building trainings imparted to its various personnel in different departments ranging from the state to the district level. The purpose of this TNA would be to improve the effectiveness of OSDMA's DRR trainings by incorporating a CCA component.

Through exemplary preparedness, the OSDMA was successful in ensuring minimum casualties during Cyclone *Phailin* (October 2013) and Cyclone *Hudhud* (October 2014). This was mainly possible due to the timely actions taken by OSDMA heeding the warnings from the meteorological department. Having learnt hard lessons from 1999's super cyclone, the OSDMA responded to these crises with decisiveness, meticulous planning, and prompt action. However, the occurrence of Cyclone *Hudhud* almost one year after Cyclone *Phailin* points to the disconcerting impact of climate change in Odisha. Many experts agree that the incidence of extreme weather events in Odisha have increased due to climate change.³

The onus is now on OSDMA to adopt strategies that facilitate integration of the exigencies of DRR with those of CCA. This TNA is an attempt to map out an effective capacity building campaign through which the OSDMA can build the capacities of various sectors and departments in the state to respond to the emerging challenges of climate change. The various trainings listed out after the analysis of this TNA exercise are also aligned to various areas of the HFA2 and other global frameworks. This alignment reflects the credibility of the proposed trainings and

2 Explanation Note, http://www.wcdrr.org/documents/wcdrr/Prezero_draft_post2015_frmwk_for_DRR_8_August.pdf

3 Disaster dossier: The impact of climate change on Orissa, <http://infochangeindia.org/environment/features/disaster-dossier-the-impact-of-climate-change-on-orissa.html>

their importance across various levels (micro, meso, and macro).

Since the impacts of climate change are observed across different sectors, this TNA exercise has proposed sector specific trainings. The sectors for which the trainings have been proposed include Agriculture, Healthcare, Housing and Urban Development, Forestry, Water Resource, Education, Industries, and Administration. A sector wise approach will help in the achievement of CCD goals.

In the pre-zero draft of the HFA2, four priorities of action have been stated for effectively managing disaster and climate risk across levels. These priorities of action and OSDMA's current performance on these trainings are listed below:

I. Understanding Disaster Risk

In terms of furthering understanding on disaster risk, OSDMA's capacity building trainings have fared quite well. OSDMA has imparted training on a plethora of themes that further understanding on disaster risk in all its dimensions of vulnerability and exposure of persons, assets, and hazard characteristics, particularly at the local level.

II. Strengthening Governance to Manage Disaster Risk

Effective communication between various stakeholders is the basis of effective governance in the field of disaster management. Ever since the tragedy of the super cyclone of 1999, the OSDMA has heavily invested resources and time to build the capacities of its staff and other stakeholders for strengthening its governance. OSDMA's success in evacuating thousands of people from their homes and leading them to safety during 2013's Cyclone *Phailin* bears testimony to OSDMA's dedication to strong governance for effective disaster risk management.

III. Preparedness for Response, Recovery and Reconstruction – 'Build Back Better'

Preparedness is the cornerstone of resilience. In a constantly changing world, the dynamic nature of risks and vulnerabilities has expanded the definition of resilience from the traditional confines of 'bouncing back' to 'building back better'. Preparedness has emerged as an indispensable pillar of supporting this new form of resilience. The OSDMA has also focused



upon capacity building efforts that buttress early warning and preparedness systems to save lives.

IV. Investing in Social, Economic and Environmental Resilience

It is now conventional wisdom to view vulnerability as a function of poverty, environmental degradation, and susceptibility of economic systems. Therefore, any concerted effort to achieve development by controlling these factors will reduce vulnerabilities. Acknowledging that social, economic, and environmental investments are essential to strengthen the resilience of persons, communities, countries, and their assets, the OSDMA has focused its capacity building efforts to address social, economic, and environmental resilience.

The following tools were used during the TNA exercise during different times:

2.5.1. Questionnaires and interviews:

Several questionnaires were prepared with the intention to collect information from different stakeholders: NGOs, government departments, OSDMA, DDMA, PRIs, and community. Each of these questionnaires addressed questions related to barriers, needs, suggestions, past good practices, etc., experienced by targeted expert/s sector representative/s or practitioners. An interview outline was also used inputs from inputs from experts, organizational representatives, and trainers.

The following questionnaires have been devised for events under TNA.

- i. Questionnaire for DRR CCA integration workshop
- ii. Different types of (group/ sector) questions to use in search conferences
- iii. Individual questions during search conferences
- iv. Interview questions (selected people) District partners
- v. Interview questions (selected people) project stakeholders

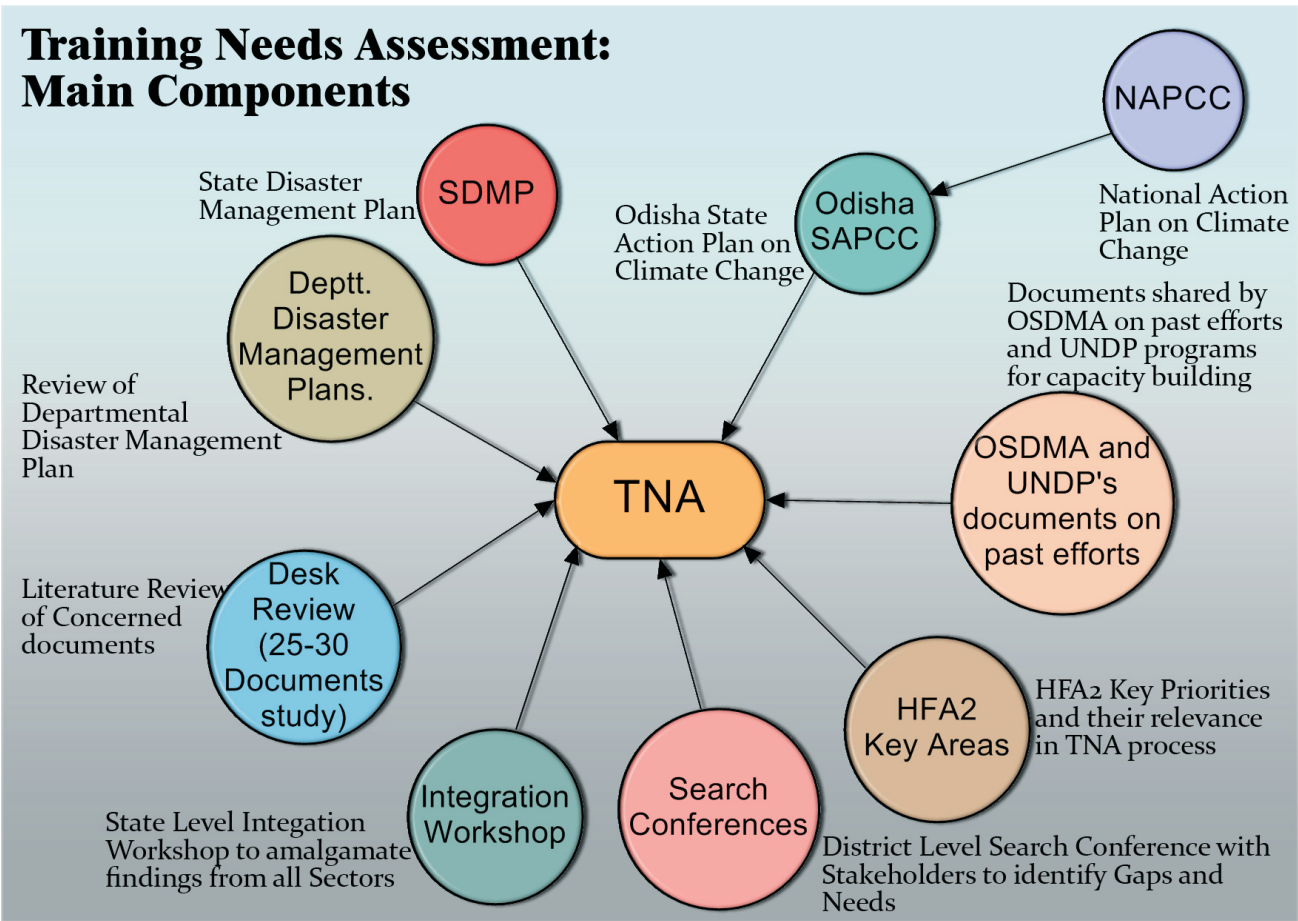


Figure 2.1: Main Components of Training Needs Assessment Process

2.5.2. Search conferences (using FGD, questionnaires and exercise):

The search conferences were key platforms for collecting the required data from sample districts targeting representatives from government and humanitarian institutions. The data was analyzed and used in the TNA report for highlighting needs and requirements.

2.5.3. Review of documents:

Literature review was conducted throughout the TNA exercise. Focus was given on the aspects related to Odisha, DRR, CCA, and existing practices on integration; it also reflects on national and international processes. Three resources were very useful during the review of documents – **Odisha State Action Plan on Climate Change; Odisha**

State Disaster Management Plan; and the four areas for shaping HFA2. The past and present efforts of OSDMA, UNDP, and other key institutions (department and humanitarian agencies) were also covered in the review exercise.

The State Disaster Management Plan (SDMP) of Odisha is another comprehensive document, which elaborates on different departments and their preparedness towards DRM. Each department has their own Departmental Disaster Management Plan (DDMP), which extensively provides information on current capacities, key gaps and needs, existing response mechanism, and further requirements in terms of training and non-training needs. The self-assessment of departments is useful as it provides updated information on preparedness levels and can be used to further plan for DRM requirements.





3

Recent Developments in Relation with Climate Change and DRR Integration

3.1. Climate Change in 21st Century – A Broader Context

The much awaited Fifth Assessment Report of the Intergovernmental Panel on Climate Change (IPCC) is out with a host of warnings about the vagaries from climate we will face in the coming years. Released in Yokohama, Japan on March 31, 2014, the report states that climate change in the 21st century is projected to reduce renewable surface water and groundwater resources significantly in most dry subtropical regions, intensifying competition for water among sectors. In areas which are known as dry regions, the frequency of drought is likely to increase by the end of the 21st century. In contrast, water resources are projected to increase at high latitudes. Drinking water quantity and quality will be adversely affected on a global-scale. Interacting factors such as increased temperature; increased sediment, nutrient, and pollutant loadings from heavy rainfall; increased concentration of pollutants during droughts; and disruption of treatment facilities during floods will cause failure to conventional water treatment methods.

Due to the rises in sea-level projected to occur throughout the 21st century and beyond, coastal systems and low lying areas will be increasingly impacted negatively. These impacts include submergence, coastal flooding, and coastal erosion. Marine-species redistribution and marine-biodiversity reduction in sensitive regions will challenge the sustained provision of fisheries productivity and other ecosystem services.¹

3.2. Climate Change in Odisha – Present Scenario

A general assessment of the report tells us that droughts and desertification, water scarcity,

reduced fish diversity and production, food insecurity, degradation in water quality, cost of adapting to sea level rise and other disasters, etc., will continue to increase, further increasing the state's vulnerability.² For over a decade, Odisha has teetered from one extreme weather condition to another: from heatwaves to cyclones, drought to floods. The state has been declared disaster-affected for 95 of the last 105 years. Floods have occurred for 50 years, droughts for 32, and cyclones have struck the state for 11 years. Since 1965, these calamities have not only become more frequent, they are striking areas that have never experienced such conditions before. For instance, a heatwave in 1998 killed around 2,200 people — most of the casualties were from coastal Odisha, a region known for its moderate climate. Since 1998, almost 3,000 people have died due to heatstroke. The 1999 super cyclone affected places like Bhubaneswar and Nayagarh, which were never traditionally cyclone-prone. While the 2001 drought parched fields in coastal districts, the unprecedented floods of 2001 submerged 25 of the state's 30 districts. Many of these areas had never witnessed floods before. Odisha has experienced around 952 small and big cyclones and 451 tornadoes between 1891 and 1970. From 1901 to 1981 there were 380 cyclones, of which 272 resulted from depressions in the Bay of Bengal. Twenty-nine of these cyclones were devastating.³

In 2005, it rained for 15 days in October causing major flooding in all the rivers. Meanwhile, the monsoon arrived 20 days late. Summer temperatures in the western part of the state touched 50 degrees Celsius, killing 113 people. For almost 20 days, the average temperature in many places stayed above 40 degrees. During 1999-2005, Odisha's average summer temperature was 42 degrees.⁴

1 Panda Ranjan, Why should we be worried about climate change, article published in Sun Odisha Times available at <http://odishasuntimes.com/42976/worried-climate-change/>

2 Ibid.

3 Mahapatra Richard, Disaster dossier: The impact of climate change on Odisha, published at Infochange Environment available at <http://infochangeindia.org/environment/features/disaster-dossier-the-impact-of-climate-change-on-Odisha.html>

4 Ibid.

These facts and figures demonstrate how climate change has been worsening in Odisha. The following section provides a brief overview of the sector wise projections and impacts of climate change in Odisha.

3.3. Agriculture and Climate Change in Odisha

Agriculture is the principal occupation for a vast majority of population living in Odisha. However, climate projections suggest a substantial shift in the patterns of rainfall towards the flood-prone coastal regions with a dramatic increase in the incidence of flooding. In some districts of this state, rice yields will come down by as much as 12 percent.⁵

Climate Extremes and Odisha's Agriculture

Odisha is among the most flood-affected states in the country. Simultaneous droughts in one part of the state and extensive floods in another are common, as are cyclones and other natural calamities. Adding to these already high risks, the climate projections suggest that temperatures,

precipitation, and flooding are likely to increase, with adverse impacts on crop yields and farm incomes. Among the more substantial effects is a spatial shift in the pattern of rainfall towards the already flood-prone coastal areas. A recent study conducted by the World Bank states that climate change is also projected to bring a dramatic increase in the incidence of flooding. In the study districts of Puri and Jagatsinghpur, the assessment finds that rice yields could decline by 5% to 12% and profits by 6% to 8% under climate change. With the dominance of rice and high levels of dependence, there is little that can be done to build flood resilience through adjustments in cropping patterns and farming practices. There is a need to further strengthen current flood protection initiatives and develop a proactive, comprehensive, and anticipatory flood management strategy.⁷

3.4. Health and Climate Change in Odisha

Climate change is a significant and emerging threat to public health. In Odisha, increased health risks will arise due to climate change. There is an already high

⁵ "New World Bank report calls for action to reduce climate change impacts in India's drought-and flood-affected areas", Published at Reliefweb on May 25, 2009 available at <http://reliefweb.int/report/india/new-world-bank-report-calls-action-reduce-climate-change-impacts-indias-drought-and>



Table 3.1: Overall projections on possible impacts of climate change on agriculture⁶

Climatic element	Expected changes by 2050's	Confidence in prediction	Effects on agriculture
CO ₂	Increase from 360 ppm to 450 - 600 ppm (2005 levels, now at 379 ppm)	Very high	Good for crops: increased photosynthesis; reduced water Use
Sea level rise	Rise by 10 -15 cm Increased in south and offset in north by natural subsistence/rebound	Very high	Loss of land, coastal erosion, flooding, salinisation of Ground water
Temperature	Rise by 1-2 Degree C. Winters warming more than summers. Increased frequency of heat waves	High	Faster, shorter, earlier growing seasons, range moving north and to higher altitudes, heat stress risk, increased Evapo-transpiration
Precipitation	Seasonal changes by $\pm 10\%$	Low	Impacts on drought risk' soil workability, water logging irrigation supply, transpiration
Storminess	Increased wind speeds, especially in north. More intense rainfall events.	Very low	Lodging, soil erosion, reduced infiltration of rainfall
	Increases across most climatic variables. Predictions Uncertain	Very low	Changing risk of damaging events (heat waves, frost, droughts floods) which will effect crops and timing of farm operations

prevalence of malaria and vector-borne diseases in certain areas. With the erratic nature of rainfall and extended seasons, these may become more widespread. Climate change has the potential to aggravate vector, water, and food-borne diseases. The intensity and frequency of extreme events such as heat waves and cyclones will further expose the vulnerable population to health risks. About 80% of malaria burden is contained to the Northern states, Chhattisgarh, Jharkhand, Madhya Pradesh, Odisha, Andhra Pradesh, Maharashtra, Gujarat, Rajasthan, West Bengal, and Karnataka. However, other states are also vulnerable and experience local and focal outbreaks. Some of the recent impacts of climate change on health involved climate extremes, . For instance, June of 2005 saw a heatwave of 46.3

degrees Celsius in Bhubaneswar. This was the highest recorded temperature in the past 33 years and 10 degrees higher than normal. The 1998 heatwave in Odisha was also recorded as one of the worst, claiming more than 2000 lives. That year was the hottest globally.⁸

Climate change projection related to human health

While there are no studies on how climate change will affect human health in Odisha, a general analysis of the available projections provides ample insight⁹:

- Higher temperatures and more frequent heat waves will likely increase heat stress, respiratory illnesses, and heat-related deaths. High

6 Mahato Anupama, Climate Change and its Impact on Agriculture, published at International Journal of Scientific and Research Publications, Volume 4, Issue 4, April 2014 available at <http://www.ijsrp.org/research-paper-0414/ijsrp-p2833.pdf>

7 A World Bank Report on "Climate Change Impacts in Drought and Flood Affected Areas: Case Studies in India" Published by World Bank on June 1, 2008, available at http://reliefweb.int/sites/reliefweb.int/files/resources/09C0395A8FE2D522492575C20006E337_Full_Report.pdf/pn-11

8 Patil R. Rajan and Deepa .T. M., Climate change: The challenges for public health preparedness and response- An Indian case study, published at Indian J Occup Environ Med. 2007 Sep-Dec; available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3168167/>

9 United States Environmental Protection Agencies, available at <http://www.epa.gov/climatechange/impacts-adaptation/southeast.html>

temperatures also correlate with poor air quality and pose a risk to people with respiratory problems. While the number of cold-related deaths is projected to decrease, net climate-related mortality will likely increase.

- Increased flooding could present extreme public health and emergency management challenges.
- The spread of some types of bacteria has been linked to warmer temperatures. For example, food poisoning from eating shellfish infected with *Vibrio parahaemolyticus* bacteria has increased by 41% from 1996 to 2006. As temperatures increase, the frequency of these types of shellfish-borne disease outbreaks in coastal waters is likely to increase.

Vector-borne diseases, such as malaria and dengue, pose a higher threat to Odisha than other places in India. In fact, the proportion of these diseases in Odisha is even greater than in Sub-Saharan Africa. Evidence indicates that rainfall variability and the 20th century trend of increasing temperatures increased the number of vectors. At present, the future of disease in Odisha is unknown. Considering the current situation and broad climatic projections, it can be inferred that a host of new diseases will emerge. Adaptation and mitigation measures will need to be in place to combat this threat.

3.5. Climate Change, Water and Sanitation in Odisha

Water supply and sanitation are a key sector that is vulnerable to climate change, and this vulnerability will have a direct impact on the ability of some nations to achieve the Millennium Development Goals. Changes in rainfall amounts and patterns have the potential to cause significant health impacts. Provision of safe water supplies and sanitation facilities can reduce the risk of water related diseases associated with changes in rainfall intensity and duration. However, the changing climate may also affect accessibility to improved water supplies and sanitation facilities.¹⁰

Water quality in Odisha will be greatly affected by climate change. In drought-affected regions of Odisha, a greater incidence of diarrhoeal and other water-related diseases may arise. This would be due to the deteriorating water quality, unsafe use of sources, as well as the reduced use of water for hygiene purposes. Increased precipitation could also lead to a decline in water quality by increasing erosion in the catchment, producing high turbulence in the source water, and mobilizing contaminants in the groundwater. Changes in the timing and intensity of rainfall coupled with the amount of water available will affect both rural and urban water supply and sanitation facilities.

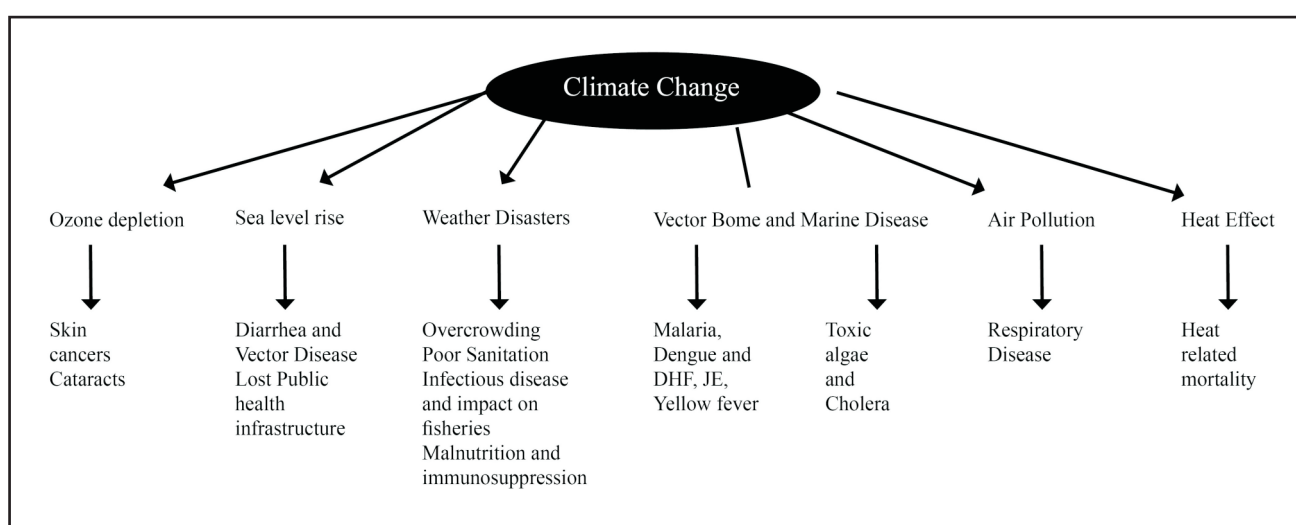


Figure 3.1

¹⁰ Katrina Charles, Kathy Pond, Steve Pedley, Rifat Hossain, Frédéric Jacot, Technology projection study, published at University of Surrey, available at http://www.who.int/water_sanitation_health/publications/vision_2030_technology_projection_report.pdf

Table 3.2: Observed effects on precipitation of changes induced by climate change, and observed or possible impacts on water and sanitation services¹¹:

Observed effect	Observed or possible impacts on water services	Observed or possible impacts on sanitation services	
Shifts in precipitation patterns	Changes in water availability as a result of changes in precipitation and other related phenomena	Reduction in water resources may lead to high pollutant concentration from wastewater	
Increase in inter Annual precipitation variability		Increases the difficulty of flood control and reservoir use during the flooding season	Higher precipitation in cities may affect the performance of sewer systems, and flooding can damage them directly. Flooding of sanitation systems can pose a health risk.
More frequent and intense extreme events		Floods affect water quality and water infrastructure integrity, and increase fluvial erosion, which introduces different kinds of pollutants to water	Wastewater treatment facilities may be put out of service by floods, leaving the population with no sanitary protection.

Sanitation facilities are mostly affected by floods, whereas drinking water supply facilities are affected by both floods and droughts.

3.6. Housing and Urban Development

Climate change has the potential to increase flooding risks in a number of ways. Rises in sea levels, storm surges, heavier and/or prolonged rainfall, and increased river flows all increase Odisha's risk profile. In addition to flood hazards, more extreme rainfall from climate change will additionally generate increased hazards from landslides in many urban areas of Odisha. Water supply abstraction and treatment works are located beside rivers, and are often the first infrastructure to be affected by floods. Particularly at risk are electrical switchgear and pump motors. In severe riverine floods with high flow velocities, pipelines may be damaged. In such cases, sanitation is likely to be affected. Flooding often damages pit latrines. The majority of rural regions in Odisha still rely on pit latrines or open defecation sites. Floodwaters usually become contaminated by waste water. Furthermore, toilets

linked to sewers are unusable without a water supply.¹²

Odisha will face severe urban water stress due to reduced rainfall and rapid increase in demand. Due to population density and rising living standards, many cities in the region already stress local watersheds. Even a small rise in sea levels will require massive additional investment just to sustain water and sewage service at current levels, which are already often inadequate. Increasing urbanization in towns and cities creates heat island effects, which could significantly increase urban respiratory problems associated with atmospheric ozone formation.

3.7. Education and Climate Change

With extreme events projected to increased under the influence of climate change, children will be hit the hardest. This is stipulated by two recent publications, Save the Children's (2008) 'Legacy of Disasters' and UNICEF UK's (2008) 'Our Climate, Our Children, Our Responsibility'. Access to education is

¹¹ Ibid.

¹² David Satterthwaite, United Nations Expert Group Meeting On Population Distribution, Urbanization, Internal Migration And Development under Department of Economic and Social Affairs published on 27 December 2007 available at http://www.un.org/esa/population/meetings/EGM_PopDist/P16_Satterthwaite.pdf



and will continue to be affected. Over the longer term, incremental environmental changes (e.g. sea level change, salination, changes in season patterns, desertification, soil erosion, species loss, etc.) are also likely to result in deteriorating livelihoods, which impact both household expenditure on schooling as well as the nutritional status of children. Evidence of the supply side consequences of extreme weather events is already emerging. In Odisha, the super cyclone of 1998 and the more recent Phailin cyclone caused considerable damage to school infrastructure. Since these disasters directly impact peoples lives and livelihoods, they also affect the educational development and schooling of children.

The cumulative effects of extreme weather events on initial enrollment and longer-term educational performance are not well known. Research in India, however, concludes that women born during the flood years of the 1970s were 19% less likely to have attended primary school. Interrupted and/or impeded access to education has a detrimental

impact on learning, and reduces the likelihood that children, especially girls, will break the cycle of poverty.

Some disasters also demonstrate the significant financial burden that rehabilitation costs exert on constrained education budgets. Emergency response to extreme weather events and their aftermath have the potential to undermine investments in education.¹³ However, in the face of such situations, Odisha has produced great examples of local level action. An example of this can be the multipurpose cyclone shelters that both deal with climate extremes and promote education. Cyclone shelters, while useful in saving lives during cyclones and storm surges, can be further utilized during non-emergency times. A shelter in regular use is likely to have proper maintenance. Extending the use of shelters so that they function as classrooms is perhaps one of the best ways to ensure this. Such multipurpose shelters are a good trend that has emerged in India. These shelters additionally support community training and

livelihood programs during non-emergency times, and can serve as health and community centres.¹³

3.8. Initiatives in Odisha

Cyclone and erosion prone, with monsoon-dependent resources, Odisha's 480 km long coastline is highly vulnerable to climate change. Its main crop is water-consuming rice, which places its agriculture at risk. While 38% of the state's geography is forest, much of this is degraded. Vector-borne disease, particularly malaria, is rampant, and climate change will cause it to spread more.

The recent initiatives to mitigate the impact of Climate Change and Disaster Risks associated with it are enlisted here with emphasis on specific sectors that are climate sensitive. The Odisha state action plan on climate change enlists key sectors and the intervention required to mitigate its effect. The key priorities are highlighted for each sector.¹⁴

3.8.1. Agriculture

Agriculture holds a predominant position in Odisha's economy. About 80–85 percent of the state's population is rural and depends on agriculture. The agricultural sector contributes about 26 percent of the GSDP. With nearly 60% of land growing rain-dependent crops, the agricultural sector is highly vulnerable to changes in climate. Further, paddy fields in the coastal areas are prone to frequent erosion, salinisation, and inundation. Climate projections indicate that drier areas will become drier and flood prone areas will be subject to more flooding. Other problems such as pest and disease outbreaks are also likely to increase due to climate variability.

Agriculture – Key Priorities

- Rapid screening and strategy assessment of State Agriculture Policy
- Establishing an effective institutional delivery mechanism to promote best practices on climate change
- Undertaking capacity building

- Continuing the livelihood-focused, people centric integrated watershed development in rain fed areas
- Increasing the area under perennial fruit plantation
- Developing water use-efficient micro irrigation methods and individual / community farm ponds
- Improving monitoring and surveillance techniques
- Developing sustainable soil, water and crop management practices
- Breeding studies on major crops for tolerance /resistance
- Conducting climate-linked research studies

3.8.2. Health

- In Odisha, increased health risks will arise due to climate change. There is already high prevalence of malaria and vector-borne diseases in certain areas. With the erratic nature of rainfall and extended seasons, these may become more widespread. Climate change has the potential to aggravate vector, water, and food-borne diseases. The intensity and frequency of extreme events such as heat waves and cyclones could further expose the vulnerable population to health risks.

Health – Key Priorities

- Capacity Building of the health sector on climate change
- Integrating climate change considerations in the State Health policy
- Strengthening approaches to manage vector-borne disease that have worsened due to climate change impacts
- Strengthening approaches to deal with heat wave conditions exacerbated due to climate change
- Strengthening approaches to deal with the physical and psychological impacts due to extreme weather conditions caused by climate change
- Addressing drought, nutrition, and food security due to increased risk of drought, consequent

¹³ Education Sector Responses to climate change, Background Paper with International Examples, Published by UNESCO Bangkok Asia and Pacific Regional Bureau for Education, 2012 available at <http://unesdoc.unesco.org/images/0021/002153/215305e.pdf-pn-2>

¹⁴ The key sectors explained here are in alignment with Climate Sensitive Sectors discussed in OCCAP

decline in , as well as increased malnutrition and food insecurity

- Undertaking measures to manage water-borne disease that have worsened due to climate change impacts
- Research & studies on climate change and health impacts
- Addressing food safety that is undermined as a result of increased ambient temperatures and extreme events
- Studying the interlinkages between air quality and climate change, and their implications on health.

3.8.3. Education

What children learn today will shape tomorrow's world. Climate Change Education for Sustainable Development (CCESD)¹⁵, therefore, has a central role in helping the general public, and particularly future generations, understand and relate to these

issues, make lifestyle changes so that greenhouse gas emissions are reduced, and adapt to the changing local conditions. While CCESD is needed at all levels, instilling climate change awareness and understanding at a young age is ultimately the best way to change behaviours and attitudes. To ensure relevance and uptake, CCESD should be oriented according to the local context and prioritize passing traditional knowledge and practices to learners. In Odisha, efforts are being made to strengthen the capacity of local authorities to provide quality climate change education for sustainable development at primary and secondary school level through:

- improved education policy, analysis, research and planning;
- teacher education and training of education planners;
- training on curriculum review/reform;
- School Safety Programme.

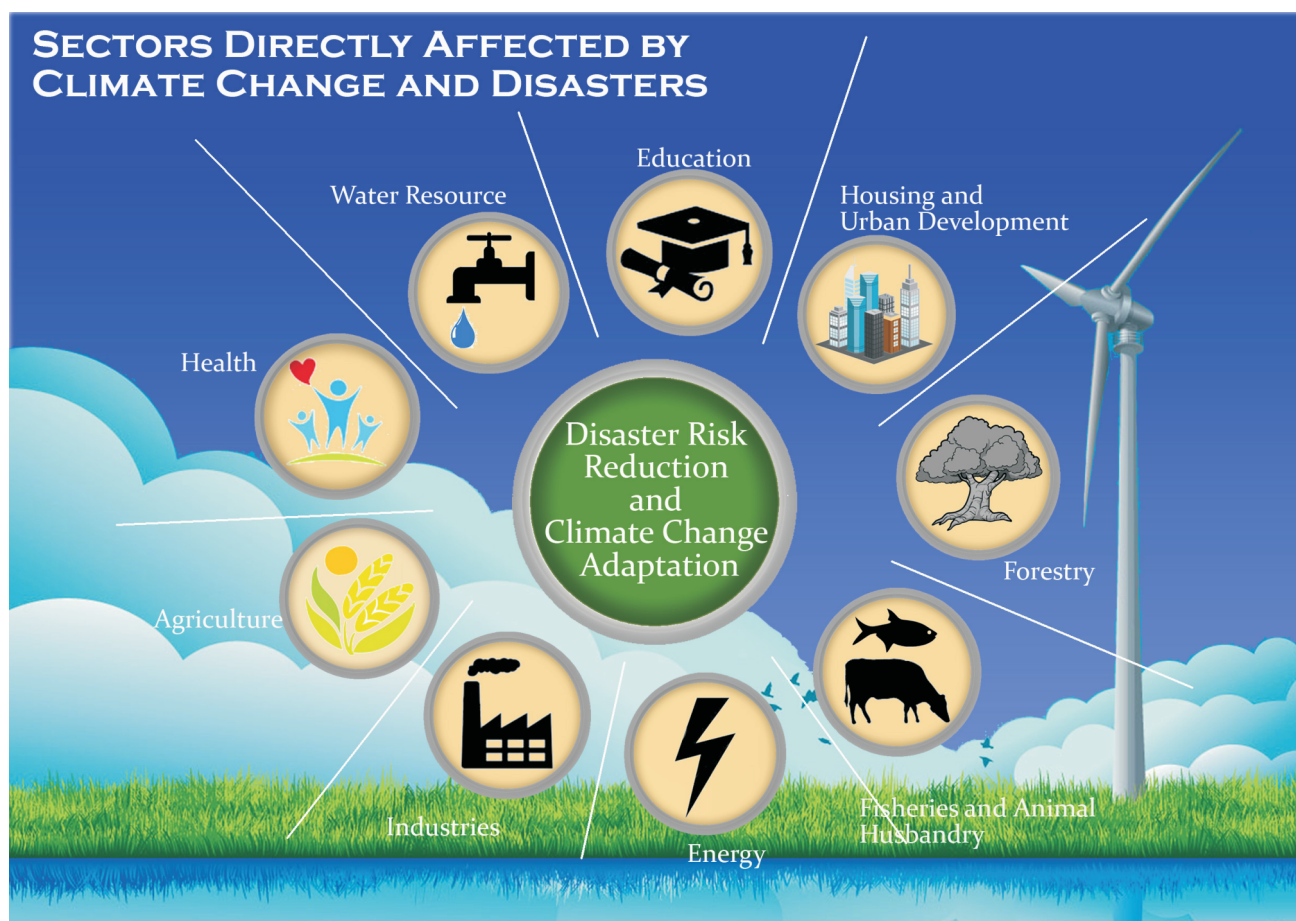


Figure 3.2: Sectors Directly affected by Climate Change and Disasters.

¹⁵ UNESCO, Climate Change Education for Sustainable Development, 2010, available at <http://unesdoc.unesco.org/images/0019/001901/190101e.pdf>



The following encourage and enhance innovative teaching approaches that emphasize quality climate change education and sustainable development:

- interdisciplinary practices;
- science education;
- whole school approaches;
- technical and vocational education and training (TVET);
- education on disaster risk reduction.

Through media, networking, and partnerships, climate change awareness is being raised and non-formal educational programmes are being enhanced.

3.8.4. Urban Development

The continuous exodus of the rural population to urban areas in Odisha has contributed to urban growth. There is already a severe strain on the existing urban infrastructure. However, as the population living in urban areas in Odisha is significantly lower than the national average, GoO is in a unique position to chart out an urban development path that is based on lessons from past mistakes / experiences of other Indian cities (particularly the metropolitan cities). Given the climate change dimension, Odisha can go further by

defining a climate-responsible urban development path.

Urban Development – Key Priorities

- Building capacity on climate change
- Incorporate climate considerations in water supply and sewerage design
- Working towards greater water efficiency
- Preparing a climate-friendly Solid Waste management plan
- Orienting towards energy efficient street lighting through ceramic discharge metal-halide (CDM) lamps,
- Developing climate responsible master plans
- Strengthening infrastructure for promoting non-motorized transport
- Improvements to water harvesting in urban areas with restoration of water tanks and artificial recharge
- Developing models of urban storm water flows and capacities of existing drainage systems with climate change

3.8.5 Housing

Promoting Green Buildings requires the use of energy and water efficient approaches, as well as the use of alternative building materials such as fly ash generated from thermal power plants in Odisha.

These initiatives are very important from the perspective of climate change adaptation as they involve the energy, water, and urban development sectors in Odisha. Regulation (and targeted procurement) by government can help to inform and guide the architectural profession as to involve necessary changes in practice. There are significant opportunities for the deployment of systems that use renewable energy sources, as well as highly energy efficient technologies, including:¹⁶

Key Priorities

- Green roof and roof design technology
- Photovoltaic glazing
- Low heat producing lighting, equipment and plant
- Use of Photovoltaic cells, solar energy, biomass, and wind-powered cooling technology
- Co-generation technologies (including waste heat capture technology)
- Impact resistant building materials, especially external claddings and glazing
- Better window designs. For example, increased thickness of glazing to reduce wind forces, or reduced panel sizes
- Improved fixing systems (roof to walls, walls to floors). For example, stiffer structural framework sealants to reduce flexure in storms
- Aerodynamic building designs that reduce deflection and resonance. For example, dynamic stabilisation systems, better foundation design
- Better planning guidance to avoid wind tunnel effects

3.8.6. Water Resource

Water resources in Odisha are impacted by the erratic monsoons. The monsoons create variability in the river flows and increase the frequency and intensity of extreme events, such as floods, droughts, and cyclones. Further research and studies are required for a realistic assessment of climate change impacts. This will have to be done at the state level and basin level. However, at the same time, conservation of water resources, adoption of better management practices with emphasis on optimal

utilization and increase in water use efficiency should be implemented. Apart from climate change adaptation measures, this will constitute good water resource management. A short-interval, basin river approach, in addition to water balance assessments, should be an integral part of IWRM.

Water Resources – Key Priorities

- Expansion of hydrometry network
- Development of flood forecasting models
- Downscaling of Global Circulation Model
- Increasing the water use efficiency in irrigation
- Constructing and protecting water harvesting structures
- Improving drainage systems
- River health monitoring and eco-systems environmental flow demand studies
- Raising awareness raising with *Pani Panchayat* through Farmers' Training Programme and creating agro-climatic stations
- Integrated Water Resources Management

3.8.7. Sanitation

Sanitation conditions in India are poor. With over 600 million people in India or 53 per cent of Indian households defecating in the open, the absence of toilets/latrines is one of the major contributors to malnutrition, a World Bank report has said. Women and girls bear the bulk of the health and care-giving burden associated with poor water and sanitation services; they are 'most often the primary users, providers and managers of water in their households and the guardians of household hygiene. If a water system falls into disrepair, women are the ones forced to travel longer distances and spend longer hours to meet their families' water needs.

Key Priorities¹⁷

- Sanitation services across all of India are poor, but in Odisha the situation is particularly dire.
- Enable access to clean toilet facilities for the maximum number of state residents possible.
- Awareness regarding use of toilets and curb down the practice of open-defecation.
- Promote hygiene awareness amongst people, use of soap for cleaning hands.

¹⁶ Mark Snow and Deo Prasad, Climate Change Adaptation for Building Designers: An Introduction, 2011, available at: http://environmentdesignguide.com.au/media/misc%20notes/EDG_66_MSa.pdf

¹⁷ Web article, available at: <http://www.healthissuesindia.com/poor-sanitation/>, accessed on 16/9/2014

- Subsidies to build toilets in remote areas, where people don't have many assets to built them on their own.
- Improve government capacity to deliver quality water, sanitation, and hygiene services in Odisha.
- Building up cleanliness drive for protection against diseases like diarrhea, cholera, malaria, and other water borne diseases.

3.8.8. Coasts and Disaster Management

With climate change, extreme cyclonic events are expected to increase in frequency and intensity. This can lead to flooding of low lying areas. To prepare for these situations, flood modeling, mapping, and forecasting will be extremely useful. This needs to be done through the scaling down of the global circulation models as pertaining to the Odisha coast.

Coasts and Disasters – Key Priorities

- Flood mapping, flood forecasting, and downscaled climate change projections modelling.
- Assessment of erosion prone areas with the help of Digital Elevation model.
- Studying coastal erosion.
- Conducting micro-level vulnerability assessment.
- Constructing flood shelters in unconventionally vulnerable locations.
- Needs assessment and constructing multipurpose cyclone shelters.
- Developing a hydrological framework.
- Dredging and river mouth widening to improve flood management.
- Strengthening coastal protection methods.
- Developing a techno-legal regime for construction of disaster resilient housing and public infrastructure.
- Integrating climate change risk in the state's disaster management policy.
- Setting up an integrated training and capacity building protocol.
- Assessment of risks due to lightning and thunderstorm.
- Improving flash flood management.
- Through appropriate modeling, predicting the impact of sea level rises on coastal ecosystems.
- Study of impact of global warming on the biodiversity of coastal ecosystem with special emphasis on flagship species.

3.8.9 Energy

The energy sector in Odisha (both state supply and captive power) is going to be a large contributor to carbon dioxide emissions. Conscious of this situation, while recognizing the necessity for energy to meet the development needs, GoO will proceed on a carbon conscious development path that will cap thermal power generation within the state the carrying capacity is reached. Key priorities were identified.

Energy – Key Priorities

- Generating cleaner energy through clean coal approaches
- Institutional development of the Energy Department
- Reducing transmission and distribution (T & D) losses
- Promotion demand side management (DSM) and energy efficiency
- Encouraging effective fly ash utilization and emission reduction
- Promoting of small and medium hydel plants
- Harnessing the biomass potential
- Promotion of grid-based wind power generation
- Maximizing solar power generation
- Developing bio fuels

3.8.10. Fisheries and Animal Resources

Animal husbandry provides livelihood support to a large number of people living in rural areas. This promotes rural incomes and does not require much infrastructure and capital for its sustainability. The key climate-related concern are methane emissions due to livestock rearing. Fishery outputs, on the other hand, contribute to the food and nutritional security of the coastal community. However, fish production in Odisha is among the lowest in the coastal states even though the state has immense potential.

Fisheries and Animal Resources – Key Priorities

- Vaccination against contagious diseases,
- Deworming and early disease warning system, emphasis on Green fodder, pasture development and grazing,
- Training on fodder production and conservation, rotational grazing, rain water harvest

technology, methane gas harvesting technology, and biogas task management,

- Conservation of local hardy animals.
- Gobar Gas tanks/packing to cylinders
- Easy and handy Methane Harvest at farmers point
- Enhancing Disease Early Warning Systems with climate change considerations
- Application of biotechnology and skilled animal breeding for development of better adopted species
- Capacity building of livestock keepers
- Research on disease early warning system relevant to livestock
- Impact of climate change on inland and coastal aquaculture
- Development of infrastructure for early warning systems in coastal areas for fishermen

3.8.11. Forestry

From both the mitigation and adaptation perspective, the forestry sector is of particular importance. Reducing emissions from deforestation, building larger carbon stocks/ sinks through afforestation and reforestation pertain to mitigation. Planting mangroves along the coastal belts and

doing forest plantations as part of soil and water conservation in watersheds pertain to climate adaptation. Irrigation catchment area treatment, which includes plantation, should be a priority.

Forestry – Key Priorities

- Increasing reforestation / afforestation activities in degraded forest areas
- Protecting existing forest stocks to act as carbon sink with stronger conservation
- Increasing planting on non-forest land and exploring where new and increased tree planting could create barriers to storm and cyclone impacts in coastal zones
- Covering bald-hills with suitable species mix
- Increasing and protecting existing mangrove cover along the coast
- Assessing fire management strategies
- Improving tree planting and forest management to integrate with watersheds and water resources management
- Working to establish new systems to support community users.
- Undertaking studies on indigenous tree species to assess their vulnerability to climate change
- Assessing additional threats to biodiversity and wildlife



- Obtaining access to updated knowledge on climate change science and policy developments
- Capacity building of Panchayati Raj institutions /communities/Joint Forest Management Committees to adapt to climate change
- Monitoring carbon stock and biodiversity at regular intervals

3.8.12. Industries

A mineral-rich state, Odisha's industrial development is oriented towards metallurgical and other metal-based industries. As these are coal-based and energy-intensive, thermal power generation tends to be an integral part of industrial development. In consideration of climate change, industrial development is required to explore ways of reducing greenhouse gas and carbon emissions, while adapting to the impacts of climate change. In developing the key priorities, three broader goals namely; (i) reducing emissions/mitigation without compromising industrial growth, (ii) developing climate resilient industrial systems and (iii) building capacity as well as realigning institutions were considered.

Industry – Key Priorities

- Integrating climate concerns in policies and plans
- Assessing GHG profiles of major industrial clusters
- Conducting heat-island study for Talcher and Jharsuguda area
- Training various stakeholders on climate change issues
- Implementing a system of compensatory water harvesting
- Streamlining institutional arrangement and strengthen OSDMA to tackle extreme climate events in coastal area
- Carrying out energy efficiency studies
- Promoting recovery, recycle, and reuse of waste material
- Setting emission standards for thermal power plants

3.8.13. Mining

Mining is a major livelihood activity in a number of districts in Odisha, and contributes significantly (8-10% of GDP) to the state's economic development. Mining, however, has serious impacts on the local

environment. Particulates, mine water discharges, displacement of peoples, and forest impacts are all adverse effects of this mining.

Mining – Key Priorities

- Incorporating climate concerns in State Mineral Policy
- Analyzing appropriate policies to promote energy efficiency
- Realizing the potential of low-grade mineral beneficiation
- Strengthening environmental monitoring
- Protecting water bodies
- Expanding and maintaining green zones
- Building capacity and generating awareness
- Realizing energy savings potential in mining

3.8.14. Transport

The transport sector contributes about 7% of the total Green House Gas Emission in the country (Natcom 2007). With greater economic growth and rapid urbanization, there is a constant increase in the number of transport vehicles, which leads to greater use of fossil fuel and more GHG emissions. If the current rate of urbanization and motorization continues, GHG emissions could grow to about 8 times the current level by 2030. Odisha is largely dependent on the road network that is comparatively less GHG or carbon friendly among the different modes of transport.

Transport – Key Priorities

- Revising state transport policies
- Integrating urban and transport planning
- Enhancing the use of rail
- Moving towards low carbon fuel
- Piloting low carbon, green highways
- Encouraging fuel use efficiency and tightening enforcement
- Promoting non-motorized transport
- Sequestering carbon through avenue plantations
- Estimating carbon emissions from the sector
- Developing inland waterways

3.9. Sectorwise Important Findings from Studies

Historically, there are separate communities of policymakers, practitioners and researchers



working on DRR, and CCA, with limited overlap in networks, meetings, methods, or tools. Some DRR specialists are sceptical of the sudden popular interest in adaptation and the adaptation community's perceived focus on a long-term agenda that only encompasses part of the entire array of hazards (excluding earthquakes, for instance). Some DRR experts feel that the adaptation community often focuses too much on climate as the main driver and fails to acknowledge the social factors behind vulnerability. Adaptation experts have tended to focus on longer-term issues, particularly on changing averages (which are easier to get from GCM modelling), and feel that the DRR community fails to address these. Additionally problematic is the use of different terminology for similar issues by the two communities.

DRR and CCA interventions must be tailored to the circumstances of specific countries and locations. These interventions must be supported by well-informed institutions whom operate out of flexible policies. Numerous studies indicate that failing to plan for future climate change threats may be less expensive in the short term, but much costlier in the long term when more funds and time will be needed to rectify any damage incurred.

Adaptation measures must not only coordinate across institutions, but should also consider

community perspectives, which includes informal settlements, matched with national or local legislation. There are limitations, however, such as a lack of available dependable high-resolution climate change scenarios. There is uncertainty that even the best available scenarios have not addressed everything.

3.9.1. Climate Variability

Both the trend analysis and projected scenario indicate that the annual rainfall of the state as a whole is an increasingly occurring trend. However, trend analysis does not agree to the projected scenario of increase is uniform over the entire state. The trend analysis suggests that six coastal districts, namely Balasore, Bhadrak, Cuttack, Khurda, Puri, and Nayagarh, interior districts of Mayurbhanj and Kandhamal, and possibly one western district of Kalahandi, are expected to receive more rainfall. All other districts in the state are expected to receive less rainfall. The following are other likely effects of climate change.

- Late monsoon onset and more pre-monsoon rainfall.
- Reduced post-monsoon and winter rainfall.
- Less rainfall in February, June, and October.
- Greater amount of cloudy days.
- Increased day and night temperatures in all months except July.

- Maximum increase in temperature in post-monsoon followed by summer.
- Extended summer up to June.
- Increased number of hot, humid summer days in coastal areas.
- Warm and short winter with fewer cold nights in western Odisha.
- More frequent extreme weather events, such as hot extremes (maximum temperature above 45°C) and prolonged heat waves.
- Greater amount of very heavy rainy days (>125 mm per day).
- Prolonged dry spells due to most of the rainfall occurring over a few days.
- Greater number of low-intensity and low pressures at the Bay of Bengal.
- More intense tropical cyclones with larger peak wind speeds and heavier rainfall.
- Increased risk of drought and flood during monsoon.
- Intense storms resulting in a loss of rain water in direct runoff, resulting in reduced groundwater recharging potential.

3.9.2. Health

A report from the Ministry of Health and Family Welfare estimates that nearly 40 million people are affected by waterborne disease every year. This places a large burden on both the health sector and the economic sector. Freshwater availability in India is also a concern; available water is expected to decrease from 1,820 m³ per capita to < 1,000 m³ by 2025 in response to the combined effects of population growth and climate change (IPCC). According to WHO, approximately 15,000 individuals die from malaria each year in India (WHO 2008). However, a recent study by Dhingra et al. (2010) estimates that approximately 200,000 malaria deaths per year in India before 70 years of age, with 55,000 in early childhood. In India, 65% of malaria cases are reported from six regions (Odisha, Jharkhand, Madhya Pradesh, Chattisgarh, West

Bengal, and the North East). In Odisha, the disease has much more serious proportions than even in sub-Saharan Africa (Narain 2008). The issue of urban malaria becomes even more important when considering the rapid expansion of urban and periurban environments, water storage techniques, and rising poverty levels.¹⁸

3.9.3. Agriculture

In Odisha, seawater incursion has reached 2.5 kilometres inland over the previous two decades. This has negatively impacted more than 600 families and their livelihoods, primarily in the Satabhaya and Kanhapur areas.¹⁹ Along these eastern coastal and inland areas, rainfall is now increasingly unpredictable and has become incompatible with established crop schedules. Evidence of this can be seen in the fact that only seven of the past 25 years have had normal rainfall. The remaining 17 years were characterized by deficient or delayed monsoon, causing an upheaval in rice production. Further climate change is expected to adversely affect the agricultural sector in the following ways:²⁰

- Reduced yields of crops due to warm days and nights.
- Decreased grain yield of rice (9%) by 2020 due to accelerated senescence and higher chaffiness.
- Decreased elongation of rice grain and lower quality of rice due to warm nights during post flowering period (October).
- Direct sown rice is at more risk due to extended summer and less rainfall in June.
- Substantial yield losses in winter crops. For example, 0.5°C rise in winter temperature would reduce wheat yield by 0.45 t/ha.
- More crop loss, water logging, and difficulty in cultivation due to more heavy rainfall events.
- More crop loss and land degradation due to increased drought occurrence.
- Increased risk of soil damage and erosion due to soil wetness, water logging, and flooding.

¹⁸Impacts of Climate Change on Public Health in India under Environmental Health Perspective published on Jan 27 2011 available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3114809/>

¹⁹Pattnaik Soumyajit, "Sea Gobbles up five villages in fifteen years" in Hindustan Times. 2007 May 18. <http://www.hindustantimes.com/India-news/Bhubaneswar/Sea-gobbles-up-five-villages-in-15-years/Article1-223440.aspx> Accessed on 02 February 2012.

²⁰Prof. Surendranath Pasupalak, Climate Change and Agriculture in Odisha, published at Odisha Review * April-May 2009 available at <http://www.Odisha.gov.in/e-magazine/OdishaReview/2009/April-May/engpdf/49-52.pdf> p. no. 50-51.

- Increased salinisation of the coastal areas, particularly Mahanadi delta.
- Long-term loss of soil carbon stocks.
- Increased crop water requirement due to accelerated evapotranspiration.
- Decreased use efficiency of nitrogenous fertilizers.
- Higher pest incidence such as increasing infestation of rice crop by the swarming caterpillar, hispa, stem borer, and bacterial leaf blight.
- Loss of cultivated land by inundation and coastal erosion in low-lying coastal areas.

3.9.4. Education

The major impacts of natural disasters on children are in the form of disease; increase of food insecurity, vulnerability, and exploitation of children in emergency situations; and access to education. The changing climate is impacting families' livelihoods and their ability to afford to send their children to school. Governments need to ensure, through scholarships, stipends or fee waivers so that families do not take their children out of school as a coping

strategy. Children incur heavy losses in a disaster event as they are deprived of their basic right to education. Generally, schools are used as disaster relief shelters, and so cater to other services in such events. Children are also forced to opt out of school in order to support their families in financial aspects by working as wagers. It takes long efforts to bring conditions back to normal, but the gap, and losses once inherited, becomes a burden for a lifetime.

3.9.5. Water Resource

In Asia, "Freshwater availability in Central, South, East and Southeast Asia, particularly in large river basins, is projected to decrease due to climate change which, along with population growth and increasing demands arising from higher standards of living, could adversely affect more than a billion people by the 2050s". In Odisha, over 80 percent of annual rainfall occurs during the monsoon period with rainfalls averaging 1400 mm. The state experiences an average of 70 rainy days. Due to the uneven distribution of rainfall, Odisha experiences either heavy flood or drought every alternate year. In recent years, wide fluctuation in climate has been



observed and irregular rainfall causing both floods and droughts is a major concern. Any reduction in the availability of freshwater resources caused by climate change will be particularly problematic for those who live in areas already suffering water scarcity or water stress, with poorer groups likely to be most affected. Furthermore, disasters related to extreme weather events have spread to some areas that were earlier characterized by drought conditions. Drought-prone districts such as Kalahandi, Koraput, Bargarh, and Jharsuguda have been experiencing frequent floods in the past two decades. Extreme heat events are also being seen more often in coastal areas.

3.9.6. Gender Equality

When gender issues are mentioned at all in discussions of climate change, it is usually with reference to women's gendered vulnerability. There is a tendency to portray women as victims, rather than as agents capable of contributing to solutions. A gender-blind approach to DRR is a weak approach. Women have different needs and possess different vulnerabilities than men and other demographics. Existing inequalities in opportunity, income, education, and traditional expectations put women more at-risk in the event of a disaster. Countries in which women are not considered equal, culturally or otherwise, see more women perish during natural disasters than men. Stemming from a variety of intersectional issues, women's confinement to traditional roles and lack of education is systemically killing them.

When a disaster strikes, a mother working at home while taking care of children and/or elderly persons will have different limitations than a male labourer who is away from home. Any girl or woman in a relief shelter post-disaster has different needs from boys or men as she is at greater risk of sexual assault than they are in those conditions. Given their roles as caregivers, women cannot migrate for work like men can, limiting their livelihoods options post-disaster. When responding to disasters, nuanced, context-specific, and needs-based approaches must be adopted so that relief and rehabilitation efforts are both fair and equitable.

The reality of gendered vulnerability is an aspect of disaster preparedness that has not been

acknowledged by some policy makers. Failing to address the needs of half a population not only significantly inhibits disaster preparedness, but is also greatly negligent.

3.9.7. Energy

Since Odisha's economy is growing at an increasing pace, its energy needs will rise significantly over the coming decade. Presently, the average demand for energy is about 2,500 MW, with the peak demand to be at about 3,200 MW. In the next 2-3 years, the average demand is likely to increase by another 1,500 MW, and the total average demand will be 4,000 MW. This additional demand is due to extending grid connectivity to most non-grid locations. In parallel, the demand from the industry will also increase significantly.

3.9.8. Housing and Urban Development

Urban areas always present some risk of flooding when rainfall occurs. Buildings, roads, infrastructure, and other paved areas prevent rainfall from infiltrating into the soil, producing more runoff. Heavy and/or prolonged rainfall produces very large volumes of surface water in any city, which can easily overwhelm drainage systems. Coastal cities that are at risk from storms will be doubly at risk as sea-level rise increases hazards from coastal flooding and erosion. For any city, the scale of the risk from these extreme weather events is influenced by the quality of housing and infrastructure in that city, the extent to which urban planning and land-use management have successfully ensured risk reduction within urban construction and expansion, and the level of preparedness among the city's population and key emergency services. For small and large coastal settlements, the integrity of coastal ecosystems, protective mangrove and salt marsh systems in particular, will also influence risk. In general, in any urban area, the people most at risk from climate change are those who are:

- least able to avoid the direct or indirect impacts (e.g. by having good quality homes and drainage systems that prevent flooding, by moving to places with less risk, or by changing jobs if climate change threatens their livelihoods);

- likely to be most affected (for instance infants and older groups who are less able to cope with heat waves);
- least able to cope with the illness, injury, premature death; or loss of income, livelihood or assets caused by climate change impacts.

3.9.9. Animal Husbandry and Fisheries

Animal rearing has been a major livelihood activity in Odisha. A shift from cattle and/or sheep rearing to goat and/or buffalo has been observed in recent years. Goat and buffalo are considered hardy when compared to sheep and cattle. Goats are non-selective animals that can survive on any type of feed/fodder/food, while buffalos are highly tolerant to extreme environments. In the past, farmers/households used to concentrate on a single type of animal, mainly milch cows and bullocks. Now about 60% of respondents argue that this strategy no longer exists. They have diversified their livestock. This is necessary as it provides a cushion to compensate losses during severe droughts or floods as different animals respond differently to the various environmental stress conditions.

As it is water-dependent, the fisheries sector in Odisha will be impacted by climate change. The livelihoods of the fishermen will be affected most. This is not only due to sea level rises and climate-mediated hazards, but also due to erratic rainfall that affects open reservoirs and ponds/ tanks.

3.10. Way Ahead

The documents analyzed during desk reviews provide a clear picture on the increasing problems associated with climate change and natural disasters. Many studies give evidence of increasing climate-induced disaster risks. Sectors that will be affected directly will have priority during mitigation efforts. There are many key findings that can be drawn from this literature review. But the most

important finding has been that climate change has indeed contributed in enhancing the vulnerability of the state of Odisha to natural hazards. Odisha is extremely vulnerable to hazards associated with water-related disaster risks, like tsunamis and tropical cyclones. The extent of damage associated with such events is massive. From the documents shared by OSDMA, the study team received extensive information about the level of preparedness and response mechanism by various departments and authorities in Odisha. The Odisha Disaster Rapid Action Force (ODRAF) is the prime organization that is immediately called in for response in any emergency situation. From its inception, the ODRAF units have rendered valuable service in the events of natural as well as human-induced disasters in the State. In the process of handling disaster situations, the ODRAF has virtually become a brand image of the administration for disaster response activities. The ODRAF has played the most important role in saving lives during the recent cyclone events of *Phailin* and *Hudhud*. It was due to their preparedness that the loss of lives was low in the region. They have an extensive training schedule for all units that includes technical knowledge of equipment and emergency response mechanisms.²¹

While these are praise-worthy efforts, certain areas still **require attention, such as livelihood and climate-induced vulnerabilities**. The studies also provide numerous gaps in the preparedness and response mechanisms of various competent authorities towards building climate resilience. Efforts are needed to identify operational gaps in the various sectors that are affected by climate change, as well as with stakeholders that are directly dealing with these sectors. Thus, the concluding remarks for the literature review here provide a strong message for OSDMA and the concerned authorities to incorporate a climate risk component in all its ongoing and future efforts towards building more resilient communities.

²¹ ODRAF, training guidelines and assessment reports, 2013; shared by OSDMA

4 Training Needs Assessment

4.1. Integration – DRR and CCA

As global climate change escalates, the risk of floods, droughts and severe storms increases. In its 5th Assessment Report, the Inter-governmental Panel on Climate Change (IPCC) projects that in areas which are known as dry regions, the frequency of drought is likely to increase by the end of the 21st century. In contrast, water resources are projected to increase at high latitudes. Due to sea-level rise projected throughout the 21st century and beyond, coastal systems and low-lying areas will increasingly experience adverse impacts such as submergence, coastal flooding, and coastal erosion.¹ With 94 per cent of disaster-related deaths occurring in developing countries, the outlook for poor people is bleak.

Climate change increases disaster risk in a number of ways. It changes the magnitude and frequency of extreme events² (meaning that coping and response mechanisms and economic planning for disasters based on past vulnerabilities may no longer suffice). It changes average climatic conditions and climate variability, affecting underlying risk factors, and it generates new threats, which a region may have no experience in dealing with. Clearly, the climate change and disaster management communities need to work together in addressing these issues. If climate change adaptation policies and measures are to be efficient and effective they must build on and expand existing DRR efforts. And if DRR approaches are to be sustainable they must account for the impact of climate change.

Climate change adaptation and disaster risk reduction (DRR) have similar aims and mutual benefits. However, to date the climate change and

disaster risk management communities³ have operated largely in isolation from each other – for a number of reasons. This situation must change as a matter of urgency. Adaptation and DRR policy makers, experts and practitioners must communicate and collaborate with each other effectively to ensure a comprehensive risk management approach to development at local, national and international levels of government. This could result in the following benefits:

1. Reduction of climate-related losses through more widespread implementation of DRR measures linked with adaptation.
2. More efficient use of financial, human and natural resources.
3. Increased effectiveness and sustainability of both adaptation and DRR approaches.

Climate Change Adaptation Community

- Use the guidance of the Hyogo Framework for Action (HFA) 2005–2015⁴ agreed by 168 governments in Kobe, Hyogo, Japan in 2005, to facilitate a comprehensive, system-wide risk-reducing approach to CCA.⁵
- Ensure there is a strong focus on DRR within the adaptation pillar of the post-2012 climate change framework.
- Use existing DRR tools that have proven to be effective in dealing with weather-related events that will be exacerbated by climate change.
- Ensure adequate focus on the socio-economic and political dimensions of managing climate risks, in consultation with the disaster risk management community.
- Ensure that adaptation is informed by successful community-based experiences in vulnerability reduction.

1 Panda Ranjan, Why should we be worried about climate change, article published in Sun Odisha Times available at <http://odishasuntimes.com/42976/worried-climate-change/>

2 The IPCC projects increased frequency of heavy precipitation events (very likely), increased area affected by drought (likely), increased incidence of extreme high sea level (likely) and increased intensity of tropical cyclone activity (likely). There is no clear evidence for increased frequency of tropical cyclones.

3 i.e. policy makers, experts, academics and practitioners.

4 The HFA contains a set of goals, activity and policy measures related to DRR, which are to be achieved by 2015.

5 Recommended by the UNISDR in 'Disaster risk and climate change', March 2008.

Disaster Risk Management Community

- Demonstrate and promote the role of DRR in climate change adaptation policies, strategies and programmes. Make DRR information and tools more accessible for climate change adaptation negotiators and managers.
- Ensure that all DRR policies, measures and tools account for new risks and the aggravation of existing risks posed by climate change.
- Actively engage in and seek to influence climate change policy at international, national and local levels.

Both communities

- Increase awareness and understanding of adaptation and DRR synergies and differences at all levels.
- Encourage systematic dialogue, information exchange and joint working between climate change and disaster reduction bodies, focal points and experts, in collaboration with development policy makers and practitioners.

Common Aims

The IPCC defines climate change adaptation as: 'An adjustment in natural or human systems in response to actual or expected climate stimuli or their effects, which moderates harm or exploits benefit opportunities'.

Disaster risk reduction can be defined as: 'The broad development and application of policies, strategies and practices to minimise vulnerabilities and disaster risks throughout society, through prevention, mitigation and preparedness'.⁶

While their scope and specific interests may differ adaptation and DRR have very similar aims in terms of seeking to build resilience in the face of hazards. They both focus on reducing people's vulnerability to hazards by improving methods to anticipate, resist, cope with and recover from their impact. In so doing, climate change adaptation clearly focuses on climate-related hazards, such as floods, droughts and storms. The disaster risk management community has a long history of dealing with such

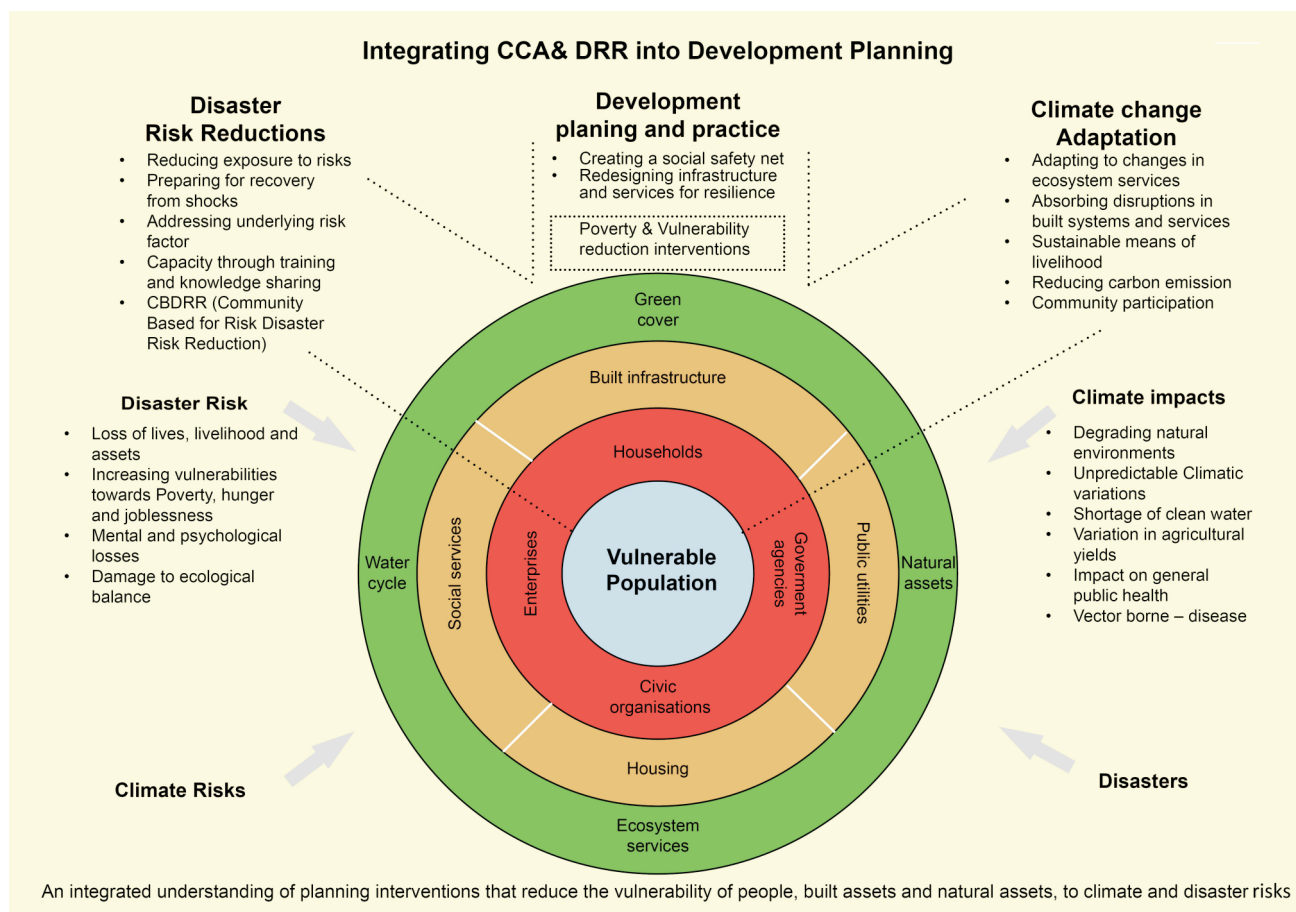


Figure 4.1: Integrating CCA and DRR into Development Planning (adapted from iiHS framework)

⁶ Twigg J (2004) Good Practice Review 9. Disaster risk reduction: mitigation and preparedness in development and emergency programming. Overseas Development Institute Humanitarian Practice Network, London



events, and therefore a wealth of experience relevant to adaptation.

Importantly, both adaptation and DRR seek to build resilience to hazards in the context of sustainable development. Climate change adaptation requires the re-shaping and re-designing of development, social and economic practices to respond effectively to new or anticipated environmental changes. Likewise DRR seeks to influence development decision-making and protect development aspirations from environment related risks. The effectiveness of both adaptation and DRR are limited if they are not viewed within the broader context of sustainable development.

The World Resources Institute (WRI) presents a model of adaptation which helps to illustrate how closely DRR is linked with adaptation.⁷ The WRI frames adaptation as a 'continuum of responses to climate change', divided into four types of adaptation efforts, ranging from 'pure'

development activities at one end of the continuum to very explicit adaptation measures at the other. The four types of adaptation are:

1. Addressing the drivers of vulnerability (i.e. factors making people vulnerable to harm).
2. Building response capacity (laying the foundation for more targeted actions).
3. Managing climate risk (reducing the effects of climate change on resources/livelihoods).
4. Confronting climate change (highly specialised activities, such as relocating communities in response to sea level rise).

While DRR measures typically fall under the middle two categories of building response capacity and managing climate risk, they can fit into *every category* of the adaptation continuum, addressing drivers of vulnerability (e.g. diversifying livelihood strategies in flood-prone areas) as well as confronting climate change (e.g. reducing risk of coastal flooding through adequate flood protection measures).

⁷ See WRI report (2007) *Weathering the Storm, Options for Framing Adaptation and Development*.

The following **table 4.1** highlights the key differences between DRR and climate change adaptation measures and approaches (some inevitable generalisations are made). The table also indicates where there are signs of convergence between the two disciplines.

Differences		Sign of Convergence
DRR	CCA	
Relevant to all hazard types	Relevant to climate-related hazards	n/a
Origin and culture in humanitarian assistance following a disaster event.	Origin and culture in scientific theory.	Climate change adaptation specialists now being recruited from engineering, water, agriculture, health and DRR sectors.
Most concerned with the present i.e. addressing existing risks.	Most concerned with the future i.e. addressing uncertainty/new risks.	DRR increasingly forward-looking Existing climate variability is an entry point for climate change adaptation.
Historical perspective	Future perspective	As above
Traditional/indigenous knowledge at community level is a basis for resilience.	Traditional/indigenous knowledge at community level may be insufficient for resilience against types and scales of risk yet to be experienced.	Examples where integration of scientific knowledge and traditional knowledge for DRR provides learning opportunities.
Structural measures designed for safety levels modelled on current and historical evidence.	Structural measures designed for safety levels modelled on current and historical evidence and predicted Changes.	DRR increasingly forward-looking.
Traditional focus on vulnerability Reduction.	Traditional focus on physical exposure.	n/a
Community-based process stemming from experience.	Community-based process stemming from policy agenda.	n/a
Practical application at local level.	Theoretical application at local level.	Climate change adaptation gaining experience through practical local application.
Full range of established and developing tools.	Limited range of tools under Development.	None, except increasing recognition that more adaptation tools are needed.
Incremental development.	New and emerging agenda.	n/a
Political and widespread recognition often quite weak.	Political and widespread recognition increasingly strong.	None, except that climate-related disaster events are now more likely to be analysed and debated with reference to climate change.
Funding streams ad hoc and Insufficient.	Funding streams sizeable and Increasing.	DRR community engaging in climate change adaptation funding mechanisms.

4.2 Key Gaps and Needs

Adaptation to climate change impacts and their integration with disaster risk reduction initiatives has attracted substantial attention recently; however the effectiveness of specific strategies in relation to greater resilience of local communities remains under-investigated. Integration of climate change and disaster risk reduction will be necessary and will occur at physiological, behavioural, social, institutional, and organizational scales involving stakeholders at several levels. To take advantage of already ongoing adaptations for creating more effective community responses to climate change impact—especially for poor rural communities whose access to basic necessities is extremely limited even in the current policy environment —

developing a baseline understanding of the region-specific demographic, social, and ecological determinants of such vulnerable communities will be necessary. Furthermore, adaptation strategies in response to climate variability and change must be designed on specific temporal and spatial scales relevant to local context. Taking steps now to adjust to current climate variability and modifying existing programs to address the anticipated impacts of climate change will make future adaptation strategies more effective. The same changes may also aid in reaching additional environmental and social objectives, such as more equitable education, empowerment of women, and improved sanitation. These community-based initiatives should be complemented by government interventions.⁸

8 Impacts of Climate Change on Public Health in India under Environmental Health Perspective published on Jan 27 2011 available at <http://www.ncbi.nlm.nih.gov/pmc/articles/PMC3114809/>

By analyzing the Departmental Disaster Management plans and the OSAPCC, several sectors and departments were found evident in both contexts. The sectors and departments that were common in both documents were analyzed in terms of their current capacities, gaps and needs which are presented in the below mentioned table:

i) Sectorwise Gaps and Needs Analyses (Table 4.2)

Sector	Responsible Department	Current Capacities	Key Gaps	Needs
Agriculture	Department of Agriculture and Department of Irrigation	1. Contributes 21.11% of the Net State Domestic Product (NSDP) 2. Employs 70% of state's population. 3. 3 Regional Institutes for Training on Extension (RITEs) and 3 state level training institutes. 4. Infrastructure available- including Directorate,	1. 60 percent of land devoted to rain fed agriculture 2. Usually, in the post flood situation there is acute shortage of seed for re-sowing and Re-planting operation in early season flood 3. Lack of hazard resistant cropping practices in vulnerable areas. 4. Toxicity and pollution of soil around industrial areas increasing	1. Development of drought and pest resistant crop varieties and orientation to the last line practitioners 2. Alternative cropping patterns and farmers sensitization on the same 3. Improving methods to conserve soil and water through research and training 4. Capacity building of farmers on climate change and disaster related issues 5. Partially damaged fields need to be made up through clonal

Sector	Responsible Department	Current Capacities	Key Gaps	Needs
		training institutes, Farms, Nurseries is 616	risk to crop productivity as well as the health of consumers. 5. Lack of awareness among farmers	propagation or gap filling with last line approach 6. Strengthening village level workforce through skill development on effective communication with farmers of different climate and disaster sensitive practices and methods.
Health	Department of Health and family welfare	1.Total no. of Govt. health care centres are 9615 covering critical disaster prone and climate sensitive areas 2.Total staff strength is 10639 dealing with health related concerns all over the state	1. Lack of inventory of hazard prone areas and specific plan to deal with climatic extremes. 2. Chemical poisoning, accidents following industrial disaster will have enormous damage as the Department is not well equipped to handle such situation. 3. Insufficient skills and awareness among staff at all levels on climate change and health related concerns. 4. Lack of skills for screening, diagnosing and mapping climatic change influenced diseases	1. Inventory of all hazard prone Gram Panchayats according to the vulnerable situation they can be exposed to like floods, heat wave, Tsunami, Cyclone. 2. Capacity building of staff for continuous monitoring of water and vector borne diseases 3. Skill development among grass-root level workers (ASHA/ ANM/ MPW) to manage water borne diseases that have worsened due to climate change impacts 4. Studying the inter-linkages between air quality and climate change, and implications on health 5. Capacity building of staff on Casualty Services & Contingency Plan for Medical Relief Centre 6. Team building within existing manpower for climate proofing of health services and infrastructure
Water Resources	Department of Water Resource	1.So far seven numbers of major dams, forty medium	1. Limited monitoring of previous and current flooding trends	1. Flood modelling of river basins using GIS and software and skill development of

Sector	Responsible Department	Current Capacities	Key Gaps	Needs
		<p>projects and 2196 minor dams have been constructed and rest 22 major and medium projects are in the ongoing stage.</p> <p>2. Establishment of 12 Automated Rain Gauges, 44 Gauge Discharge sites, 12 water level recorder and 9 full climate stations</p> <p>3. All the department Incharge are vested with particular responsibilities for Before, During and After flood scenarios</p>	<p>2. Storm surge modelling done only with help of information from IMD and lack of trained staff</p> <p>3. Monitoring of existing dams and embankments a tedious task.</p> <p>4. The idea of river water drainage into the sea as a 'waste' has been found wrong.</p> <p>5. Absence of adequate rain water harvesting practices</p>	<p>manpower for the same</p> <p>2. Most of the large dams are aged and debate need to be placed for their Decommissioning. Studies need to be conducted for understanding the need and accordingly platform for the debate needs to be created.</p> <p>3. Developing surface water bodies near mines and Industries. Sensitization of the respective stakeholders and capacity development is required for the same</p> <p>4. Ensuring Minimum interference in river flow through revisiting designs and adequate skill training to staff</p>
Urban Development	Department of Housing and Urban Development	<p>Total 106 Urban Local Bodies (ULBs)</p> <p>All the municipalities have their own set of assets like vehicles, tools, sweeping machines, tipper, JCB machines, etc.</p>	<p>1. Lack of basic civic amenities in different distant hazard prone areas.</p> <p>2. Lack of adequate preparedness planning and measures.</p> <p>3. Inadequate habitat and waste management measures.</p>	<p>1. Efficient Solid Waste Management through awareness among masses and capacity development up to last line workforce.</p> <p>2. Habitat and waste management for the existing urban infrastructure. The department needs to launch sensitization and awareness drive at mass scale through strengthening the skills for leading such initiatives among its workforce.</p> <p>3. Provision for proper biomedical waste</p>

Sector	Responsible Department	Current Capacities	Key Gaps	Needs
				<p>management- banning of waste of polythene.</p> <p>4. Building strategy and platform for promoting Per colony garden-cum-plantation.</p> <p>5. Developing adequate capacity among manpower for planning and implementing urban preparedness measures for climatic extremes.</p>

From the analysis of both DMPs and OSAPCC, several cross cutting needs emerge and they need to be addressed in a more efficient way to be incorporated in developmental planning.

ii) Cross Cutting Issues to Both DMPs and OCCAP (Table 4.3)

Issues	Gaps and needs
1. Awareness	Climate change is a relatively new issue. Awareness within the GoO ,businesses and civil society associated with the different sectors needs to be strengthened.
2. Capacity building	Awareness is the first step. The next is to build the capacity knowledge, skills and resources to be able to address climate change concerns. This is again a need across all the individual sectors.
3. Information needs	Information on the climate change impacts/implications of different sectors are not readily available. Both top-down (from climate projections) as well as bottom-up (from collecting empirical data / information) approach is required for all sectors that are impacted due to climate change, e.g. water resources, agriculture, coasts, and disasters.
4. Estimation of extent of emissions and impacts Integration with state planning processes	While all individual sectors recognize the climate change relevance, there is no data / information regarding the extent to which their sector contributes to the overall emissions. There is also no data / information to the extent the sector has to adapt to climate change impacts. Such data must be collected. Climate change is relevant across a number of activities within each individual sector. As these activities are planned as a part of the overall annual state planning, it is required for each sector to integrate climate change concerns into their respective planning. Development planning needs to integrate climate change concerns.

4.3. Awareness and Sensitization

The awareness of major Odishan stakeholders regarding climate change and DRR is limited. It must be broadened both at the government level and the grass roots involving communities.

1. The district consultations covered total of **139 participants** from various govt. departments from around 16 sectors that are directly or indirectly influenced by climate change and impacts of disasters. Of those participants, 68% didn't know anything about the OSAPCC. Such situation reflects high demand and need to focus on **awareness and sensitization on OSAPCC and related efforts**. Detailed analysis on consultations is provided in Annexure 3.⁹ Further sensitization is required on subjects that links climate change and disaster risk reduction efforts.
2. The stakeholders have agreed to the fact that their **existing knowledge and skills will not be sufficient to meet challenges related to climate change and extreme** events (82% agreed), the responders have mentioned various **challenges** such as training on specific skills, availability and usage of modern technology, knowledge products, scientific information on both magnitude of the problem and its solution.
3. Most of the participants have attended trainings on disasters (39%), few have attended trainings on climate change (7%) but there were very few who have attended trainings covering both the subjects (6%). This fact gives a clear indication for requirement of trainings on climate change and its integration with DRR efforts.
4. Currently, the level of knowledge on climate change and adaptation, as well as its links with DRR efforts in different stakeholders is low. This creates an urgent need for awareness generation programmes through training on community-based adaptation and closure links with DRR and develop efforts. These efforts must target all categories of communities, **especially vulnerable locations and climate sensitive service provider sectors**. The awareness of

different government departments towards OSAPCC was low, however awareness of the OSDMP was adequate. CCA awareness is still lacking.

5. The participation of local communities is usually very low during such activities. A major reason being their lack of understanding towards the serious impacts climate change can bring in their simple daily chores like farming, fishing, coconut production or the need of fresh water for drinking. Focus on awareness and sensitization of largest stakeholder i.e. the people towards the various aspects of adaptation process like capacity building, structural interventions and financial interventions, is necessary to make the efforts far-reaching.
6. Children, the group of stakeholder which are most vulnerable, can be substantially the strongest part of risk reduction efforts. Children need to be made aware about different kinds of climate change impacts and disaster risks. They can be extremely handy in such situations and can be trained for various disaster situations, which they can handle.

Sometimes mainstream approaches to sustainable development can result in organizations promoting 'mitigation' activities that fail to address, or even actively damage, poor women's interests in developing countries. The value and cost of women's time, labour and energy are left out of conventional economic analyses. This reinforces the argument made above that we need to look again at the sustainable development model, with a gender justice perspective.

4.4. Role of Key Stakeholder Departments

Role of Stakeholders in CCA and DRR in Odisha for Sustainable Development

4.4.1. Background

Given the present dynamics, Odisha has an emergent need for coherent, cooperated and coordinated actions involving multiple stakeholders for disaster risk reduction and climate change adaptation in order to achieve sustainable

⁹ For more information on district consultations refer annexure no. 2,3

development. Managing disaster risk will enable the state and its communities to sustain their socio-economic development; it saves lives, potentially reduces economic losses and unleashes opportunities. The evidence of disaster risk reduction in sustainable development and climate change adaptation is well established through the IPCC Special Report on Extreme Events (SREX 2011), three successive Global Assessment Reports for Disaster Risk Reduction (GAR 2009, 2011, 2013), and a growing literature and practice in disaster risk reduction.¹⁰

Most recently, in March 2014, the Working Group 2 contribution to the Fifth Assessment Report of the Intergovernmental Panel on Climate Change assessed a wide variety of approaches for managing risks and building resilience.

Hence, when we look at Odisha from the above perspective, the basic fact which finds expression here is that the local government (Government of Odisha) and different private sector role players operational in Odisha have a greater role in promoting synergies between Climate Change Adaptation and Disaster Risk Reduction to ensure sustainable development.

The World Bank in its recent Report (Building Resilience, Integrating Climate and Disaster Risk into Development) clearly explains that in order to deal with climate and development uncertainties, national stakeholders need sustained and flexible programs, which require clear institutional frameworks and predictable, long-term financing (over a decade at least). Climate affects multiple sectors, and introduces an added complexity in many countries where governance systems are structured along sectoral lines. This is the case in Odisha. Emerging experience suggests that to be effective, institutional coordination across various ministries should be set at the highest possible level.

In climate and disaster resilient development, the process of strengthening risk management—through better information, timely financing, contingency funds, and enabling policies and planning can sometimes be more important than

the actual achievement of discrete activities (such as building a protection dyke). Often, the activities—and in some cases the actual disaster—serve as a forum to catalyze better climate and disaster resilience decisions. The presence of uncertainties also requires a robust feedback system to determine which approaches succeed, which ones fail and why. The paucity of short-term results, together with slow initial disbursements, may at first deter some donors accustomed to more conventional and risk averse investments; however, it is important that we all recognize that this is how climate and disaster resilient development works.

Despite progress made, many challenges remain. Long-term projections of climate and development scenarios continue to be highly uncertain, which is often cited as a cause for policy inaction. Thus, stakeholders that are critical for taking ahead synergies must play diverse but coordinated roles in order to deal with the challenges of climate change and increased extreme events in the context of Odisha. A brief analysis of sectoral roles in CCA and DRR for sustainable development is presented below:

4.4.2. Sector Wise Roles

Role of Agriculture Department /Sector

Adaptation to climate change in agriculture aims to minimise peoples' vulnerability by improving their ability to cope with the impacts of climate change, which is also known as 'adaptive capacity'. Adaptive capacity is often limited, particularly in poor rural areas where people live on subsistence agriculture and generally have little formal education. Here, people have to be provided with climate change-related information and given access to social, economic, institutional, and technical resources. There is already evidence that agriculture will suffer the brunt of climate change and increasing disasters in the state. However, to deal with the challenges, the concerned departments, along with OSDMA will have to address a number of issues for CCA and DRR in agriculture. A range of adoption measures are available to reduce vulnerability to climate change

¹⁰ Coherence and mutual reinforcement between a post-2015 framework for disaster risk reduction, Sustainable Development Goals and the Conference of Parties to the UNFCCC by UNISDR, April 2014, available at http://www.preventionweb.net/documents/posthfa/Mutual_reinforcement_of_2015_Agendas_UNISDR.pdf

by enhancing adaptive capacity and increasing resilience. The major roles in this context are described below:

- **Crop Diversification:** Growing non-paddy crops in rainfed uplands to perform better under prolonged soil moisture stress in kharif. The department will have to address both the emerging demand and supply issues. Proper training at all levels should be designed for effectively addressing crop diversification among affected communities
- **New crop varieties:** High Yielding Varieties and hybrids of vegetables tolerant / resistant to alternating temperature regimes and warm winters, improved rice varieties resistant to flash flood in low lands, salinity tolerant rice varieties in coastal areas. The department will have to
- **New rice culture:** Cultivation techniques such as the System of Rice Intensification (SRI) method of rice cultivation during summer and in well drained medium lands during *kharif* under assured water supply. This is a wet method for direct sowing. Comprehensive farmers training would be required for intensifying the use of this method.
- **Preference to rice transplanting:** Going for the transplanting of rice instead of dry method of direct sowing for more assured yield. The department should adopt a variety of new methods instead of just the dry method direct sowing in order to ensure more production.

Success Story: Odisha

In October 1999, a Category 5 cyclone devastated the eastern coastline of India. The strongest cyclone on record in the North Indian Ocean left 10,000 people dead and about 1.7 million homeless, resulting in disaster losses estimated at US\$4.5 billion. Fourteen years later, in October 2013, Category 4 Cyclone *Phailin* hit the same stretch of coastline around Andhra Pradesh and Odisha (formerly known as Orissa). This time, a different story unfolded: fewer than 40 people died (0.4% of the 1999 casualties) and initial estimates of economic losses stood at US\$700 million.



What changed? Essentially, years of disaster risk prevention and preparedness paid off. After 1999, the Odisha State Disaster Management Authority (OSDMA) invested heavily in improving capacity to manage disaster risk through early warning systems and preparedness simulations, including annual storm drills and the involvement of local community and volunteer organizations.

OSDMA also invested in new cyclone shelters, evacuation routes and strengthened coastal embankments. With improved forecasting, the Indian Meteorological Department was able to provide accurate advance warning (72+ hours) and tracking forecasts before *Phailin* made landfall, allowing about a million people to evacuate. Improvements in communication technology also played a central role in enabling the network of community and volunteer organizations to mobilize the larger population; currently, 60% of the population in Odisha own mobile phones, compared to just 2 million handsets in all of India in 1999.

Source: World Bank (2013)

- **Altered sowing time:** Dry sowing of rice should only take place after sufficient monsoon rainfall has recharged the soil profile. Early sowing of *rabi* crops should take place in February.
- **Efficient fertilizer use:** Optimum fertilizer dose, balanced fertilization, split application of nitrogenous and potassium fertilizers, deep placement use of *neem*, *karanja* products and other such nitrification inhibitors, liming of acid soils, use of micronutrients such as zinc and boron, use of sulphur in oilseed crops, and integrated nutrient management. This needs systematic orientation of field staff for effective implementation.
- **Efficient water use:** Frequent but shallow irrigation, drip and sprinkler irrigation for high value crops, and irrigation at critical stages. The department has to play an important role in improvising irrigation facilities.
- **Integrated pest management:** The department will have to take and lead measures through farmers training and sensitization to control increased incidence of polyphagous insects like swarming caterpillars and accelerated life cycles of stem borer in rice.
- **Drought and flood management:** Preventive measures for drought that include on-farm reservoirs in medium lands, growing of pulses and oilseeds instead of rice in uplands, land grading and levelling, stabilization of field bunds by stone and grasses, graded line bunds, contour trenching for runoff collection, conservation furrows, mulching and more application of Farm Yard Manure (FYM). Recommended contingent measures for drought and flood are to be ready in stock for adoption depending on the emerging scenario of drought, time of occurrence and land situation. There has to be effective and well established coordination and responsibility line between OSDMA and Agriculture department to lead measures in this regard
- **Land management:** Contour ploughing, contour planting, terracing, close spacing crops, and other recommended practices of soil conservation in sloppy lands to minimize soil erosion. Creating awareness and building appropriate platform for the above will have to

be priority role in this regard for the department

- **Catchments management:** The department should focus on the need for better catchments management planning and technical interventions on the watersheds. There should be effective and inclusive planning involving role players like the Water Resources department, OSDMA and the Agriculture department.

Role of Health Department/Sector

The impacts of climate change on health are place-dependent and likely to vary from region to region across India. Climate change is expected to have a range of health impacts, some of which are already apparent. Public health adaptation is imperative, but there is a need to increase adaptive capacity and resilience in public health systems. While no single step can reverse the effects of climate change, climate change is expected to increase the burden of climate-sensitive diseases such as heat-related illness, vector-borne disease, diarrheal disease, injuries from extreme events, and respiratory diseases.

Malaria, the mosquito-borne disease, is endemic in all parts of India, except at elevations above 1,800 meters and in some coastal areas. The tribal dominated areas of Odisha are regarded as principal malaria prone areas. Presently, the transmission window (based on minimum required conditions for ensuing malaria transmission) is open for 12 months in eight states of India, of which Odisha is one.

Since mitigating the adverse impacts of climate change on human health is not possible, it is necessary to strengthen adaptive capacity of people. In fact, the IPCC identified rebuilding public health infrastructure as –the most important, cost-effective and urgently needed adaptation strategy. Other measures include public health training programmes, more effective surveillance and emergency response systems and sustainable prevention and control programmes. The Department of Health has a crucial role in initiating, facilitating, leading and advocating actions as follows:

- **Primary prevention:** refers to an intervention implemented before there is evidence of

disease or injury: avoiding hazardous exposure, removing causative risk factors or protecting individuals so that exposure to the hazard is of no consequence. For example, bed nets can be supplied to populations at risk of exposure to malaria and early warning systems (e.g. extreme heat health warnings, famine early warning) established to provide information on hazards and recommended actions to avoid or reduce risks. Primary prevention largely corresponds to anticipatory adaptation.

- **Secondary prevention:** Involves intervention implemented after disease has begun, but before it is symptomatic (e.g. early detection or screening), and subsequent treatment that averts full progression to disease. Examples include enhancing monitoring and surveillance; improving disaster response and recovery; and strengthening the public health system's ability to respond quickly to disease outbreaks. Secondary prevention is analogous to reactive adaptation. The department has to strengthen the capacities of its manpower to be able to

recognize and deliver as per the needs through training on secondary prevention.

- **Tertiary prevention:** Finally, tertiary prevention attempts to minimize the adverse effects of an already present disease or injury (e.g. better treatment of heat stroke, improved diagnosis of vector-borne diseases). As the adverse health outcome is not prevented, tertiary prevention is inherently reactive.

The department should recognize that climate-related adaptation strategies can not be considered in isolation of broader public health concerns such as population growth and demographic change; poverty; public health infrastructure; sanitation, availability of health care; nutrition; dangerous personal behaviours; misuse of antibiotics; pesticide resistance; and environmental degradation. All of these factors will influence the vulnerability of population and the health impacts they experience, as well as possible adaptation strategies. Sanitation and water treatment may have a profound influence on health consequences associated with climate change.¹¹

11 Patra Sudhakar, Climate Change and Health vulnerability in South Asia, Published at International Journal of Humanities and Social Science Invention, March 2013 available at [http://www.ijhssi.org/papers/v2\(3\)/version-3/E233139.pdf/pn-38](http://www.ijhssi.org/papers/v2(3)/version-3/E233139.pdf/pn-38)



Role of Education Sector/Department

Traditionally, educational institutions were established and structured on the basis of a strong belief in objective knowledge and forming the 'right' answers to every question. In this light, the task of education was to provide students with the truth and correct techniques. This role is still valid as factual knowledge and efficient techniques are crucial prerequisites for rational action. Yet it should not be the singular approach. Climate risks contain a degree of uncertainty and addressing them requires being able to assess the interplay between a number of aspects, including ethical considerations of what is good and bad, rather than of solely aiming to uncover the truth.

Furthermore, the balancing act between tackling long-term sustainable development issues and more immediate economic imperatives is another challenge for the education sector.

However, if not specialised, in order to deal with the challenges of climate change in the education sector, the department will have to play a crucial role in leading and collaborating action for DRR and CCA. Some of the areas where it will be required include¹²:

- Climate proofing education infrastructure:** Climate change proofing of educational infrastructure in order to minimize the risks and associated costs of weather-related damage is clearly an important starting point. This would entail better risk assessment in making decisions about school location and improved building design and maintenance to better withstand severe weather events as well as slower incremental deterioration. This may include building school and community water catchment systems. A concerted focus on school design and upgrading offers opportunities both to reduce environmental impact in terms of material use (e.g. minimizing use of burnt bricks and tiles in construction, utilizing more energy efficient cooking apparatus), and also to incorporate design elements, which create improved learning environments (e.g. levels of natural lighting,

sanitation facilities, reduced noise from rain impact, spaces conducive for learning). There is not only a dimensional understanding required to move ahead with this approach, there will also be the necessity to ensure convergence to meet the resource need. Multipurpose infrastructures (e.g., multipurpose cyclone shelters to be used as school building in non-emergency periods can be a good approach, examples for convergence as already in place) The Education Department should design, identify and mobilise resources with innovative concepts like this and more.

- Capacity to respond to displacement and migration streams:** The impacts of climate change are widely predicted to result in significant population movements. The need to respond to periodic forced in- and out-migration of student populations who are displaced by extreme weather events suggests the need for climate proofed schools in terms of structures and functions, and schools in 'buffer zones' capable of accommodating expanded numbers of students at short notice. The Department should have to play a crucial role in building capacity of schools and teachers to deal with such functional challenges through integrated training approaches.
- Adaptation to seasonal changes:** In addition to extreme weather events, climate change is also being implicated in changes in seasonality. Key processes in the management of educational provision have evolved to accommodate associated weather patterns. These include the timing and duration in which school building and maintenance is practicable, the examination cycle, and textbook distribution. Similarly, disease incidence (and by implication school attendance) is also known to follow similar patterns. Given the significance of seasonality in our country and in Odisha as well, school systems will need the capacity to align with the change. The department should build the capacity of stakeholders to plan events based on analysis of changes in seasonality. Decentralisation will have to be promoted so that schools are enabled to make decisions in

¹² <http://unesdoc.unesco.org/images/0021/002153/215305e.pdf/pn-9-11>

consideration of climatic risks associated with their location.

- **Re-orienting teaching and learning:**

Educational responses to climate change should not consist solely of adding new 'inputs' to curricula. Addressing climate change also requires the promotion of key areas of knowledge and skills. These will be needed at all levels (primary, secondary, tertiary, and adult education) as well as via diverse modes of delivery (formal, non-formal, and professional development). A range of specific topics and content areas are needed to address environmental change and impacts, and these may vary significantly depending on particular contexts and needs. However, an indicative outline of key areas of knowledge and skills includes:

- a. **Knowledge of climate change and wider environmental processes:**

This includes both specific, content-based knowledge (e.g. climate, deforestation, habitat loss, water cycle, soil erosion, air pollution) as well as awareness of strategies to address pressing environmental concerns (e.g. reducing carbon consumption, encouraging low carbon development, reducing deforestation through sustainable forest management, improving water and waste management).

- b. **Knowledge of local environmental conditions, associated risks and management strategies.**

The precise content of this area will depend on local and national contexts and concerns. Possible topics might include: the annual flood cycle and how to manage it; sustainable agricultural methods; existing areas of pollution and potential strategies for improved water, soil and waste management; sustainable forest management; and awareness of valuable endemic species (both flora and fauna) and how to protect them.

Education on climate risks and vulnerabilities, and their increasing trends, as well as options for reducing climate risks are important in creating the required culture for climate change

resilience. Development interventions, such as compulsory primary education and optional higher education systems, as well as other sectors, such as media, need to be used as vehicles for sharing knowledge and providing education on climate risk reduction. The department may seek the expertise of expert agencies for integrating climate change concerns from this perspective.

- **Promoting School Based DRR:** The Education Department will have to ensure that school safety and school based CCA are included amongst the primary functions and responsibilities of schools. The Department will have to be both catalyst and promoter in order to enable the schools and other educational institutional to undertake actions for disaster risk reduction including climate change adaptation in their respective institutions and beyond.

Role of Urban Planning and Housing Department /Sector

The state is experiencing climate change impacts, such as changes in average temperatures, more extreme weather events, and rising sea levels. While the severity and pace of future climate change impacts are difficult to predict, the impacts of climate change are expected to be significant for both rural communities and metropolitan regions. Climate change will have enormous impacts on urban areas in the developing world. The known and growing effects of climate change, increased temperatures, rising seas, and increased incidence of severe storms will be especially significant for urban areas as many are located by high-risk coastal areas. In urban areas, the poor are typically the most vulnerable. They tend to live in slums. These informal settlements are often located in areas that are the most exposed to the effects of climate change, notably low-lying areas, steep slopes, and ravines. Little or no infrastructure exists to provide protection from storm events or to ensure mobility. Reflecting the low and unstable incomes of the residents, but exacerbated by poor land tenure characteristics, little or no building regulation, and lack of housing finance, housing quality is low and provides poor resistance to natural disasters. The



inherent vulnerability of these settlements is amplified as the effects of climate change become more pronounced.¹³

Sustaining and improving human settlements in the face of ongoing climate change should become an important lens for cities in the future. So the department will need to wrestle with complicated issues in order to adapt to climate change impacts.

For urban settlements, the term adaptation refers to actions that are needed to make human settlement, capital, and productivity more resilient as the climate continues to change. It might, depending on circumstances, include the following types of actions which the Department should initiate:

- Hardening of infrastructure to make it more resilient to extreme weather.
- Building seawalls to reduce the impact of rising seas and extreme weather.
- Improving housing quality to make it more resistant to storm events.
- Land filling to raise elevations for new development.

- Relocation to alternative settlement areas.
- Investment in cooling technologies to improve comfort as urban heat island effects take hold.
- Disaster planning to enable more effective evacuation based on improved early warning systems for storm events.
- Public health measures to address changes in disease vectors.
- Facilitating settlement of new urban migrants in more appropriate parts of the city and use of proper designs in new construction.
- Improved enforcement of critical building and land use regulations.
- Construction of two-storied cyclone shelter houses in high tide affected areas and one strong cyclone shelter house in areas affected by cyclone.
- Selection of stronger buildings by the department authority for shelter during cyclones.
- Construction of higher foundations for houses.
- Construction of cyclone-proof shelters in the cyclone-prone areas.

¹³ Peter Feiden, Adapting to Climate Change: Cities and the Urban Poor, published on dated August 2011 available at <http://intlhc.org/wp-content/uploads/2011/09/Climate-Change-and-the-Urban-Poor.pdf>

There are two key areas for Urban Local bodies to consider for adaptation towards Climate Change, Disaster Risk and Development Initiatives.

1. The very large overlap between most of the measures needed for adaptation and local development (especially improving and extending provision for piped water, good sanitation and drainage, solid waste collection, garbage disposal, prevention-focused health care and support for upgrading within informal settlements);
2. The very large overlaps between climate-change adaptation and building resilience to extreme weather/disasters (regardless of whether the extreme weather or other catalysts for disasters are related to climate change).

Many needed measures may seem to be quite minor adjustments to current practices – for instance in adjusting building codes, land sub-division regulations, land-use management and infrastructure standards – but the sum of all the minor adjustments over time can build greater resilience without high costs.¹⁴ The department needs to ensure competent, capable, accountable local governance – and should also ensure minimum backlogs in protective infrastructure and services.

Other Sectors and Expected Role in DRR-CCA for Sustainable Development:

Building on existing relevant national and international instruments, the State of Odisha may determine more specified roles and responsibilities for all public and private stakeholders in accordance with national plans and priorities. Some indications may include:

- **Business, professional associations, private sector financial institutions, and philanthropic foundations are encouraged to:** actively engage with the public sector for the determination of laws, policies and plans to manage DRR and CCA; base investment decisions on risk considerations; integrate DRR and CCA in business models and practices; develop quality standards for DRR and CCA; give

special attention to strengthen DRR and CCA in small and medium enterprises; engage in and support research and innovation in DRR and CCA; share knowledge and practices; invest in prevention and strengthen DRR and CCA practices through supply chains; and advocate for DRR and CCA with customers.

- **Academia and research** are encouraged to: focus on the evolving nature of risk and scenarios in the medium and long terms; increase research for local application and information, including that relating to small-scale disasters and local climatic impacts and variabilities, in a simple, easy to understand and accessible manner, in close cooperation with science and academia; and stimulate a culture of prevention and strong community involvement in sustained public education campaigns and public consultations at all levels of society.
- **Financial, investments, and trade institutions** are encouraged to review and revise financial and trade regulations on the basis of DRR and CCA considerations and
- **Social groups, volunteers, civil society, and and faith-based organizations,** are encouraged to engage with public institutions and business to, inter alia: provide specific knowledge and pragmatic guidance in the context of the development and implementation of normative frameworks, standards and plans for disaster risk reduction; engage in the implementation of local, national, regional and global plans and strategies, and their monitoring; contribute to and support public awareness and education on disaster risk and climate change; and advocate for an inclusive and all-of-society DRR and CCA which strengthens the synergies across groups. Moreover, in particular:
- **Children and youth** should be recognized for their contribution through their perspectives, knowledge, skills and needs to ensure that disaster risk plans designing, resourcing and implementation are tailored accordingly, and should be given the space and modalities to contribute.

¹⁴ Climate Change and Adaptation: Effects and Implication for Urban Governance by David Satterthwaite published on 27 Dec 2007 available at http://www.un.org/esa/population/meetings/EGM_PopDist/P16_Satterthwaite.pdf

- **Women** should be recognized as critical to increase and add the availability of capacity to manage disaster risk, and to design, resource and implement gender-responsive disaster risk management.
- **Persons with disabilities** should be recognized as critical in the assessment of risk and design and implementation of plans tailored to specific requirements, and in increasing the awareness and education for an accessible disaster risk management for all.

4.5. Strategic Approach

Training needs are a sub-set of larger capacity needs. Training needs are essentially learning needs that can be addressed through a training intervention. Training works on knowledge, skills and attitude of people that form a part of the human capacity. Other dimensions of capacity include infrastructure, policy, institutions, strategy, structure and culture, which often call for non-training solutions to capacity gaps related to these dimensions.

As disaster risks are directly linked to the existing capacities of communities at risk and other stakeholders, particularly government, to cope with them, developing capacities of key stakeholders, particularly communities, is the key to effective disaster management and disaster risk reduction on the ground. Training is widely accepted to be the most powerful instrument of building capacities of people by enhancing their knowledge, skills and attitude. Non-training factors such as infrastructure, policy, strategy, action plans, work culture, and enabling environment are other major contributors to the overall capacity of the system to function and deliver results.¹⁵ Some of the strategic approaches for implementing the TNA recommendations are discussed here that will guide future course of action on trainings integrating CCA and DRR.

4.5.1. Training of Trainers

The ongoing training programs of OSDMA are facilitated by experts from different fields like educators, departmental heads, team of trainers,

scholars, DRR experts, etc. The training of such members who impart trainings is essential as it will automatically increase the knowledge of the person they will train. These target groups are entry points for OSDMA to achieve the desired result of wide spread information dissemination and knowledge building and promoting and strengthening integration of climate change with development works.

4.5.2. Strengthening Knowledge, skill and attitude approach

As training needs relate to knowledge, skills and attitude, identified training needs have to be grouped in these three categories. This helps in firming up the overall orientation of the training program. While there are usually inputs related to all the three categories of knowledge, skills and attitude in a training program, one of them or a couple of them could constitute the focus of the training to be imparted. Training needs often help determine the training objectives, but the reverse could also be true in certain cases. It is possible that training objectives are defined in advance and needs assessment exercise is carried out in view of certain pre-agreed objectives.

4.5.3. Creating pool of Master Trainers at different levels

A more specific and objective-oriented approach shall be implemented by OSDMA for training needs. This approach shall focus primarily on identifying target groups, audiences, stakeholders learning needs, duration of trainings and target group size. This approach will cover a hierarchical method of information and training dissemination having a top-bottom system of application. On the top level there shall be officials from the state governmental at minister and secretary level, representing different departments concerned. The next level will have district representatives like DM, collector, head of ULBs, etc. Following them will be sub-district level officials comprising BDOs, Cos, B.E.E.Os, CDPOs, CMOs, A.E.Os, A.Es/J.Es of work departments and block level officers. The village level representatives

¹⁵ NIDM, Strategic framework for implementation of training, 2013, available at: <http://nidm.gov.in/pdf/ncrmp/Deliverable%206.pdf>

shall cover teachers of primary/secondary schools, ANM, Anganwadi workers, ASHA, Rojgar Sewak, etc.

There must be a pool of master trainers for multi-layered training programs, and instead of designing generalised trainings, focus shall be on target audience and subject specific capacity building.

4.5.4. Capacity building of major stakeholders

From the response of participants in consultations it is clearly visible that all round capacity building will be required to address the challenges posed by climate change and disasters. Some of the specific recommendations in this regard are as follows:

- a) Through imparting training and Ensuring adequate facilities in work
- b) Through building positive, cooperative and collaborative attitude among staff and public
- c) Through better coordination and cooperation between PRI members and Administration
- d) Promotion and up-gradation of motivation of staff towards preparedness
- e) Through planning and distribution of work according to the person's capacity
- f) Through SOP and Mock Drill to achieve effective coordination among involved stakeholders

If entire response sheet is analyzed, a unanimous acceptance to the need for skill and knowledge building on climate change adaptation and related issues at different levels can be seen as the most dominating recommendation for removing the barriers in manpower to deal with climate change. The selection of stakeholders and the thematic approach of training will be the key in this regard. A multi-stakeholder approach with more synergetic and integrated objectivity building relevance and importance will definitely accelerate the learning level leading to holistic result achievement.

4.5.5. Awareness and Sensitization Approach

The awareness level of stakeholders including government officials and community members was found to be very low towards climate change issues and disaster risk information. Increasing awareness

level of all stakeholders shall be promoted through sensitization training which will communicate directly on importance of adaptation, building understanding on climate change and projection facts and figures, as well as conservation of water and resources. A well informed society will be capable of handling situations in a more systematic and informed manner. OSDMA and climate concerned departments should initiate awareness and sensitization drives to promote adaptation practices in citizens especially in urban areas, population living near and inside forests.

4.5.6. CSDRM/ Integration Approach

The Climate Smart Disaster Risk Management approach¹⁶ responds to the urgent need for organizations to be able to learn, reflect and integrate in better ways in order to remain relevant to their mission and goals. CSDRM is flexible, because you work in unique and complex environments. It helps us evaluate which of the many existing tools and frameworks in disaster risk management, climate change adaptation and development are right for us. The approach can give greater assurance that our work is supporting the realization of sustainable development that is climate smart and disaster proof.

Integration of Climate change adaptation and disaster risk reduction approaches into ongoing developmental programmes ensures addressing these major problems with existing resources. Further this approach helps in aligning the existing policies and incentives to be best utilised for reducing climate vulnerabilities and disaster risks. Ongoing flagship programs like MGNREGA and IAY can be utilised efficiently to address the needs of communities by modifying the current practices.

4.5.7. Database on Assessment of Trainees

OSDMA created and maintained good quality database of trained participants especially trainings related to ODRAF. The system of participant's data management should expand to other training

¹⁶ CSDRM approach 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.
<http://community.eldis.org/.59e0d267/SCR%20DRM.pdf>.

programmes too. This is important to strengthen facilitation for effective integration of DRR and CCA in development actions from block to state levels. The database should be in section for block to state level training programmes and also different for response and mitigation subjects so that strategy can be built for targeting the right candidates. A sample datasheet is provided in annexure 5 for reference.

4.6. SWOT Analysis (including existing capacities and requirements)

SWOT is generally used by organisations to analyse their internal strengths and weaknesses, and its operating environment's opportunities and threats. It is used at preliminary stages of planning and decision making and acts as a precursor to developing a plan or finding a solution that takes into consideration many different internal and external factors. During the current TNA exercise SWOT analysis is elaborately helpful in identifying current capacities of various climate sensitive sectors, and their corresponding departments that will have maximum impact of climate change scenario.

Important Attributes of TNA for SWOT Analysis:

1. Institutional Capacities
2. Stakeholder Participation
3. Public Awareness and Media
4. Integration of CCA and DRR

The above mentioned attributes are analysed under the framework of National Action Plan on Climate Change (NAPCC) and the eight missions incorporated with it for a better and climate resilient nation. The NAPCC states that it is guided by the following principles:

- To protect the poor and vulnerable sections of society through an inclusive sustainable development strategy that takes climate change into account;
- To achieve national growth objectives with a distinct change in direction that enhances ecological sustainability, while reducing greenhouse gas emissions;
- To devise efficient and cost- efficient strategies for end user demand side management;

- To deploy appropriate technologies for adaptation and mitigation of greenhouse gas emissions;
- To engineer new and innovative forms of market, regulatory and voluntary mechanisms to promote sustainable development;
- To implement programmes through unique linkages as required with civil society, local governments and through public-private-partnership; and
- To welcome international cooperation for research, development, sharing and transfer of technologies supported by additional funding and a global Intellectual Property Rights regime that facilitates technology transfer to developing countries.

The eight missions listed below are therefore expected to advance India's development and define its approach to climate mitigation and adaptation while satisfying the above stated principles:

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

Out of the eight national missions, the one for sustaining the Himalayan Ecosystem is not applicable in Odisha, but the rest can be used as parameters for strengthening the current capacities of different sectors and departments. OSDMA and many concerned departments are functioning pretty well in terms of the identification of risk factors and self assessment of departments. The departmental DMPs are well organised and comprehensively cover important aspects of capacity building for their particular sector.

Table 4.4: SWOT analysis of different climate sensitive sectors as per the findings from OCCAP

Strengths	Weaknesses	Opportunities	Threats
1. Agriculture Sector			
The key priorities identified in the Odisha context fall in line with these national policy directions, and the institutional setup constituted of 3 Regional Institutes for Training on Extension (RITEs) and 3 state level training institutes (Institution on Management of Agricultural Extension, Minor Irrigation and Water Use Training Institute, Odisha Farm Machinery Research & Development Centre)	Almost every alternate year Odisha faces some sort of drought or moisture stress like condition due to uneven and erratic distribution of monsoon rains.	National Agriculture mission would identify and develop new crop varieties; more importantly it would use traditional and modern agricultural techniques to achieve its stated mission goal.	Shortage of agri-inputs like seeds, fertilizers, and pesticides, etc. in aftermath of flood on account of surge in demand for damage repair.
2. Energy			
The national mission on EEE builds on the 2001 Energy Conservation Act. This mission will look at ways to create a market based mechanism to enhance cost effectiveness of improvements on energy efficiency. Odisha is a large scale operator in this sector with contributions to national grid and heavy industries.	Most of the powerplants are thermal or coal based, which are having quite low efficiency (37%). Transmission and distribution losses. Generation of fly ash in big volumes.	Many opportunities are present within the renewable sector of power generation (Hydel, Solar and Wind). Also there is potential for bio-mass and waste based power generation.	Erratic climatic pattern can be a big hurdle in planning for renewable energy generation. Tropical cyclones and tsunamis also pose threat to large scale projects.
3. Health			
Odisha has a very strong network of rural health workers and their supporting assets. Total no. of government health care centres including hospitals, health care, family care centres, primary and regional medical centres, dispensaries, etc. = 9615	Infrastructure levels are still poor, and awareness level of health workers are not adequate in changing climatic conditions.	Since a lot of humanitarian agencies are working in Odisha, it gives immense opportunity for incorporating large scale capacity development programs with it.	High level of exposure to natural hazards and epidemic diseases outbreak after a climate extreme event.

4. Water Resource

The National Water Mission ensures integrated water resource management to conserve water, minimizes wastage and ensures more equitable distribution both across and within states. Odisha has both coastal as well as inland water resources and a strong network of river basins.	Natural setting of Odisha makes it vulnerable to erratic monsoon rains, floods and droughts. The numbers of people affected by both are in large quantities.	Part of Integrated Water Resource Management can be efficiently applied here, for river basin management. Watershed management, an emerging new concept can be incorporated with community level awareness and sensitization programs. ¹⁷	Increasing urbanization and deforestation poses threat to water management, surface percolation is decreasing, leading to more run-off and flood like situations.
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5. Education

The GoI has large scale schemes to make education available to maximum children in the country through Sarva Siksha Abhiyaan (SSA) and School Safety Program.	Education is still not a major issue of concern for most of the communities. Especially in tribal belts schools are difficult to find.	Humanitarian agencies like UNDP and UNICEF are working in areas to strengthen disaster knowledge in schools and with children of vulnerable sections of society. School safety (structural and non-structural) is being endorsed by GoI.	In the times of disasters school buildings are used for emergency shelter, and children are forced to work in the informal sector to earn extra for the family.
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6. Housing and Urban Development

Strong workforce, and infrastructure in the state. Total 106 Urban Local Bodies (ULBs) All the municipalities have their own set of assets like vehicles, tools, sweeping machines, tipper, JCB machines, etc.	Lack of adequate and climate proof plans for urban development. lack of adequate skills and knowledge among manpower for climate sensitive planning.	Use of GoI flagship programs like JNNURM to strengthen the municipalities of medium and small cities. Also to govern new development.	Increased frequency of climatic extremes leading to cost overlaps in urban infrastructure development projects and increased pressure of population inflow in vulnerable locations.
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7. Forestry

The State has a total recorded forest area of 58,140 sq km. Out of this, there is forest cover (above 10% canopy density) over 48,855 sq km, which is about 31 percent of the state's geographical area. It has	Large scale industrialisation and mining activities and illegal deforestation leading to gradual loss in forest cover. The forest department has a tough task of keeping a check on vast areas.	The state's key priorities are in line with the national green mission. Availability of funds from Compulsory Afforestation Fund Management and Planning Authority has enhanced the allocation	Mangrove forests are extremely vulnerable to climate change impacts. Disaster events also bring major damages to forest cover and green cap.
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¹⁷ <http://www.wotr.org/ecosystems-based-watershed-development>, accessed on 16/10/2014

dense forest (canopy cover more than 40%) of 28,467 sq km and open forest (canopy cover 10 to 40%) of 20,388 sq km.		in the forest sector, which has enabled substantially larger programmes on afforestation and protection measures.	
8. Fisheries and Animal Husbandry			
The major livelihood options for Odishans are animal husbandry and fishing. Both need to adapt to the changing climate.	Fish production in Odisha is among the lowest in the coastal states even though the state has immense potential. Animals contribute largely to methane emissions from the state.	Odisha is endowed with water resources in the form of reservoirs with high inland fisheries potential. There is immense potential both in closed water bodies, e.g. ponds and tanks (freshwater and brackish), as well as open water bodies like reservoirs, rivers, estuaries, lakes, lagoons, and canals and swamps for sustainable and successful aquaculture.	Erratic rainfall is relevant in the context of open reservoirs and ponds / tanks, where the risk in sea level and the climate-mediated hazards is relevant in the context of coastal fishing which will influence the reservoirs and impact fisheries livelihoods.
9. Industry			
Very strong network of large scale industries being operated in the state.	Checking on carbon emissions is a big task, as most of the industries are not monitored properly for pollution.	Carbon exchange policies and carbon credit to help in cutting down the actual damage being done to the environment.	Non-concerned development that can lead to worsening of situation.



Other parameters for assessments have been taken from different ongoing programmes for capacity building facilitated by UNDP, UNISDR, etc.

SWOT Analysis of Institutional Mechanism at the State Level¹⁸ (Table 4.5):

Strengths	Weaknesses	Opportunities	Threats
State has already established SDMA, SEC and DDMA.	Inadequate dedicated professional manpower within DDMA.	Strengthening the already notified institutions by taking appropriate measures and making them fully functional / operational.	Increasing frequency of climatic disasters which creates the need for more resources and manpower to respond to and manage the events.
State Disaster Management Authority (SDMA) has been created within the Revenue Department to deal with disaster related issues.	Department is still focusing on typical DRR and climate change concerns as they need to be addressed in an integrated manner.	Gol-UNDP program on "Enhancing Institutional and Community Resilience to Disaster and Climate Change" will be helpful in building capacity of the stakeholders to address DRR with climate change concerns	If climate change concerns are not adequately addressed, the increased frequency and magnitude of climatic disasters will affect goal-achievement for which the SDMA is created
Establishment of State Emergency Operation Centre (SEOC) and District Emergency Operation Centers (DEOCs)	Lesser Human Resource to manage the DEOCs. Less HR to operate the Equipments provided to SEOCs / DEOCs.	Further strengthening with Emergency Equipment	The response may not be coordinated, effective and adequate if SEOCs/DEOCs are not strengthened and capacitated with an adequate amount of sophisticated equipments and Decision Support Systems
Establishment of Block Control Rooms	Lesser Human Resource to manage the Block Control Rooms. Not properly functional due to less HR support. Less HR to operate the Equipments provided to Block Offices.	Emergency Equipment procured and placed with the Block Control Rooms.	If Block Control Rooms are not established with latest communication tools, Adequate HR, and Decision Support System (DSS), it may be difficult to deal in case of a mega disaster as there may be complete collapse of communication and DSS. The response may not be coordinated and effective.

¹⁸From TNA-DRR conducted in 2013, shared by OSDMA



4.7. Training Requirements SectorWise

The present TNA exercise seeks to identify the requirements related to trainings that create a closer link between DRR and CCA. The efforts should be focused on improving communication and collaboration between the climate change adaptation and disaster risk reduction communities.

All the concerned stakeholders need to be sensitized and trained towards general and specific aspects of climate change, disaster risks and the process of integrating them with development planning. The emphasis of trainings will be on identified gaps in terms of knowledge skills and aptitude, and needs of key sectors for DRR and CCA. The training modules would be developed for different stakeholders depending upon their roles.

The main areas where trainings are needed have been enlisted here:

- a) Awareness about the provisions of the Disaster Management Act, 2005.
- b) National and State Policy on Disaster Management
- c) National and State Action Plan on Climate Change (NAPCC and OCCAP)
- d) National Training Policy, 2012
- e) Guidelines issued by the National Disaster Management Authority, State Disaster Management Authority and the State Executive Committee
- f) Orientation and awareness on Disaster Management and its various aspects
- g) Orientation and sensitization of various stakeholders towards climate change and its various aspects
- h) Sensitization towards mediums of integrating components of climate change and disaster risk reduction in development planning
- i) Training to perform the Emergency Support Function (ESF) assigned to the departments

The following training requirements have been identified for capacity building of different stakeholders in Odisha SDMP 2013.¹⁹ (Table 4.6)

No.	Broad Groups	Departments/ Agencies to be involved
1.	Policy and Planning	All MLAs, Secretaries and HODs
2.	Construction/ Public Works Sector	PWD, Road and Building, Rural Works, Tourism, Urban Development, Irrigation, Water Resources
3.	Search and Rescue, Law and Order	ODRAF, Civil Defence, Home Guards, Police, Fire and Emergency Services
4.	Social Sector	Social Justice and Empowerment, Women and Child Development, ICDS, NGOs
5.	Management and Coordination Sector	Revenue and DM Department, SDMA, District Administration
6.	Industrial Sector	Industry
7.	Health Sector	Health Department, CDMO, Red Cross, Animal Husbandry, NGOs
8.	Livelihood Sector	Agriculture, Horticulture and Forest
9.	Communication	BSNL and other private Network Operators, Police, Home Guards, Forest, Electricity
10.	IEC and Media	Information and Public Relation
11.	Voluntary Sector	NCC, NSS, Women and Youth Organisations, CSO, CBO, Market Organisations, VDMTs, Youth Services and Sports, etc.
12.	Service Sector	Food and Civil Supplies, Forest Corporation, Transport, Health
13.	Public Representative Sector	Elected Representatives of Panchayati Raj, and Urban Local Bodies
14.	Forest Sector	Department of Forests and Environment
15.	Tourism and Civil Aviation Sector	Department of Tourism and Civil Aviation, OTDC
16.	Education Sector	Universities, Higher and Elementary Education

It is predicted that climate change will impede poverty alleviation programmes in Odisha both directly and indirectly, compromising the current growth strategy. The direct impacts could include loss of life, livelihoods, assets, infrastructure, etc. from climatic extreme events. The indirect impacts could be the effect on economic growth. Continuing climate change variation is predicted to alter the sectoral origins of growth, including the ability of the poor to engage in the non-farm sector. This could nullify the pro-poor potential of macroeconomic policies, trade, and private sector investment. Substantive capacity building will be required for primary and secondary stakeholders for better risk reduction and adaptation. The following are training related issues identified under the Odisha State Action Plan on Climate Change 2010–2015²⁰.

Table 4.7: Training related needs identified in OSAPCC

No.	Sector	Needs related to training
1.	Agriculture	Capacity building for better management of land and water in the context of climate risks. Continuous capacity building support to CBOs, extension officers, and farmers.
2.	Coasts and Disasters	Set-up of an integrated training and capacity building protocol. Raising awareness of the community and the stakeholders on coping mechanisms.

¹⁹ Odisha State Disaster Management Plan, August 2013.

http://www.osdma.org/Download/State_Disaster_ManagementPlan_Aug2013.pdf.

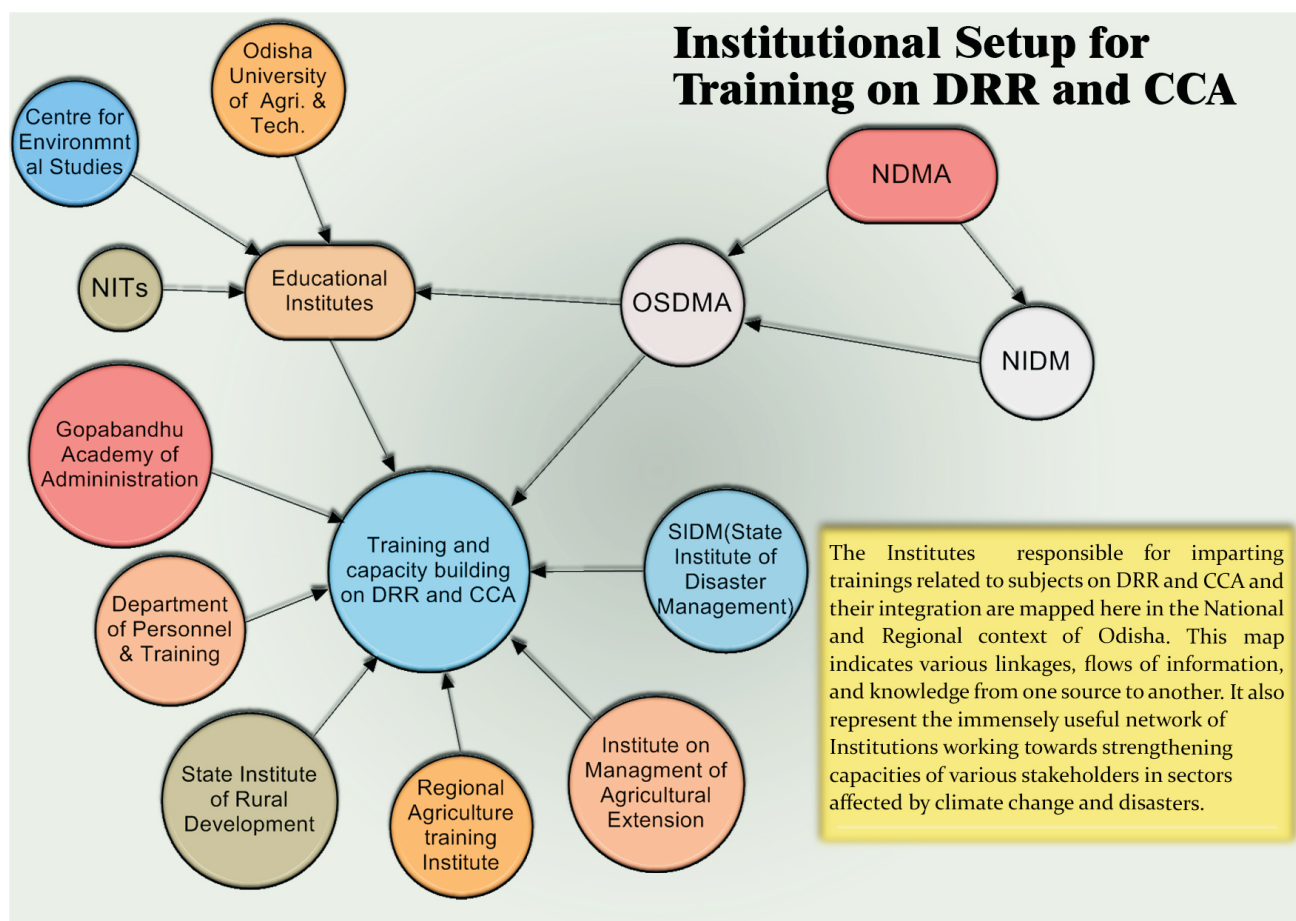
²⁰ Odisha Climate Change Action Plan 2010–2015. <http://Odisha.gov.in/portal/occap.pdf>.

3.	Energy	Training of the members of working group or their representatives of different departments and organisations on sector specific climate change issues.
4.	Fisheries and Animal Resources	Training on fodder production, fodder conservation, rotational grazing, rain water harvesting technology, methane gas harvesting technology, biogas tanks management, etc. Reorientation of livestock keepers to adopt more responsible practices.
5.	Forestry	Capacity building of PRIs/ communities/ JSM institutions to adapt to climate change
6.	Health	Sensitization of the health service providers ANMs, ASHA, AYUSH, Doctors, AWW); general training cum awareness campaigns reaching local communities in vulnerable areas (especially coastal and flood-plain).
7.	Industry	Training on climate change issues to all organisations involved with promoting industrial development and industrial enterprises in the large, medium and small-scale sectors.
8.	Mining	Training on the clean development mechanism, cleaner production/ low carbon/ efficient technologies and climate abatement measures.
9.	Urban Planning	Orientation and sensitization of stakeholders at all levels of the urban local bodies. Training with practical orientation with field/ exposure visits.
10.	Water Resources	Raising awareness with Pani Panchayat through farmers' training programme. Adaptation to scientific crop management in the context of varying water availability.

There are many overlapping areas in SDMP (State Disaster Management Plan, Odisha) and OSAPCC (Odisha State Action Plan on Climate Change). The common issues provide platform a for linking initiatives, which can be cohesive and catered together. Sectors like agriculture, forests, health, education, industries, urban planning, water resources are such that impact common people in everyday activities, and are important from the perspective of capacity building and training needs, as they cover cross-cutting issues both towards DRR and CCA..



Figure 4.2: Training Institutions setup, which can be collaborated to work with.

**Table No. 4.8:** List of Institutions providing training on DRR and CCA in India

Name of Institution	Areas of Intervention	Activities -Level
1. National Institute of Disaster Management	DM and DRR approaches, integration and mainstreaming, adaptation; educational, training, as well as research needs and strategies; documentation, policy analysis, and law; planning, strategic and analytical tools; international, regional, and institutional cooperation; human resource planning; interdisciplinary coordination; etc.	Training need analysis, development of training design, modules / manual and toolkits, diploma and higher level programmes on interdisciplinary curriculum of disaster management, national/ international and state levels.
2. National / Regional Science Centre(s)	Disaster risk management training and awareness, culture of safety and prevention, etc.	Short courses and orientations for school principals, teachers, and school volunteers, members of ecoclub, etc.
3. National Institutes of Technical Teachers Training	Safety and risk reduction in technical education / institutes, lab safety, electrical and chemical safety, earthquake safety, pandemic control, DRR, awareness, etc.	Short courses and orientations for college/school principals, teachers, demonstrators, technical staff, members of eco-club, etc.
4. National Labour Institute and Regional Labour Institutes	Safety risk analysis, multi -hazard risk reduction and emergency planning, culture of prevention and preparedness, coordination, occupational health and safety, etc.	Diploma course on Safety Risk Management, Occupational Health and Safety, Response Preparedness, short-courses for government officials, etc.

5. Academic Staff College(s) in Universities / Sponsored Orientation programmes in University Departments	DM and DRR approaches, integration and mainstreaming, adaptation; educational, training, as well as research needs and strategies; risk analysis and impact assessment; regional and local cooperation; planning and preparedness; role of NSS, NCC, infusing DM and DRR into higher education; etc.	University department heads/ deans, college/ teachers, technical staff, etc. zonal/ state level courses under UGC refresher /orientation course under environment studies and sponsored by other Ministries NDMA/MoEF/DST, etc.
6. Indian Institute of Technology (IITs) / Indian Institute of Management (IIMs) / Indian Institute of Science Education and Research (IISERs) / IISc Bangalore	DM and DRR approaches, integration, mainstreaming, and adaptation; educational, training and research needs, mitigation strategies, risk analysis and impact assessment, multi-hazard risk analysis and management, EIA, auditing, chemical disasters, climate- change, coastal and forest related disasters, disasters related with water, sanitation and health, waste management, climate-change; law and policy, vulnerability, planning and management; etc.	Training of faculty members of universities/ management /technical institutes, senior officials/ executives from government, corporate, or NGOs, professional and management development courses, etc.
7. National Institute of Food Technology and Management	Training of faculty members of universities/ management/technical institutes, senior officials/ executives from government, corporate, or NGOs, professional and management development courses, etc.	Training to food, environment, and agriculture sector officials, traders, disaster managers, etc.
8. Institute of Economic Growth	Role of policies and legislation in disaster risk reduction, economic evaluation of environmental impacts of disasters, natural resource policies and DRR, disaster impact assessment, financial instruments of DRR, and environmental statistics for disaster management.	Training to officials of Indian economic service, Indian statistical service officials; faculty members of economics, environment, agriculture, geography, management, etc.
9. Indian Institute of Forest Management Bhopal	DM and DRR approaches, integration, mainstreaming, and adaptation; educational, training, as well as research needs and strategies; risk analysis and impact assessment, forestry sector and disaster management, forest fire management; etc.	Training of IFS officials, state forest service officials, faculty members/scientists in forestry/ environment, S and T, agriculture institutes, etc.
10. Forest Research Institute, Dehradun	DM and DRR approaches, integration, mainstreaming, and adaptation; educational, training, as well as research needs and strategies; risk analysis and impact assessment, forestry sector and disaster management, forest fire management, etc.	Training of IFS officials, state forest service officials, faculty members/scientists in forestry/ environment, S and T, agriculture institutes, etc.

11. NDMRRI (DMI Bhopal)	DM and DRR approaches, integration, mainstreaming, and adaptation; educational, training, as well as research needs and strategies; risk analysis and impact assessment; multi-hazard risk analysis and management; industrial disasters; climate change and related disasters; coastal hazards and risk management, mining and forest related hazards; housing and DRR; etc.	Training of government officials from ministries/departments DM, environment, revenue, agriculture, forestry, water resources, rural development, etc. and faculty members from institutes in the above fields; executives from public/private sector industries, etc.
12. National Environmental Engineering Research Institute (previously Central Public Health Institute), Nagpur	Disasters related to water, sanitation, environmental-health, waste management, food safety, and climate change; management of these during disasters and emergencies, EIA, risk analysis, auditing, as well as infrastructure and recovery planning.	Government or external scientists, engineers, and planners; NGOs; disaster managers; and faculty members from related institutes; officials from pollution control board, water supply, health, DM, etc.
13. National Institute of Rural Development	DM and DRR approaches, integration and mainstreaming, adaptation; mitigation strategies, risk analysis and impact assessment, multi-hazard risk analysis and management, climate-change and natural resources related disasters, food security and livelihood issues in disaster management, rural institutions, and community participation in DRR.	Training of officials from government departments, rural development, water, environment, land-use, agriculture, etc. and faculty from institutes of government and outside, NGOs, PRIs, etc.
14. Indian Agriculture Research Institute	DM and DRR approaches for agriculture, food and natural resources, integration and mainstreaming, climate change adaptation; mitigation strategies, multi-hazard risk analysis and impact assessment, agrochemicals, GMOs, biotech and microbial disasters, coastal and forest hazards; Plant protection, land use, rural livelihood and DRR, etc.	Training of department officials in agriculture/ forestry, land-use, environment, KVKs, WALMI, faculty of related institutes/ colleges, NGOs, etc.
15. Lal Bahadur Shastri National Academy of Administration	DM and DRR approaches, integration and mainstreaming, adaptation; planning needs and strategies, coordination, strategic and analytical tools, regional local cooperation, human resource planning, ground action evaluation and monitoring, disaster reporting, institutions, incident management, etc.	Training of IAS officers (all levels) and other civil service officers, and faculty members in Administrative Training Institutes at states/UTs, etc.
16. Indian Institute of Public Administration	DM and DRR Approaches, integration and mainstreaming, adaptation; educational, training and research needs and strategies, risk analysis, EIA, cooperation, planning and preparedness, infusing DM	Training of officials from central/state Government, corporate, public/private sector, NGOs, and faculty members from Institutes /Universities; APPA

	and DRR into higher education, environment and development, environmental law and policy role in DM, policy analysis and governance for DM, etc.	participants, elected members, civil service officials, scientists and technologists from government institutes and departments, etc.
17. Centre for Disaster Management (in Central Universities)	DM and DRR Approaches; integration and mainstreaming, risk analysis, damage assessment, climate change adaptation and mitigation strategies, financial strategies, climate change, coastal and forest related disasters, auditing, chemical disasters, urban risks, disasters related with water, sanitation and health, waste management, EIA, law and policy, vulnerability, planning and management, community participation, psychosocial care, etc.	Professional training courses, diploma and post-PG courses; training to faculty members of training institutes/colleges and universities, NGOs, corporate, governmental departments, etc.
18. National Remote Sensing Centre, Hyderabad	DM and DRR approaches for agriculture, food and natural resources, housing; Integration and mainstreaming, climate change adaptation; mitigation strategies, multi-hazard risk analysis and impact assessment, coastal and forest hazards; land-use and DRR, using principles and application of space technology, multi and hyper-spectral remote sensing, Geo-informatics application, data integration and presentation for decision support system, web-enabled systems of event reporting, planning, etc.	Training to faculty members of training institutes/colleges and universities, NGOs, corporate, government departments, etc., professional training courses, diploma and certificate.
19. Indian Institute of Remote Sensing, Dehradun	-DO-	Training to faculty members of training institutes/colleges and universities, NGOs, corporate, government departments, etc., professional training courses, diploma and certificate.
20. All India Disaster Mitigation Institute, Ahmedabad	DM and DRR approaches; integration and mainstreaming, risk analysis, damage assessment, climate change adaptation and mitigation strategies, climate change, coastal and forest-related disasters, auditing, urban risks, disasters related with water, EIA, vulnerability, planning and management, community participation, etc.	Training to faculty members of training institutes/colleges and universities, NGOs, corporate, government departments, etc.

Table no. 4.9: List of Institutions providing training on DRR and CCA in Odisha

Name of Institution	Areas of Intervention	Activities -Level
1. Gopabandhu Academy of Administration Bhubaneswar	DM and DRR approaches, integration and mainstreaming, adaptation; planning needs and strategies, coordination, strategic and analytical tools, regional local cooperation, human resource planning, ground action evaluation and monitoring, disaster reporting, institutions, incident management, etc.	Training of IAS officers (all levels) and other civil service officers, and faculty members
2. State Institute of Rural Development (SIRD) – Disaster Management Cell Bhubaneswar	DM and DRR approaches, integration and mainstreaming, adaptation; mitigation strategies, risk analysis and impact assessment, mutli-hazard risk analysis and management, climate-change and natural resources related disasters, food security and livelihood issues in disaster management, rural institutions, and community participation in DRR.	Training of officials from government departments in rural development, water, environment, land-use, agriculture, etc. and faculty from institutes of government and outside, NGOs, PRIs, etc.
3. Institution on Management of Agricultural Extension (IMAGE) Agriculture Dept. Bhubaneswar	DM and DRR approaches for agriculture, food and natural resources, integration and mainstreaming, climate change adaptation; mitigation strategies, mutli-hazard risk analysis and impact assessment, agrochemicals, GMOs, biotech and microbial disasters, coastal and forest hazards; plant protection, land-use, rural livelihood, DRR, etc.	Training of officials of deptt. agriculture/ forestry, land-use, environment, KVKs, WALMI, faculty of related institutes/ colleges, NGOs, etc.
4. Regional Institution on Training and Extension (RITE) - Agriculture Dept. (Mahisapat, Dhenkanal, Bolangir, Rangeilunda, Ganjam)	DM and DRR approaches for agriculture, food, and natural resources, integration and mainstreaming, climate change adaptation; mitigation strategies, mutli-hazard risk analysis and impact assessment, agrochemicals, GMOs, biotech and microbial disasters, coastal and forest hazards; plant protection, land-use, rural livelihood, DRR, etc.	Training of department officials from agriculture/ forestry, landuse, environment, KVKs, WALMI, faculty of related institutes/ colleges, NGOs, etc.
5. Centre for Environmental Studies, Forest Department, GoO	DM and DRR approaches, integration and mainstreaming, adaptation; educational, training and research needs and strategies, risk analysis and impact assessment, forestry sector and disaster management, forest fire management, etc.	Training of IFS officials, state forest service officials, faculty members/ scientists in forestry/ environment, S & T, agriculture institutes, etc.



6. Panchayati Raj Training Institute	Safety risk analysis, multi-hazard risk reduction and emergency planning, culture of prevention and preparedness, coordination, occupational health and safety, etc.	Short courses and orientation for PRI members, government officials, community leaders, participation of people, NGOs, etc.
7. Fire Training Institute	Safety and risk reduction in technical education / institutes, lab safety, electrical and chemical safety, earthquake safety, pandemic control, disaster risk reduction, awareness, etc.	Diploma course on Safety Risk Management, Occupational Health and Safety, Response Preparedness, Short-courses for government officials, etc.
8. National Institute of Technology, Rourkela	DM and DRR approaches; integration and mainstreaming; adaptation; educational; training and research needs; mitigation strategies; risk analysis and impact assessment; multi-hazard risk analysis and management; EIA; auditing; chemical disasters; climate change; coastal and forest related disasters; disasters related with water, sanitation, and health; waste management; climate-change; law and policy, vulnerability, planning and management, etc.	Training of faculty members of universities/ management /technical institutes, senior officials/ executives from government, corporate or NGOs, professional and management development courses, etc.
9. Utkal University Departments of Climate Concerned Studies-Sponsored Orientation programmes in University Departments	DM and DRR Approaches, Integration and mainstreaming, Adaptation; Educational, training and research needs and strategies, Risk analysis and impact assessment, Regional and local cooperation, Planning and preparedness, Role of NSS, NCC, Infusing DM and DRR into higher education, etc.	University department heads/ deans, college/ teachers, technical staff, etc. zonal/ state level courses under UGC refresher /orientation course under environment studies and sponsored by other ministries NDMA/MoEF/DST, etc.
10. Odisha University of Agriculture and Technology (OUAT), Bhubaneswar	DM and DRR approaches, integration and mainstreaming, adaptation; educational, training, and research needs as well as strategies, risk analysis and impact assessment, regional and local cooperation, planning and preparedness, role of NSS, NCC, Infusing DM and DRR into higher education, etc.	Training of department officials in agriculture/ forestry, land use, environment, KVKs, WALMI, faculty of related institutes/ colleges, NGOs, etc.
11. Odisha Space Application Centre	DM and DRR approaches for agriculture, food, and natural resources; housing; integration and mainstreaming; CCA; mitigation strategies, multi-hazard risk analysis and impact assessment; coastal and forest hazards; land-use and DRR; use of principles and application of space technology; multi and hyper-spectral remote sensing; Geo-informatics application, data integration and presentation of decision support system; web-enabled systems of event reporting; planning; etc.	Training to faculty members of training institutes/colleges and universities, NGOs, corporate, government departments, etc., professional training courses, diploma and certificate.

The above mentioned institutions can be collaborated for imparting various trainings. These institutions are equipped with trained manpower and infrastructure, dedicated to strengthening the capacities of various stakeholders pertaining to climate sensitive sectors. The State of Odisha recently laid the groundwork for the establishment of State Institute of Disaster Management (SIDM), which will take care all sorts of training related requirements in the state, and it will be the premier institution for addressing Disaster Response. The institute is being set up as part of the Odisha Disaster Recovery Project, which will be executed with the assistance of the World Bank. The institute will also have a composite office complex for the Odisha State Disaster Management Authority, special relief commissioner and the State Emergency Operation Centre. OSDMA will be the main governing agency that will cater services at this institution. The findings of this TNA exercise will have a closer and efficient implication with the help of SIDM in the coming future. However, it is to be mentioned here these institutions have their own capacity and limitations. Though the opportunities of exploring the advantages are enormous, there are challenges in terms of infrastructure, resource and equipment crunch, inadequate/shortage of manpower compared to the requirement. There are opportunities of strengthening needs-based coordination and creating a of common platform between and among these institutions to deliver as per the training needs for DRR and CCA.

4.8. Sector Specific Training Requirements

The training and capacity building efforts should be **addressed in order to bring together critical groups of development partners**; namely those working on, food security, the environment, sustainable livelihoods, urban planning, water resource management and disaster management. Education and health remain key sectors for this topic. The approach mentioned above cannot work on its own; multiple approaches needs to be implemented in the planning of OSDMA at state level and similarly at district level by DDMA's and concern departments. The cross cutting issues needs to be addressed effectively. In terms of the integration of CCA – gender (women as a key

contributor in adaptation and promoter of climate change mitigation), economic (aspects related to cost of adaptation and income of livelihood resources) and trans-boundary (natural resources, extreme events, management issues) are three **key cross cutting issues**.

There are several existing opportunities that should be utilized to get advantage. A) OSDMA's wealth of knowledge and experience is one of the best places to utilize the Odisha CCAP findings in DRR and effective integration initiation; b) Year 2014-15 is very active at different levels from state to global for shaping Post 2015 Framework for DRR. OSDMA's initiative at state level should be in line with 4 key priorities of Post 2015 Framework; c) The capacity building efforts with a closure link between DRR and CCA is highly required but has not been effectively demonstrated. OSDMA could demonstrate this model for other states.

The following is a list of trainings which resulted from the study and from the district consultations conducted in 3 districts of **Puri, Kendrapada and Ganjam**²¹. A total of 139 participants from different departments and sectors took part in the district consultations. Along with the district consultation, integration workshop for different stakeholders became one of the important elements to identify training needs. The feedbacks from them gave shape to actual needs of trainings in the state of Odisha²². However these trainings should address at least one of the following areas.

1. **Uncertainty:** Improve information on how hazards are changing with detailed risk assessments from diverse knowledge sources (e.g. local, climatology, social science).
2. **Adaptive capacity:** Enable institutions and networks to develop new skills, knowledge, and resources needed to enhance adaptive capacity to climate change. For example: particular to Odisha, community-based early warning systems for floods could be institutionalized so that vulnerable people are able to cope better.
3. **Poverty and vulnerability:** Empower and support communities to address the root causes of vulnerability through challenging injustice, increasing access to resources and services, as well as through environmentally sound development.

²¹ For detailed analysis of district search conference, refer to annexure No. 3, 4, 5

²² Refer to district consultation summary report Annexure 3

The following list can be modified based on priorities and time frame; some of these can be merged into a combined training programme. The table is based on document-review, consultations with different sector officials and experts, the state disaster management plan by OSDMA, and it incorporates existing TNA recommendations.

Table no. 4.10: List of proposed trainings

Title of Training	Key Components/ Topics covered	Target Audience and level	Focus/ Priority Areas
a) General			
1. Sensitization towards Policies and Existing Legal framework for DRR and CCA integration	DM Act, National DM Policy, NAPCC, SDMPs, OCCAP	All stakeholders, government officials, PRIs, NGOs, etc.	Legal frameworks and policies
2. Disaster Risk, Climate Change and Advocacy	UNFCCC and Kyoto protocols; lobbying and advocacy for climate change; handling climate change negotiations and communications; Post 2015 Framework for DRR.	Climate concern and development work related dept.; designers and policy makers	Climate change, international developments, policies
3. Disaster Management: Advance Planning and Preparedness for Floods and Cyclones	Disaster Management focused on floods and cyclones, and advance planning for better preparedness. SOPs and checklists for disaster management. Information systems and decision making tools for disaster management (IDRN, etc.); Arrangement for financing relief and reconstruction activities; Coordination and management of NGO, CBOs and other's activities during emergencies and assigning roles to various stakeholders IEC in DM.	All stakeholders, govt. officials, PRIs, NGOs, disaster respondents, ODRAF, OSDMA, etc.	Floods and cyclone affected areas, planning and management process, financial aspects and role of stakeholders.
4. Role of Media and Communication Channels during Disasters	Utility of information, education, and communication (IEC) in various phases of DM process viz: planning, mitigation, during disaster, recovery, and rehabilitation.	Media channels, TV, radio, private communication networks	Information dissemination and management
5. Geo-Informatics Application in Disaster Management	The use and utility of GIS in Disaster Management. Identifying and mapping various geographical and demographic data that can be used for better planning and management during emergency situation	Govt. officials, public awareness dept., health, demographics	Demographic data consolidation and management using technology

Title of Training	Key Components/ Topics covered	Target Audience and level	Focus/ Priority Areas
6. Vulnerability Impact Assessment of Climate Change	Assessment of specifically climate sensitive sectors and impact of vulnerability towards climate change.	Climate sensitive sectors	Local communities, crops, indigenous practices
7. Environmental Impact Assessment of Various Climate Sensitive Sectors	Sectors which are extremely climate sensitive needs to be assessed for the environmental impacts of changing climate and the best possible means to minimize the damage.	Climate sensitive sectors, NGOs, etc.	Climate Change Impact on environmental aspects
8. Tourism and Environmental awareness	Promoting environmental sensitive tourism which includes sensitization towards fragile coastal and inland eco-system	Tourists, local communities, NGOs, etc.	Local crafts and art, coastal ecosystem and preserving environment
9. GIS in CCA	Use of technology and Geo-informatics for data collection and monitoring of climate change pattern	All stakeholders, govt. officials, PRIs, NGOs, field surveyors	Data collection and monitoring on CCA
10. Environmental Laws, Policies and Governance for better Climate Change Management	Use of existing frameworks like OSAPCC and ongoing Govt. Schemes like IAY, MGNREGS, RGGVY, etc. to better cater the needs of CCA.	All stakeholders, govt. officials, PRIs, NGOs, policy makers, etc.	Laws and policies, development programs with integrated approach to CCA
11. Climate Change and Cross Cutting Issues	Gender: gender, livelihood, climate change, and extreme events	Social welfare dept., Women institutions and NGOs	Issues that are cross cutting through several sectors
12. Role of crucial departments in Search and Rescue operations	Awareness and sensitization about DM and technologies / tools available for search and rescue, general role of the department in crisis management, etc.	OSDMA, ODRAF, Police Dept., Search and rescue	Use of better technology, techniques and equipments in DM
b) Agriculture			
1. Climate Change, Sustainable Agriculture and Food Security	Changing climate poses great threat to agriculture, which is the main source of livelihood and food requirements. Exploring ways to introduce sustainable agricultural practices which include use of high yield crops, lesser irrigation requirements, storage and supply of food grains during floods, drought, cyclones, tsunami, etc.	Agriculture Dept., local communities, NGOs, PRIs	Agriculture, climate resilient yields, better irrigation methods

Title of Training	Key Components/ Topics covered	Target Audience and level	Focus/ Priority Areas
2. Climate Resilient Agriculture, Animal Husbandry, and Other Livelihood Practices	Sensitization towards practices which are more climate resilient, provide better yields and less prone to infectious diseases that can arise after a disaster event. Management of animals and safeguarding them during disaster events and also from impacts of climate change.	Agriculture Dept., animal husbandry, local communities, NGOs, PRIs	Climate sensitive agriculture practices, managing animal resources during and post disaster event
c) Health			
1. Awareness training of health workers especially towards Vector-borne diseases and general healthcare procedures during phases of mitigation, disaster and recovery	First aid, participatory training methodology, training on modern techniques, handling mass casualty and carcass disposal, epidemic, counseling and motivation, nutrition, immunization, hygiene, and sanitation; opening of health control, establishing and managing mobile health unit.	Health workers, ASHA, volunteers, NGOs, CBOs, etc.	Preparedness against vector borne diseases, and management of disaster situation
2. Preparedness against infectious diseases in a disaster event	Disasters often lead to mass level epidemic disease outbreak due to poor management and care of affected people.	Health workers, ASHA, volunteers, NGOs, CBOs, etc.	Preparedness against epidemic outbreak after a disaster event
3. Emergency response SOP for health workers and volunteers in pre, during and post disaster event	SOP for various organizations and volunteers that are in place for first level emergency response.	Health workers, ASHA, volunteers, NGOs, CBOs, etc.	Preparedness, and management in a disaster situation
d) Housing and Urban Development			
1. Sensitization towards Sustainable Development and Environmental Concerns	Orientation towards sustainable development, environmental issues, and climate sensitive development concerns	Top level officials from ULBs, municipal corporations, architects, planners	Housing and Urban Development, Forestry, Construction / Public Works
2. Sensitization towards earthquake risk management and resilient construction	General orientation about disaster management and earthquake risk reduction, safe construction practices related to multi-hazards; NBCs, building by-laws, best practices at national and international level.	Top level officials from ULBs, municipal corporations, architects, planners	Sector Housing and Urban Development, Construction/ Public Works Sector

Title of Training	Key Components/ Topics covered	Target Audience and level	Focus/ Priority Areas
3. Urban Disaster and Risk Mitigation Management	Hazards arising from unplanned urban growth, basic necessities of safe urban agglomeration, minimization of risks	Top level officials from ULBs, municipal corporations, architects, planners	Housing and Urban Development, Construction/ Public Works Sector
4. Community Based Disaster Risk Reduction and Management in Urban Areas (SHGs/RWA/Slums)	Consultations with community members to motivate them to lead the process of DM and DRR through active participation in planning and management. Identifying local leaders and vesting them with responsibilities to cater for the community as a whole.	Community level organizations like SHGs, RWA, Slum representatives, Co-operatives	Empowering and including local level voices in disaster preparedness
5. Sensitization towards role of Extremely Vulnerable groups in DRR and CCA in Urban areas	Involving the vulnerable groups in the entire process of DRR and CCA by hearing their voices and consultations, making children, women, and elderly active participants in the process.	Women, children, elderly, physically challenged, excluded and vulnerable sections from society	Empowering and including excluded voices in disaster preparedness
6. Awareness of Voluntary groups like NCC, NSS, NGOs, SHGs, and other organisation towards CBDRM and CCA	Strengthening the roles of voluntary organizations, general sensitization towards CBDRM and CCA practices, training on volunteer mobilization and management.	Voluntary groups (NCC, NSS, NGOs, etc.)	Capacity building and strengthening preparedness
7. Public Infrastructure: Green Planning and Cost Effective Approaches	New development and construction with use of greener technology and materials to minimize damage towards environment.	PWD, engineers, planners, technical persons, trainers of the concern dept.	Environment sensitive development
8. Urban Risk Reduction/ Rural Risk Reduction (Separate)	With strong linkages of environment and disaster risk reduction with possible adaptation and mitigation measures.	Staff of ULBs, development authorities; operation officers, decision makers.	Overall risk reduction procedure in urban areas
9. Training on bio-medical, industrial and general Waste and pollution management in urban agglomerations	Handling and management of different types of waste products and their efficient disposal.	Staff of ULBs, waste collectors, NGOs, corporate investors	Waste Management

Title of Training	Key Components/ Topics covered	Target Audience and level	Focus/ Priority Areas
10. Role of Gender in Disaster Management	Role of both genders during a disaster situation, sharing of responsibilities, giving more opportunities to women, participation in decision making	Women and children, SHGs, welfare organizations	Women and Child Welfare, Gender Equality,
e) Forestry			
1. Land, Water, Mining and Forest: Laws and policies	Legal framework for controlling mining activities in ecologically sensitive zones	Govt. officials, forest dept., Mining dept.,	Forest, Land, Water resource, mining
f) Rural Development			
1. Sensitization towards formulation of Village DM Plan	Formulation of process for preparing village DM plan that can be comprehensive and inclusive of needs of occupants and is context specific like coastal, riverine, forest, tribal, etc.	Rural dept., PRIs, OSDMA, NGOs, CBOs in rural areas	Preparation of Village DM plans inclusive of context specific information
2. Role of PRIs in DRR and CCA planning and process	PRIs form the widest and strongest base of institutional mechanism in rural sector. The role of these institutions needs to be more clearly defined and to be made responsible during DRR and CCA planning process. Sensitization towards basic DRR and CCA issues, and methodology to integrate them PRI functions.	Rural dept., PRIs, OSDMA, NGOs, CBOs in rural areas	Strengthening role of PRIs in DM and CCA planning
3. Climate Change Adaptation and Non-farm Economy Development	Exploring parallel economy alternatives where agriculture is a mainstream practice.	Rural dept.; NGOs, CBOs in rural areas	Alternative livelihood to agriculture
4. Rural Livelihoods, Adaptation to Climate Change and Extreme Event Management	Should be linked with faster and green recovery contributions by small businesses.	Rural economic groups and DRR practitioners and institutions (GO and NGOs)	Small scale and household industries, livelihood options
g) Water Resource			
1. Awareness and Sensitization towards Climate Change Responsive Irrigation and Water Resource Management	Water Resource is going to be a crucial sector for planning and management from perspective of both DM and CCA. Initiatives to reduce wastage of fresh water, promoting irrigation techniques that are more viable and gives more output by strategic usage of available resources.	Dept. of water resource, Irrigation, local communities, farmers, etc.	Management of water resource

Title of Training	Key Components/ Topics covered	Target Audience and level	Focus/ Priority Areas
h) Education			
1. Importance of School Safety and Safe Education	Orientations on general school safety and sensitizations on DM and DRR related issues, safety of institutions, DM Plans, mock drills, IEC, DM in education; first aid, search, and rescue, etc.; and hands-on training in handling fire equipment, "dos and don'ts"	Education, child welfare dept., schools, institutions, teachers, children	Capacity building, structural and non-structural preparedness of schools, mock drills, etc.
2. Training of teachers and parents for effective inclusion of DRR and CCA in education	Awareness and sensitization of teachers and parents towards impacts of DRR and CCA and importance of its knowledge.	Education, child welfare dept., schools, institutions, teachers, children	DRR and CCA awareness amongst teachers and parents
3. Need of DRR and CCA oriented Education at all levels	Inclusion of DRR and CCA in general education curriculum so that children are sensitized at all levels towards mitigating the impacts of climate change and disaster risks.	Education, child welfare dept., schools, institutions, teachers, children	DRR and CCA awareness amongst students at all level
4. Green Institutions and Education on Climate Change Adaptation, Mitigation and Management of Extreme Events	Covers health, WASH, DRR, and educational areas	Education dept., institution, NGOs, health workers, social welfare	Environment sensitive education and institutions
i) Loss and Damage			
1. Economics of DRR, Adaptation and Mitigation and/ or separate Loss and Damage Associate with Climate Change and Extreme Events	Climate change impact assessment on extreme events, climate change with key fields; loss and damage associate with climate change; adaptation approaches and techniques. Loss and Damage: Understanding on L + D; institutional responses to adaptation and L+D; assessment, financial mechanism; economic aspects of livelihoods and MSME with focus on climate change and extreme events.	Senior managers, private sectors, DRR, CCA, development practitioners; finance, environment, urban	Financial constraints associated with loss and damage assessment

Title of Training	Key Components/ Topics covered	Target Audience and level	Focus/ Priority Areas
j) Industries			
1. General DM practices in factories and chemical hazard industries.	Safety and DM SOPs in industries exposed to hazardous chemicals and work environments.	Different industries, factories, Govt. officials, workers and decision makers	DM awareness amongst stakeholders
2. Greenhouse Gas Inventories Computation and Reporting	Methodologies available for GHG inventories; type and sourcing of data required for GHG computations; use of computer software for computation of GHG; inventories GHG reporting requirements	Climate concern depts., industries, mining, etc.	Green house emission monitoring
3. Natural Energy, Recycling Process and NRM	Harnessing more on natural energy options and promoting use of alternative sources for energy requirements.	Local communities living around rich natural resource areas in Odisha; local institutions	Use of natural resources, recycle, reuse
4. Training on DM/DRR/CCA for mining industries	General awareness of stakeholders in mining sector in Odisha, SOPs , environmental concerns and climate sensitive approach	Mining dept., Mining industries, workers, local communities	Strengthening capacity and awareness
k) Administration			
1. Training on Management of Relief Kitchens for field practitioners	Lot of active field practitioners are taking care of relief and management work, having a management system in place for their daily needs like food and essentials is necessary.	Govt. dept., NGOs, CBOs, local communities, etc.	Management of secondary resources
2. Training of officials on Crowd Management	During a disaster event crowd management becomes a severe problem as the front line managers are not properly equipped and trained	Govt. dept., NGOs, CBOs, volunteers, local communities, etc.	Better crowd management
3. Training on Report Writing Skills (for reporting a disaster event)	Systematic reporting of a disaster event is crucial for next line of action. Training of responsible person for proper reporting is necessary.	Govt. dept., NGOs, CBOs, volunteers, PRIs, local communities, etc.	Effective reporting of disaster event
4. Training to police staff as first respondent to a disaster event	Police personnel are usually the first ones to attend to a disaster event; they need to be systematically trained for such situation(response and reporting).	Police staff, volunteers	Proper methodology to attend to a disaster event.

4.9. Non-training Requirements

One of the best ways to **mainstream climate change concerns into DRM** is to understand possible the current and future impacts and address them in development and risk reduction planning. For this, it is necessary to look at a range of climate scenarios and overlay them with future socio-economic scenarios to obtain an idea of future risks. However, there are limitations, such as lack of availability of dependable high-resolution climate change scenarios and uncertainties that even the best available scenarios and projections have not addressed. Hence, there is a need to look for alternative means of addressing uncertain climate risks. One way to do this is to identify no-regret or win-win options, as these would be beneficial in reducing vulnerabilities to a range of possible changes in climate.

For OSDMA

Institutional/Policy/Planning related actions:

1. With its experience, OSDMA can take on roles that move beyond capacity building and facilitating. OSDMA can bring various stakeholders together and initiate different in-linked actions from action research; knowledge management; sector assessment and its implication; capacity building inputs to key sectors for promoting and strengthening stronger links between DRR, CCA, and sustainable development, as well as pilot for the most vulnerable sectors/ areas discussed during the TNA process.
2. OSDMA should initiate exercise of integration in existing training and capacity building efforts. This will build the impact in the short term and make existing efforts advance where climate related risk, consequences, adaptation and mitigation aspects integrated.
3. There is potential to connect the achievements and learning of OSDMA with the Post-2015 Framework for DRR and its priority areas. OSDMA should initiate studies to capture the lessons learned, progress achieved, and challenges faced for contributing to the Post-2015 Framework.
4. OSDMA should work towards establishing a knowledge hub that creates a closer link of DRR and CCA efforts that are taking place in Odisha. This can aim towards establishing an inter

agency institution, which would serve as a regional hub for exchange of information, experience sharing and knowledge products in eastern-coastal regions.

5. The State of Odisha is well-experienced in its DRR actions. The institutions based in Odisha have contributed actively to reach this level. However, OSDMA should have a platform for effective knowledge management and facilitation between these institutions. This is especially important at current stage, as OSDMA is planning for long term capacity building. This gap can be filled by separate groups or programmes related to knowledge management (may be learning centre targeting different universities and training institutions). This will enable the training and capacity building efforts to be more strategic.

Research and Development related action:

6. Such actions will magnify impact. For example, IAY, with its safe construction practices, deals not only with earthquake and flood hazards but also with other climate consequences. A study should be conducted by OSDMA or/ with concerned department on the **constructive evaluation of flagship programmes (such as MGNREGS, IAY) to identify areas of improvement that reflect stronger development actions in relation with adaptation and preparedness** against climatic events at the state level. A focus should be put on districts located along coasts and river basins that have sustained maximum damage from climate-induced events.

Launched by the Government of India and outlined in the **National Action Plan on Climate Change (NAPCC)**, disaster management must:

- Reducing risk to infrastructure through better design and engineering;
- Strengthening communication networks and disaster management facilities;
- Protecting coastal areas among key initiatives for addressing climate change.

Women and Children Welfare

Institutional/Policy/Planning related actions:

- Social protection measures like insurance, cash transfers, pensions, and child grants in reducing risk and vulnerability for children.

Table no 4.12 : Policy Level Intervention

Policy option	Potential impacts and target points
Mainstream DRM on all administrative levels	<ul style="list-style-type: none"> • Strengthening capacities of institutions at all levels • Mainstreaming DRM into climate change adaptation policies and activities (National Adaptation Programmes of Action – NAPAs) • Formalising collaboration and the coordination of climate-related risk reduction activities through a multi-sector mechanism • Developing mechanisms to actively engage and empower communities and local governments in the assessment of vulnerability and impacts • Formulating local adaptation activities containing DRM measures
Promote DRM research	<ul style="list-style-type: none"> • Investing in better information and forecasts • Selecting and evaluating information on future disasters, the effects of climate change and the resulting impacts • Conducting assessments of vulnerability and identifying particularly vulnerable groups
Enhance early warning systems	<ul style="list-style-type: none"> • Developing and disseminating high-quality information about climate hazards and their likely future changes • Implementing procedures to ensure warnings reach vulnerable groups • Developing local capacities for understanding and disseminating warning messages in a proper manner • Undertaking public information activities to help people understand the risks they face
Reduce underlying risk factors	<ul style="list-style-type: none"> • Incorporating climate risk-related considerations into development planning processes and sector plans • Integrating climate risk-related information in city planning, land use planning and water management • Strengthening and maintaining protective works such as coastal wave barriers and flood ponds • Constructing shelters to protect people and livestock
Build a culture of resilience through awareness and education	<ul style="list-style-type: none"> • Creating participatory risk maps • Developing education curricula on climate adaptation and risk reduction • Incorporating adaptation activities into plans for recovery from specific disasters • Supporting the diffusion of information

- Children should be involved in designing, carrying out and evaluating disaster risk reduction programming at local level.
- Focuses on basic guidelines for adaptation actors, reducing the longer term risks with children in mind, preparing for extreme weather events and adapting to impacts and losses in the context of Odisha.
- To ensure children's participation in the development of key documents such as Poverty Reduction Strategy Papers (PRSPs), National /State Adaptation Programmes of Action, etc.

Financial Allocations:

- Provide adequate resources to assist local communities to integrate children as social actors in all their preparedness and response activities.

Advocacy:

- Advocate for communities and local authorities to support children in taking their place as active citizens who contribute significantly to community well-being and self-protection in the face of potential and actual disasters.²³

²³ Children, Climate Change and Disasters compiled by Thomas Tanner, Jimena Lazcano, Kattie Lussier, Emily Polack, Katy Oswald, Anasuya Sengupta, Leah Murphy and Fatema Rajabali available at http://www.childreninachangingclimate.org/database/CCC/Publications/CCC_Children-Climate-Disasters-Bibliography.pdf

Calling for effective and gender-just climate policies in the short term, and envisioning gender-just models of sustainable development for the future, go together. Women, especially women in Odisha, need policy makers to hear their adaptation and mitigation concerns right now, even though it can be frustrating to work within the mainstream approach; this engagement in policy could itself help to produce new ideas and debates about development directions. OSDMA and WCD Department of GoO will have to work together for ensuring the above mentioned actions.

Housing and Urban Development Sector

The quality of government both at national level and, just as crucially, at the local (district or municipal) level influences the levels of risk from climate change facing those with limited incomes or assets in several ways:

- Quality of provision for infrastructure for all areas (which should limit risks of flooding for the whole city area, not just for the wealthier areas) and land-use management (to limit or make more resilient settlements in high-risk areas);
- Quality of provision for disaster-preparedness (including warnings, measures taken to limit damage and, if needed, good provision to help people move to safer areas quickly);

- Quality of planning for and coordinating disaster-response (for instance rescue services and appropriate emergency and health care services) and reconstruction (to help those who have lost their homes and livelihoods) which should aim to improve resilience, but seldom achieves this;
- Extent to which poorer groups can buy, build, or rent “safe” housing in “safe” sites;
- Degree to which the local government creates an enabling environment for local civil-society action to contribute towards addressing the practical aims identified above.²⁴

Financing for adaptation is critical, and investing in building women's adaptive capacity would be an effective, holistic approach. As the impact of climate change intensifies, more and more public funding in both industrialized and developing countries will be needed for public adaptation measures. So drawing on gender-budgeting and gender-auditing techniques to compare the gendered costs and benefits of alternative adaptation strategies would also be a useful way to ensure that poor women's interests and priorities are not overlooked. The same applies to funding for mitigation. In fact, the gender-budgeting movement is an excellent example of how existing GAD-related approaches and tools could usefully be applied to the climate change crisis.

²⁴ Climate Change and Adaptation: Effects and Implication for Urban Governance by David Satterthwaite published on 27 Dec 2007 available at http://www.un.org/esa/population/meetings/EGM_PopDist/P16_Satterthwaite.pdf



5 Lessons Learnt and Conclusion

Key Findings

The impacts of climate induced disasters on **food security, access to water, human health, ecosystems, and urban areas** will have severe implications for the achievement of sustainable development. The present coping capacity to climate change is very limited particularly for small farmers, rural communities, urban poor, women, and children. There are several good practices and policies, but these need to be scaled up. While government programmes in these sectors address issues relevant for strengthening adaptive capacity to climate change, they do not as yet explicitly incorporate the increased risks due to climate change. Adapting to the changing conditions of climate would form an integral part of sustainable development. Inclusion of climatic risks in the design and implementation of development initiatives is vital to reduce vulnerability and enhance sustainability.

Adapting to climate change will be necessary and will occur at **physiological, behavioral, social, institutional, and organizational** scales. To take advantage of already ongoing adaptations for creating more effective public health responses to climate change impacts—especially for poor rural communities whose access to health care is extremely limited even in the current policy environment—developing a baseline understanding of the region-specific demographic, social, and ecological determinants of health will be necessary. Furthermore, adaptation strategies in response to climate variability and change must be designed on specific temporal and spatial scales relevant to Odisha. The TNA reflected the need for integration of risk reduction and adaptation concerns with systematics and knowledge intensive approach. The gaps and needs in and across sectors can be widely addressed through incorporating a wider and inclusive perspective.

Promoting good governance, identifying adequate policy options, building legal and institutional

frameworks and developing strategic instruments play key roles in integrating climate change adaptation into DRM. Community initiatives and financial mechanisms are two measures that can make adaptation and DRM efforts not only cost-effective, but above all sustainable.

A knowledge-intensive, rather than input-intensive approach should be adopted to develop adaptation strategies. Traditional knowledge about the community's coping strategies should be documented and used in training programs to help find solutions to address the uncertainties of climate change, build resilience, adapt agriculture and reduce emissions while ensuring food and livelihood security.

Children's place and role as active citizens contributing to community wellbeing and resilience in the face of potential hazards should also be acknowledged and promoted by the authorities and communities.

Financial Scoping

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

- a) Most of the proposed strategies in the OSAPCC fall under **Capacity Development**. In line with existing expenditure, these should be funded using a combination of Central and State funds. Since these strategies do not have a **Climate-Oriented** motive, yet provide climate resilience, the State will benefit from them even in the absence of climate change.
- b) Proposed R&D strategies, such as the collection of data, climate modelling based on agro-climatic zones, and other climate related research, almost entirely overlap with the National Mission on Strategic Knowledge for Climate Change. Odisha could potentially access funds available under this mission in order to implement these strategies. In contrast, Odisha might be more amenable to spending its

own resources on CD strategies that are more tangible in nature, such as infrastructure, and sustainable products and practices.

- c) Coasts & Disasters and Forestry are the two sectors that have devoted significant portion of their proposed budget to CO strategies. Since the State and local Governments may not benefit much from these activities in the absence of climate change, the capacity and willingness for State funding decreases, with an increasing need for funding from Central Government and international sources.
- d) There are a few sectors, like Agriculture, Water, and Forestry that have proposed strategies that are of a **General Development** nature. Most of these are continuation or expansion of on-going programmes. This forms around 21% of the proposed climate budget for the State. Since the State and local Governments will benefit from these programmes even in the absence of climate change, a substantial share of funding these strategies should come from these sub-national governments.
- e) The objectives of many of the current Environmental Action Programs (EAPs) overlap with the proposed climate strategies. This makes a strong case for Odisha to seek additional funds from international donors and either extend the on-going projects or expand their scope.
- f) **Micro-insurance (MI)** has also evolved in India on large scale, primarily with the aim of supporting poverty alleviation and helping marginalised people, especially farmers.¹

Private and Corporate Sector Involvement

The scope for private sector investment in adaptation should be explored. Based on current initiatives and investments, the following are potential areas:

- a) conceptualizing technologies that facilitate resilience building against climate change;
- b) adoption of sustainable practices by the private sector, especially by agri-business, food and beverage companies;
- c) private equity funds and contributions from large corporations through their Corporate Social Responsibility (CSR) programmes to

finance certain adaptation strategies. Another area where the private sector has been operational for quite some time now is agriculture insurance. However, the role of private sector within crop/weather insurance remains restricted as the issue of commercial viability continues to exist.

Existing institutions will continue to play a crucial role in the implementation of the State's climate agenda. The analysis of proposed strategies in different sectors in the OCCAP highlights the considerable overlap between existing/on-going programmes and the proposed strategies. Since climate change action (especially adaptation) is not just additional to development but often is development, there is a strong case for maintaining the existing institutional set up for flow of funds and implementation of climate actions. The Panchayati Raj Department has a designated **State Institute for Rural Development (SIRD)**, which provides capacity building and training for elected Panchayat representatives. The importance of such institutions cannot be undermined as they are directly involved in the developmental activities of the rural areas that are most vulnerable to climate change. Such institutions should be equipped with the relevant knowledge and expertise, and their scope should be expanded in order to enable them implement climate relevant schemes.

Way Ahead

- a) OSDMA to play a pivotal role in promoting the close alignment of strategies related to disaster risk reduction, climate change adaptation, and sustainable development. OSDMA should consider the institutional structures and mechanisms that would support such an alignment.
- b) Request the stakeholders to collect good practices and develop regional principles for integrating disaster risk reduction and climate change adaptation into sustainable development.
- c) Promote the building of an evidence base, including with respect to losses and damage related to disasters and climate change, and encourage the sharing of information across the region, particularly for disasters that may be trans-boundary in nature.

¹ Adaptation to Climate Change with a Focus on Rural Areas and India Authors: Dr S. Satapathy, Indian Ministry of Environment and Forests, Director of the Climate Change Division. This publication has been jointly prepared by GIZ and MoEF available at <http://nidm.gov.in/PDF/pubs/Adaptation%20to%20Climate%20Change.pdf>

Annexure: 1

TNA Summary Note (with Key Findings and Highlights)

General Profile of Odisha

The state of Odisha lies on the eastern coast of India between 17°49' and 22°36' North latitudes and between 81°36' and 87°18' East longitudes. The state is divided into 30 districts, 58 sub-divisions, 314 blocks (administrative units in descending order of geographical area and population) and 103 urban local bodies for administrative divisions. The total population of Odisha as per 2011 census is 41,974,218. Having a coastline of approx. 480 kms, the state is heavily affected by tropical cyclones, sea water insurgency, heavy rainfall, and even severe drought conditions.

The climatic conditions are dominated by hot summers and mild winters. Odisha has a four season cycle. Rainfall is received from Bay of Bengal branch of monsoon from May till September, and brings heavy to very heavy rainfall season during these 4-5 months.

Disaster Scenario

The geographical location and climatic conditions of Odisha make it extremely vulnerable to multiple hazards like storms, tsunamis, inland floods, droughts, flash floods, and even landslides. Out of a total geographical area of 15, 571 lakh hectares, 1.40 lakh hectares are very flood prone. The densely populated coastline of Odisha makes the population living there vulnerable to frequent storm events. The disasters not only result in loss of lives and assets, but also create a long period of recovery and rehabilitation which further adds to the already woeful situation of the people in Odisha. The state has been frequently tormented by major climatic disaster events like major cyclones in 1999, cyclone *Phailin* in 2013, and cyclone *Hudhud* as recently as 2014. Floods are frequent visitors and their fury is experienced almost every year.

Current Disaster Response from Different Agencies in Odisha

Odisha State Disaster Management Authority (OSDMA) is the lead agency working towards Disaster Risk Reduction and Emergency Response. To date, OSDMA has constructed 135 Multipurpose Cyclone Shelters in 6 coastal districts of the state stretching from Ganjam to Balasore, and another 163 are under construction with help of funds from World Bank. On similar grounds, Multipurpose Flood Shelters are also being constructed in flood prone districts. Odisha has its own Disaster Rapid Action Force, which responds to any emergency situation, having 10 units placed at different places in the state. A GoI-UNDP programme on DRR and capacity building is being implemented by OSDMA on wide scale. The National Cyclone Risk Mitigation Project (NCRMP) is being implemented in Odisha with assistance from Government of India and the World Bank. School safety initiatives are also being supported by OSDMA to provide safer learning environments and building capacity in students.

Institutional Mechanism- OSDMA and relevant departments (DRR and CCA)

Revenue and Disaster Management Department of Odisha has the responsibility of providing immediate relief to the people affected by various calamities such as floods, droughts, cyclones, hailstorms, earthquakes, fire accidents, etc. It also takes initiatives for relief, rescue, rehabilitation and restoration work. OSDMA came into existence after the super cyclone of 1999. The Authority has the mandate to not only take up mitigation activities but to also provide the relief, restoration, reconstruction and other measures. There are high level committees formed for efficient management and response to any disaster situation viz. The State Disaster Management Authority (SDMA) and State Executive Committee (SEC). The next tier

consists of District Disaster Management Authority (DDMA) and further subsequent personnel in different departments.

Training Needs Assessment (Background, Approach, Methodology)

The GOI-UNDP project on "Enhancing Institutional and Community Resilience to Disasters and Climate Change (2013-2017)" aims to strengthen the capacities of government, communities, and institutions for disaster risk reduction against climate change enhanced risks, and for developing preparedness. By evaluating existing capacities and further requirements in training and non-training needs, OSDMA took the initiative of conducting a TNA exercise under this programme to strengthen the current DRR and CCA response mechanism. OSDMA, with technical support from AIDMI, conducted the TNA by covering major climate sensitive sectors and departments to come up with existing gaps and needs for capacity development of various stakeholders. The TNA exercise helped to identify the requirements related to trainings that create closer links between DRR and CCA.

The Odisha State Disaster Management Plan (SDMP) provided a strong base for identification of broad groups and sectors that require trainings towards strengthening Disaster Resilience. A total of sixteen sectors have been identified in SDMP for further strengthening via training needs analysis. Similarly, the Odisha Climate Change Action Plan (OCCAP) identifies ten important climate sensitive sectors that need interventions for further strengthening climate change adaptation in the coming future. These sectors are Agriculture, Coasts and Disasters, Energy, Fisheries and Animal Resources, Forestry, Health, Industry, Mining, Urban Planning, and Water Resources. Analysis and assessment of existing departmental capacities is one important step during TNA to identify gaps and needs for strengthening the response mechanism.

The TNA process collected information about an expression or implied organisational (involved stakeholders) needs that could be met by conducting training. This TNA process will help stakeholders (including training providers and receivers) to address the knowledge requirement that exist in the form of gaps and requirement of current time – climate smart and integration.

The main components for conducting this TNA exercise were: literature review of studies and research works regarding climate change and disaster risks, consultations with various stakeholders through search conference and integration workshops, questionnaires that assessed knowledge and skills of participants in consultations, and the analysis of two main documents on DRR and CCA in the state of Odisha (SDMP and OCCAP). The interviews took place at different times (with support from OSDMA team) to cover up stakeholders from district to state level and from government officials, UNDP, and humanitarian agencies. The Hyogo Framework for Action (HFA), the seminal framework that has guided and informed global disaster risk policy and practices is set to be completed in 2015. For the post-2015 framework (HFA2), four priorities of action on which to focus in order to improve DRR have been identified for the South Asia region. It is noteworthy that OSDMA is committed towards orienting its training programme with the key priorities of HFA2. The TNA exercise follows the same and excels in addressing the key priorities in a comprehensive manner.

HFA2 and current TNA exercise

In December 2012, the UN General Assembly decided to convene the Third World Conference on Disaster Risk Reduction in Japan in 2015 to see how the HFA1 fared and to develop a post-2015 framework for DRR or the HFA2. After a series of consultations and workshops across all levels, the pre-zero draft of the HFA2 was circulated few weeks ago. Thus, the purpose of the HFA2 is stated to '*manage disaster and climate risk in development at local, national, regional and global levels for resilience of people, communities and countries*'. During the TNA exercise, reviews of existing training structures identify the alignment of these trainings with the HFA2 priorities of action and the recommendations based on gaps found.

Developments in relation with Climate Change and Disaster Risk Reduction Integration

Odisha is highly susceptible to the impacts of climate change and natural disasters. There have been many developments in the state towards addressing these risks and towards incorporating relief efforts in regular planning and development processes. The TNA focused on sectors that are equally affected by the impacts of climate change and disaster risk. These sectors are: Agriculture, Health, Education, Water resource and Sanitation, Housing and Urban Development, Forestry, Energy, Industries, and Fisheries and Animal Husbandry.

The OCCAP and SDMP have laid down key priorities and efforts towards these sectors to address the changing conditions due to climate change. Key priorities for each sector are provided here in brief.

Agriculture

- Rapid screening and strategy assessment of State Agriculture Policy
- Establishing an effective institutional delivery mechanism to promote best practices on climate change
- Undertaking capacity building
- Continuing the livelihood-focused, people-centric integrated watershed development in rain-fed areas
- Increasing the area under perennial fruit plantation
- Developing water use-efficient micro irrigation methods and individual / community farm ponds
- Improving monitoring and surveillance techniques

Health

- Capacity building of the health sector on climate change
- Integrating climate change considerations in the State Health policy
- Strengthening approaches to manage vector-borne disease that have worsened due to climate change impacts
- Strengthening approaches to deal with heat wave conditions exacerbated due to climate change
- Strengthening approaches to deal with the physical and psychological impacts due to extreme weather conditions caused by climate change
- Addressing drought, nutrition, and food security due to the increased risk of drought, consequent decline in agriculture, and increased malnutrition & food security

Education

- Improved education policy, analysis, research, and planning;
- Teacher education and training of education planners;
- Training on curriculum review/reform;
- School Safety Programme.

Urban Development

- Building capacity on climate change
- Incorporate climate considerations in water supply and sewerage design
- Working towards greater water efficiency
- Preparing a climate-friendly MSW management plan
- Orienting towards energy efficient street lighting through CDM
- Developing climate-responsible master plans

Water Resource

- Expansion of hydrometry network
- Development of flood forecasting models
- Downscaling of global circulation model
- Increasing the water use efficiency in irrigation

- Constructing and protecting water harvesting structures
- Improving drainage systems

Sanitation

- Sanitation services in India are poor all across the country. In states like Odisha with large tribal populations however, these services are even worse.
- Increase access to clean toilets for use by the maximum number of residents.
- Awareness regarding use of toilets and curb down the practice of open- defecation.
- Promote hygiene awareness amongst people; use of soap for cleaning hands.
- Subsidies to build toilets in remote areas, where people don't have many assets to built them on their own.

Coasts and Disaster Management

- Flood mapping, flood forecasting, and downscaled climate change projections modelling.
- Assessment of erosion-prone areas with the help of Digital Elevation model.
- Studying coastal erosion.
- Conducting micro-level vulnerability assessment.
- Constructing flood shelters in unconventionally vulnerable locations.
- Conduct needs-based assessment and constructing multipurpose cyclone shelters.
- Developing a hydrological framework.
- Dredging and river mouth widening to improve flood management.
- Strengthen coastal protection methods.

Energy

- Generation cleaner energy through clean coal approaches
- Institutional development of the Energy Department
- Reduce transmission and distribution (T & D) losses
- Promote demand side management (DSM) and energy efficiency
- Encourage effective fly ash utilization and emission reduction
- Promote of small and medium hydel plants.

Fisheries and Animal Resources

- Vaccination against contagious diseases,
- Deworming and early disease warning system, emphasis on green fodder, pasture development, and grazing,
- Training on fodder production, fodder conservation, rotational grazing, rain water harvest technology, methane gas harvesting technology, biogas tanks management
- Conservation of local hardy animals.
- Gobar Gas tanks/packing to cylinders.

Forestry

- Increasing reforestation / afforestation activities in degraded forest areas
- Protecting existing forest stocks to act as carbon sink with stronger conservation
- Increasing planting on non-forest land and explore where new and increased tree planting could create barriers to storm and cyclone impacts in coastal zones
- Covering bald-hills with suitable species mix
- Increasing and protecting existing mangrove cover along the coast
- Assessing fire management strategies.

Industries

- Integrating climate concerns in policies and plans
- Assessing GHG profiles of major industrial clusters

- Conducting heat-island study for Talcher and Jharsuguda area
- Training various stakeholders on climate change issues
- Implementing a system of compensatory water harvesting
- Streamlining institutional arrangement and strengthen OSDMA to tackle extreme climate events in coastal area.

Transport

- Revising state transport policies
- Integrating urban and transport planning
- Enhancing the use of rail
- Moving towards low carbon fuel
- Piloting low carbon, green highways
- Encouraging fuel use efficiency and tightening enforcement
- Promoting non-motorized transport.

Mining

- Incorporating climate concerns in State Mineral Policy
- Analyzing appropriate policies to promote energy-efficiency
- Realizing the potential of low-grade mineral beneficiation
- Strengthening environmental monitoring
- Protecting water bodies

While many human lives have been saved, livelihood and climate-induced vulnerabilities must be addressed. The studies provide many gaps in preparedness and in the response mechanisms of various competent authorities working to build climate resilience.

Integration – DRR and CCA

CCA and DRR have similar aims and mutual benefits. However, to date the climate change and disaster risk management communities have operated largely in isolation from each other for a number of reasons. This situation must change as a matter of urgency. Adaptation and DRR policy makers, experts, and practitioners must communicate and collaborate with each other effectively to ensure a comprehensive risk management approach to development at local, national, and international levels of government. This could result in the following benefits:

1. Reduction of climate-related losses through more widespread implementation of DRR measures linked with adaptation.
2. More efficient use of financial, human, and natural resources.
3. Increased effectiveness and sustainability of both adaptation and DRR approaches.

While their scope and specific interests may differ, CCA and DRR have very similar aims as to build resilience in the face of hazards. They both focus on reducing people's vulnerability to hazards by improving methods to anticipate, resist, cope with, and recover from their impact. In so doing, CCA clearly focuses on *climate-related hazards*, such as floods, droughts, and storms. The disaster risk management community has a long history of dealing with such events, and therefore possesses a wealth of experience relevant to adaptation.

Key Gaps and Needs Related to TNA

The SDMP and OCCAP were reviewed in great detail so as to identify various training gaps. Taking steps now to adjust to current climate variability and modifying existing programs to address the anticipated impacts of climate change will make future adaptation strategies more effective. The same changes may also aid in reaching additional environmental and social objectives, such as more equitable education, empowerment of women, and improved sanitation. These community-based initiatives should be

complemented by government interventions. The awareness level of major stakeholders in the context of the state of Odisha about climate change and DRR is limited and needs to be broadened right from the government officials to the grass root level involving local communities. This becomes an important part of the TNA process as many of the proposed trainings are focused towards increasing awareness and sensitization of various stakeholders regarding the issues and challenges of CCA and DRR.

Most of the stakeholders who participated in the search conferences and integration workshops have agreed that their **existing knowledge and skills will not be sufficient to meet the challenges related to climate change and extreme weather events**. The current level of knowledge on climate change and adaptation and link with DRR efforts in different stakeholders is low, creating an urgent need of awareness generation programmes through trainings on community based adaptation and closure links with DRR and development efforts that target all categories of communities, **especially vulnerable locations and climate sensitive service provider sectors**.

Possible Approach/ Strategies for Conducting the TNA

Several approaches have been discussed in the aftermath of the TNA process that will eventually help OSDMA and relevant stakeholders to strengthen their current knowledge, skills, and basic understanding towards issues related to climate change and disaster risks.

1. Training of Trainers Approach
2. Strengthening knowledge, skill and attitude
3. Creating pool of trainers at different levels
4. Capacity building of major stakeholders
5. Awareness and Sensitization approach
6. CSDRM/Integration approach

A SWOT analysis was conducted for the various climate-sensitive sectors from SDMP and OCCAP. The eight national missions enlisted with the NAPCC were taken as a parameter for SWOT analysis. Out of the eight national missions, the one for sustaining the Himalayan Ecosystem is not applicable in Odisha, but the rest can be used as parameters for strengthening the current capacities of different sectors and departments. OSDMA and many concerned departments are functioning pretty well in terms of identification of risk factors and self assessment of departments. The Departmental DMPs are well organised and comprehensively cover important aspects of capacity building for their particular sector.

This SWOT analysis led to the identification of various training needs from various sectors. All the concerned stakeholders need to be sensitized and trained towards general and specific aspects of climate change, disaster risks, and the process of integrating them with development planning. The emphasis of trainings will be on identified gaps in knowledge skills and in the aptitude, and needs of key sectors for DRR and CCA. The training modules would be developed for different stakeholders depending on their roles.

The main areas where trainings are needed have been enlisted here:

- a) Awareness about the provisions of the Disaster Management Act, 2005
- b) National and State Policy on Disaster Management
- c) National and State Action Plan on Climate Change (NAPCC and SAPCC)
- d) National Training Policy, 2012
- e) Guidelines issued by the National Disaster Management Authority, State Disaster
- f) Management Authority and the State Executive Committee
- g) Orientation and awareness on Disaster Management and its various aspects
- h) Orientation and sensitization of various stakeholders towards climate change and its various aspects
- i) Sensitization towards mediums of integrating components of climate change and disaster risk reduction in development planning
- j) Training to perform the Emergency Support Function (ESF) assigned to the departments.

There are many overlapping areas in SDMP (State Disaster Management Plan, Odisha) and OCCAP (Odisha Climate Change Action Plan). The common issues provide a platform for linking initiatives, which can be cohesive and catered together. Sectors like Agriculture, Forests, Health, Education, Industries, Urban planning, and Water Resources are impact common people in everyday activities, and are important from the perspective of capacity building and training needs as they cover cross-cutting issues in both DRR and CCA.

The final outcome of this exercise is a list of proposed trainings based on the TNA findings and various gaps identified from consultations and feedbacks from the participants. The list is based on document reviews, consultations with different sector officials and experts, and the OSDMA's state disaster management plan. It additionally incorporates existing TNA recommendations.

Lessons Learnt

Adapting to climate change will be necessary and will occur at **physiological, behavioral, social, institutional, and organizational** scales. To take advantage of already ongoing adaptations for creating more effective public health responses to climate change impacts—especially for poor rural communities whose access to health care is extremely limited even in the current policy environment—developing a baseline understanding of the region-specific demographic, social, and ecological determinants of health will be necessary. Furthermore, adaptation strategies in response to climate variability and change must be designed on specific temporal and spatial scales relevant to Odisha.

There are several existing opportunities that should be utilized:

- a) From Odisha's wealth of experience, the findings from Odisha's SAPCC in the field of DRR and initiation of effective integration can be utilized;
- b) HFA2: From the state to global level, 2014 was a very active year for shaping the HFA2. This was done based off the progress of the HFA so that existing challenges could be addressed. OSDMA's initiative at the state level should be in line with the HFA2 priorities of action;
- c) Capacity building efforts with closer links between DRR and CCA are required as they have not been effectively demonstrated. The OSDMA could demonstrate this model for other states.

A knowledge-intensive, rather than input-intensive, approach should be adopted to develop adaptation strategies. Traditional knowledge about the community's coping strategies should be documented and used in training programs to help find solutions that address the uncertainties of climate change, build resilience, adapt agriculture, and reduce emissions while ensuring food and livelihood security.

Communities must support children as active citizens able to contribute significantly to community well-being and self-protection in the face of potential and actual disasters.

Way Ahead:

- a) Promote the close alignment of strategies related to disaster risk reduction, climate change adaptation and sustainable development, and consider the institutional structures and mechanisms that would support such an alignment.
- (b) Request the stakeholders to collect good practices and develop regional principles for integrating disaster risk reduction and climate change adaptation into sustainable development.
- (c) Promote the building of an evidence base, including losses and damage related to disasters and climate change, and encourage the sharing of information across the region, particularly for disasters that may be trans-boundary in nature.

Annexure: 2

List of Contributions from Search Conference

A. List of participant from Search Conference at Kendrapara

No.	Name of the Participant	Designation	Organisation / Department / Association	Phone/Mobile	Email
1	Pramod Kumar Das	Collector, Kendrapara	Revenue Department	06727-232602	dmkenrapara@gmail.com
2	Bikas Kumar Mahapatra	Project Director	District Rural Development Agency, Kendrapara	06727-220064	
3	Sridhara Swain	President	Zila Parishad, Kendrapara		
4	Rajanikanta Mohanty	Deputy Collector, Emergency	Revenue Department	06727-232803	deockendrapara@gmail.com
5	Ambika Prasad Nanda	State Head	UNDP	9437020580	
6	Ramesh Chandra Mahanty	Additional Superintendent of Police	Department of Police, Kendrapara	9439465693	ambika.prasad@undp.org
7	Vishal Pathak	Senior Coordinator	AIDMI	9909925894	bestteam@aidmi.org
8	Anand Prokash Kanoo	Junior Coordinator	AIDMI	9401120454	bestteam@aidmi.org
9	Binod Kumar Senapati	Block Development Officer	Aul Development Block	9437251144	
10	Prahlad Chandra Sethy		CSO, Kendrapara	9438878548	
11	Jugal Kishore Tripathy	Executive Engineer	Aul Embankment Division, WRD	9437291732	jugaltripathy@gmail.com
12	Gadadhar Patra	Assistant Conservator of Forests	Department of Forests and Environment, Rajnagar Forest Division	9437107252	patra.act2007@gmail.com
13	Gouranga Chandra Behera	Head Clark	Garapur Tehsil	9777232201	gouranga.behera1962@gmail.com
14	Babulal Kar	DPC Memeber		9861215266	babulal68kar@gmail.com
15	Govind Nayak	Assistant Secretary	Gramutthan (NGO)	9437168040	gcnayakgu@gmail.com
16	Udaya Nath Behera	Executive Director	Varrat (NGO)	9437450283	varratudaya@gmail.com
17	Binodo Bihari	Executive Engineer	Irrigation	9437078990	
18	Pramod Kumar Pradhan	N/M	RCDC (NGO), Raj Nagar	9938377806	climatechange@gmail.com
19	N/M	N/M	RCDC (NGO), Raj Nagar	9937330553	
20	S. Sasmal	Project Manager	RCDC (NGO), Raj Nagar	9776618787	
21	Bishnu Prasad A	Block Development Officer	P & R Department	9437208535	bishnu008@gmail.com
22	Kailash Chandra Behera	Block Development Officer	P & R Department	9438035919	

No.	Name of the Participant	Designation	Organisation / Department / Association	Phone/Mobile	Email
23	Dr. Binayak Prasad Prusty	CDMO, Kendrapara	Health Department	9439988886	
24	Khiroda Kr. Behera	TDR-cum-BDO, Rajnagar	P & R Department	9437230795	khiroda.behera@gmail.com
25	Manoranjan Mohanty	BDO, Garapur	P & R Department	9437112700	
26	Subhrendu Ku. Mohanty	District Agricultural Officer	Agriculture	9776273405	daoken.dag@nic.in
27	Laxman Kumar Behera	SDI and PRO	SDI and PRO	9938994624	
28	Sarat Mallick	Assistant Fire Officer	Fire Services	9437464584	mallicksaratchandra@gmail.com
29	Dr. Bhubanendra Raut	CDVO, Kendrapara	ARD Department	9437508307	
30	Smarak Mohanty	Committee Member	Jay Bharati Sathi Samaj	9658522739	
31	Narayan Behera	IEC & HRI	RWSSS	9937964939	
32	B. Prasad Pati		Nature's Club (NGO)	8895645821	naturesorissa@gmail.com
33	Suresh Chandra Parikh	Project Coordinator	Gramutthan (NGO)	9437297832	sureshgram-utthan@rediffmail.com
34			Gramutthan (NGO)	9777813655	
35	Saroj Kumar Das	Tehsildar	Revenue and DM	9437034184	
36	Nilamadhab B.	Tehsildar	Revenue and DM	9437459144	
37	Basudev Behera	Chairman, PS	P & R Department	9777092603	
38	Sarojini Setty	Chairman, PS	P & R Department	8658791723	
39	Chitrasen Setty	Chairman, PS	P & R Department	9871058317	
40	Ramesh Kumar	Block Development Officer	P & R Department	9439109887	
41	Ramesh Chandra Behera	Block Development Officer, Raskanika	P & R Department	9437666470	
42	Kapilendra Mallick	Chairman, PS, Rajkanika Block	P & R Department	9937751567	
43	Pradipta Kishor Biswal	Chairman, PS, Pattamundai Block	P & R Department	9937358263	
44	Niranjan Sahoo	Secretary	Jay Bharati Sathi Samaj	9938968028	
45	Siba Malik	Additional Tehsildar	Revenue and DM	7504181061	

B. List of participant from Search Conference at Puri

No.	Name of the Participant	Designation	Organisation / Department / Association	Phone/Mobile	Email
1	Sunita Dhanwan	Tehsildar	Revenue and Disaster Management Department	9437156282	
2	Bichitra Kumar Panda	Assitant Fire Officer, Puri	Fire Services	9178346891	
3	Dehadutta Sarangi	Additional BDO	P & R Department	9437204860	
4	Prasanta Kumar Jena	Asst. Collector	Collectariate, Puri	9937371044	pkjena33@gmail.com
5	Dr. Ajay Kumar Baitharu	ADMO, PH	Public Health	9439994709	drbaitharu@gmail.com
6	Sarat C. Behera	Forest Ranger	Forest and Environment	9437280981	
7	Madhusudan Dash	Sub. Collector	Collectariate, Puri	9437332498	
8	Prasanna Kr. Das	Emergency Officer	R & D Department	9437082440	emergency_puri@yahoo.in
9	Badal Kr. Mohanty	Deputy Collector	R & D Department	9437511221	
10	Ashok Kumar Rath	Pro. Assistant	PR Department	7205190650	
11	Nirakar Nayak	Tehsildar	R & D Department	9437194823	
12	Subhananda Mahapatra	Tehsildar	R & D Department	9861056660	
13	Ansuya parida	Organiser	ASA (NGO)	9237051762	asaorissa@gmail.com
14	Chitranjan Tripathy	Convenor	ASA (NGO)	9937790764	
15	Atul R S	Additional Tehsildar	R & D Department	9437275126	
16	Umesh Ch. Mohanty	ABDO	P & R Department	7873413255	
17	Harish Chandra Dash	Secretary	SOLAR (NGO)	9437189167	solkonara@rediffmail.com
18	Premananda S.	Coordinator	Gram Unnayan Samiti (NGO)	8058752371	
19	Binapani Mishra	Secretary	SWAD (NGO)	9437280605	swadsapyabi@gmail.com
20	Subhashree Dash	Assistant Fisheries Officer	Fisheries & RD	9437161600	
21	Prachi Mahapatra	Tehsildar	R & D Department	8658403403	
22	Harapriya Dash	Tehsildar	Revenue and Disaster Management Department	9861049363	
23	Niranjan Behera	Sarapanch	Panchayatiraj	9937527935	
24	Mamata Jena	Panchayat Samiti Member	Panchayatiraj	7377690442	
25	Birati Pradhan	Sarapanch	Panchayatiraj	9583925022	
26	Kalyani Guru	Panchayat Samiti Member	Panchayatiraj	9938619767	

No.	Name of the Participant	Designation	Organisation / Department / Association	Phone/Mobile	Email
27	Dipak Kumar Mahapatra	Community Mobiliser	OSDMA	7381952427	
28	Sarojini Dash	Panchayat Samiti Member	Panchayatiraj	9938552633	
29	Prabir Kumar Nayak	General Secretary	Dalit Seva Sangathan (NGO)	9937635967	
30	Surendra Kumar Polai	Community Mobiliser	OSDMA	9937180907	
31	Durjadhana Khatoai	Sarapanch	Panchayatiraj	9937846361	
32	Gautam Kumar Prusty	Coordinator	Gram Unnayan Samiti (NGO)	9861860394	
33	Santosh Kumar Pati	community Mobiliser	OSDMA	94371503999	
34	Prakash Kumar Behera	community Mobiliser	OSDMA	9937821984	
35	Kailash chandra baral	special land aquisition officer	ASTARANG PORT	9437281173	
36	Santosh Kumar Behera	General Secretary	CSMMC (NGO)	8658430794	
37	Sasmita Pradhan	Panchayat Samiti Member	Panchayatiraj		
38	Balakrushana Penthoi	Sarapanch	Panchayatiraj	8338872469	

C. List of Participants from Search Conference at Ganjam

No.	Name of the Participant	Designation	Organisation / Department / Association	Phone/Mobile	Email
1	Sarat Kumar Misra	Range Officer	Department of Forest	9438531575	
2	Saroj Mohan Palo	Dist. SC/ST Education Coordinator	SSA	9437529074	
3	Asok Kumar Panda	Senior Assistant	Notified Area Council (Town Committee)	9438342414	nacchikiti@gmail.com
4	Kishor Kumar Sahoo	Executive Officer	NAC (Gopalpur)	9438510530	
5	Alekh Kumar Sethy	Deputy Director	Planning	9437034399	dpmcl.gjm@nic.in
6	Chabi Madhab Bhuyan	Junior Engineer	Housing and Urban Development	9658038040	
7	Basanta Kumar Pal	Executive Officer	Housing and Urban Development	9040685780	
8	M. R. Dash	Industrial Promotion Officer	DIC, Ganjam	NM	

No.	Name of the Participant	Designation	Organisation / Department / Association	Phone/Mobile	Email
9	Md. I. Z Khan	Assistant Conservator of Forests	Forest Department	9437682321	dfobhmpr@yahoo.com
10	Susanta Kumara Sadangi	Junior Engineer	Housing and Urban Development	9438030115	
11	Padma Charan Nayak	Senior Clerk	Food and Civil Supplies	9861262457	
12	Bijaya Laxmi Nayak	CDPO	ICDs WCD	9438603385	cdpochatrapur1@gmail.com
13	Smt. Swapana Rani Padhi	Executive Officer	Housing and Urban Development	9777938133	
14	Saheba Panigrahi	ABDO	P & R Department	9861466563	
15	G. Simandri Reddy	Deputy Subedar	8th Battalion, ODRAF Chatrapur	9439259747	
16	Pradip Kumar Panda	ABDO	P & R Department	9437261871	
17	Bishi Pradhan	Assistant Fire Officer	Odisha Fire Services	9437746933	
18	Bhawani Sankar Pradhan	ABDO	P & R Department	8855855583	
19	Basanta Kumar	Head Clerk	Emergency	9438843871	
20	Dr. Ananta Prasad Pande	SDVO	Animal Husbandry and Veterinary Department	9437284193	
21	Ranjan Kumar Naik	Addl PD (Tech)	P & R Department	9437115587	ranjanapdtech@gmail.com
22	Jayadu Pradhan	Executive Engineer	H & UD Department	9437186393	
23	Sarat Chandra Behera	Dy. Director	Horticulture	9437132770	ddhganjam@gmail.com
24	Dr. Saroj Kumar Mishra	ADMO (Medical)	Health and Family Welfare	9439985004	sarajmisra3@rediffmail.com
25	Radhamohan Behera	Executive Officer	H & UD Department	9437858193	radhamohan@gmail.com
26	Sarat Chandra Mista	Asst. Fisheries Officer	Fisheries (Mariene)	9437762546	
27	Sabyasachi Hota	DC (Eng)	R & DM Dept	9437563800	sabyasachihota@gmail.com
28	Dr. Lalatendu Sahoo	Tehsildar	R & DM Dept	8763588944	lala-sahoo@yahoo.com
29	Sarat Chandra Saraf	Executive Officer	H & UD Department	9938089399	sarat.sc.saraf@gmail.com
30	Pramod Kumar Panda	Asst, Engineer	Water Resources	9861070694	
31	Kureshu Prasad Bisheyi	AEE	Minor Irrigation	9437234765	

No.	Name of the Participant	Designation	Organisation / Department / Association	Phone/Mobile	Email
32	Prasanta Kumar Mahapatra	Executive Engineer	PHED	9437180088	eephbam@gmail.com
33	Dipti Ranjan Mohanty	Dist. Labour Officer	Labour & ESI	9437109149	dlochatrapur@gmail.com
34	M. Nageshwara Subudhi	Executive Officer	H & UD Department	9437140053	
35	Subrat Dash	DFO	Fisheries	9437114090	dfogmbam@rediffmail.com
36	Subrata Choudhury	Asst Engineer	Water Resources	9437592049	subratachoudhury19@gmail.com
37	Prabodh Kumar Dubey	Executive Officer	H & UD Department	9437110121	
38	Nalin Kumar Patnaik	Asst. Engineer	Water Resources	9437166266	eebam_wr@yahoo.com
39	Suvendu Kumar Sahu	Tehsildar	R & DM Dept	9938540575	teh_chatrapur@yahoo.in
40	Niranjan Sahu	ABEO	Education	9861240014	
41	Simanchal Sadangi	Asst. Executive Engineer	H & UD Department	9437322370	mrsadangi@rediffmail.com
42	G. Raj Gopal	AEE	PWD	9437165801	
43	Bhaskar Chandra Tripathy	AEE	Water Resources	7381735958	
44	Pradipta Kumar Sethy	Weaving Supervisor	Textiles and Handloom	9437753679	pksethy@gmail.com
45	Udayanath Dalabehera	Executive Officer	H & UD Department	9439539381	nackodala@gmail.com
46	Ganesh Kumar Patnaik	Accountant	H & UD Department	8895140868	knnnac@rediffmail.com
47	Prabhasini Nayak	CO	H & UD Department	9439326014	prabhasini.2009@gmail.com
48	Jaya Krushna Barik	DSWD	W & CD	9437232805	dswdganjam@nic.in
49	Dharmananda Sethy	DPO	P.R Deptt	9437333391	dpo.od-gan@nic.in
50	Arjun B.	FMS	Agriculture	9437438153	arjunbiragi61@gmail.com
51	Umesh Chandra Khato	Asst. Collector	Collectariate	9437281524	
52	Subrat Kumar Mahapatra	Junior Engineer	H & UD Department	9437282486	subrat_jitu@rediffmail.com
53	Adda Prafulla	ABEO	Education	9438721470	beochatrapur@gmail.com
54	Binita Senapoti	ADEO	Education	9778043719	bseapoti03@gmail.com
55	N/M	Junior Engineer	H & UD Department	N/M	
56	Kumar Behera	Forest Ranger	Forest Department	9438423645	
57	N/M	N/M	Agriculture	N/M	

Annexure: 3

Summary Report on District Level Search Conferences for Training Needs Assessment

Background

Due to the weather extremes experienced throughout the world, climate change no longer necessitates justification. Numerous impacts have become visible and are increasing with time. Due to this, climate change is a priority both on a global scale and in local contexts.

In reaffirming its commitment for CCA and mitigation, the Government of India has initiated a number of programs envisioned under the umbrella of the National Action Plan on Climate Change. Different UN agencies are also supporting the Government of India and different state governments in this cause. In one such initiative, a detailed TNA was planned for the State of Odisha on Climate Change Adaptation and Disaster Risk Reduction under the Government of India and the United Nations' Development Program's "Enhancing Institutional and Community Resilience to Disasters and Climate Change." This program envisages to build the capacity of stakeholders so that they can adapt to adverse climatic changes. This program also aims to provide technical support that will strengthen the capacities of government, communities, and institutions to fast-track implementation of the planning frameworks on Disaster Risk Reduction and Climate Change Adaptation. It is being implemented in 10 states namely – Assam, Andhra Pradesh, Himachal Pradesh, Jharkhand, Kerala, Maharashtra, **Odisha**, Sikkim, Tripura, and Uttarakhand. In total, it will cover 25 districts, 10 cities, and 10,000 villages during the project duration in the above mentioned districts.

Key Components of the program include the following:

- Mainstreaming DRR and CCA in Development Planning
- Urban Risk Reduction
- Technical Assistance and Capacity Building
- Support for Knowledge Management
- Enhancing resilience of vulnerable communities to cope with disasters and climate variability by implementing scalable demonstrative pilot initiatives

As the program was spearheaded by Odisha State Disaster Management Authority, it decided to conduct an in-depth TNA which will provide a detailed road map for initiating capacity building efforts with different stakeholders. This exercise was assigned to the All India Disaster Mitigation Institute, Ahmedabad, which has previous experience, the required expertise, as well as the skills for conducting the assessment. Possessing experience in comprehensive and result-based training needs assessment, AIDMI designed and implemented the methodology.

Methodology

As a comprehensive study, the TNA is designed to incorporate the perspectives and opinions of different sectors for DRR and CCA integration. This study was planned to be conducted through the following steps:

- Literature review
- Conduct of Search Conferences in three districts of Odisha namely, Kendrapara, Puri, and Ganjam
- Individual and institutional interviews
- State level integration and validation workshop
- Drafting of the TNA Report.

The district level search conferences were the main exercise involving representatives from different district level line departments. The search conferences were so designed to both sensitize the participants as well as to obtain necessary data for the study.

Conduct of the Search Conferences

1st Search Conference at Kendrapara on 11th November 2014.

Venue: DRDA Conference Hall

Participants: District Collector, Additional District Collectors, Project Director DRDA, Engineers from Irrigation, Water Resources, Officers from Agriculture, Forest and other Line departments, representatives from local NGOs and civil society groups, children, etc. (A detailed list is enclosed as Annexure-2 A).

Details of Proceedings

Session 1: Introduction and Background

The inaugural session was facilitated by Mr. Bikas Kumar Mahapatra, Project Director, DRDA, which included a warm welcome to the participants and facilitators. He thanked the participants for making this conference successful with lively participation and sharing of experiences that can make TNA meaningful and logical. He additionally thanked the District Collector for his valuable perspectives. In his speech, the District Collector, Mr. Pramod Kumar Das, expressed his gratitude towards the UNDP and the OSDMA for selecting Kendrapara for this valuable exercise. He has given a brief background about the initiatives taken by OSDMA for promoting and spearheading disaster management activities in the state.

Mr. Ambika Prasad Nanda-UNDP Odisha's State Project Coordinator- explained the background of the Gol-UNDP project and called upon for active participation. After his speech, a brief introduction session was held where the participants introduced themselves with their professional and academic background.

Overview of Global Climate Change, Projections and Trends:

The first technical session was facilitated by AIDMI. The agenda was concerned with DRR and CCA: a brief orientation on climate change, its recent trends, global scenario, increasing vulnerabilities, causal factors, and some predictions concluded through different research studies. The presentation focused on different examples of specific changes brought by climate change and associated disasters. This helped in setting up a background with sufficient importance for the theme to be considered. Facilitators from AIDMI kept the participants involved through frequent interactive questions related to the presentation. The presentation made alarming predictions such as desertification and its future impact on the world, ice melting and its impact on the Himalayan Glaciers, and particular organisms and species threatened by climate change were shared with participants. The presentation addressed the challenges posed by our development efforts as well as the consequences of unlimited and unsustainable practices that have increased the risk of climate related risks. The presentation shared local and global incidents of climate-related risks, drawing clever links between increasing disasters and climate change.

Session III: Odisha State Action Plan on Climate Change (OSAPCC):

A brief presentation on the Odisha State Action Plan on Climate Change followed. The thrust of the presentation explained the key sectoral projections and different steps suggested. All key sectors including Agriculture, Disaster Management, Energy, Industry, Mining, Urban Planning, Health, Forest, Animal Husbandry, etc., were explained in terms of key projections and suggested adaptation and mitigation strategies as prescribed by the OSAPCC. Participants asked relevant questions which were accordingly clarified. This presentation was also unique in the sense that participants got an overview of specific actions needed for Climate Change Adaptation in their respective sectors.

Session IV- Individual Perspectives on CCA and DRR – importance and scope for integration:

The session that followed provided the perspectives of individuals. The participants were given both objective and subjective questions. These questions aimed to understand whether the participants had engaged in DRR and/or CCA related capacity building activity. The participants were additionally asked about their present activities related to CCA and DRR, as well as other initiatives by different organizations/departments which they think were related to CCA and DRR. Their opinion was sought on barriers and possible solutions, areas for capacity building apart from their responsibilities in this time of climate change, as well as measures needed for effective integration of DRR and CCA activities in their sector/work. A detailed analysis of the findings as reflected by the participants has elaborated the main TNA report.

Session V: Team Work on strengthening DRR, CCA integration into developmental operations:

Grouped according to their thematic areas of operation, the participants subsequently engaged in team work. The groups were as follows:

Group I: Agriculture and irrigation,

Group II: Development Administration (Block Development and Revenue),

Group III: NGOs and Children,

Group IV: Combined Group (Health, Public Health, Food and Civil Supplies).

The groups collaborated their findings. They were the following: observed local impacts of climate change; predictions related to further impacts/changes in climate; requirements of dealing with challenges which includes training and capacity building; and barriers for taking CCA into action. Leaders from each group presented the findings which were again analyzed and further discussed. A detailed analysis of the team work findings in addition to further discussion of the conference is included in the final TNA report.

2nd Search Conference at Puri on 12th November, 2014.

Venue: Additional District Collector's Chamber

Participants: Mainly representatives from Line departments such as Irrigation, Health, Forest etc, BDOs, Additional BDOs, PRI representatives, NGO and Civil Society representatives. (A detailed list is enclosed as Annexure-2 B).

Summary of Proceedings: A similar conference was organized at Puri. It was inaugurated by Sub-Collector Puri Mr. Prasanta Kumar Jena who gave a brief but enthusiastic welcome address followed by the background sharing by Mr. Ambika Prasad Nanda, State Head for UNDP in Odisha. He shared the key components of Gol UNDP program on Institutional and Community Resilience to disasters and climate change. The sessions were the same as in the earlier conference which was enriched by active and energetic experience sharing, inputs, and suggestions by the participants. There were moments of active involvement and lively discussion that produced valuable information and experience. These are elaborated in the main TNA report. While the sharing of individual perspectives was similar to Kendrapara's, there was greater variance in the group work. There were four groups as follows: 1. Civil Society, 2. District and Block level line departments, 3. Community Mobilizers of OSDMA and 4. PRIs and Community Representatives. The exercise thereby generated a different level of interest and qualitative yield. A detailed analysis of the explanations given by the groups is included in the main TNA report.

3rd Search Conference at Ganjam on 13th November, 2014

Venue: District Collector's Conference Hall, Ganjam

Participants: This conference mainly had representation from all Line departments including Water Resources, Irrigation, Agriculture, Education, Women and Child development, Rural Development, Forests,

Fisheries, Handloom and Textiles, as well as all major line departments at district and Block Level. (A detailed list is enclosed as Annexure-2 C).

The third in the series of conferences was organized at Ganjam, which was inaugurated by the Additional District Collector of Ganjam. He emphasized the vulnerability of Ganjam to climate change and coastal disasters. He also urged active participation from all. The background on the conference and broader program of Gol and UNDP was given by the State Head of UNDP in Odisha. While the rest of the session and individual perspective seeking exercise was same as the other districts, in place of the group activity as there was a more diverse group; a round table discussion on the same four points was held. This was very productive since many important experiences and information on Ganjam specific impacts and requirements were yielded. The findings from both the individual perspectives and round table are comprehensively documented in the main TNA report.

Key Findings and Lessons Learnt

1. The participatory tools work best when there are homogenous groups. The findings are solid and localized when more participatory discussions are conducted in an organized manner, be it a thematic group exercise or a round table.
2. All three conferences highlighted local impacts to district specific situation on DRR and CCA , highlighting the need for taking similar sorts of sensitization-cum-data collection conferences in all the districts.
3. The local knowledge and experience can be utilized for designing future strategies to address key challenges in integrating DRR and CCA
4. Needs assessments must be an ongoing process that should be updated and contextualized based on progress achieved once the initial steps are taken based on the present study.
5. Efforts must be made to address soft as well as materialistic barriers as expressed by the participants through use of varied and dynamic strategies.

Conclusion

These three exercises were critical in the context of understanding the present knowledge and awareness level as well as in identifying the unaccounted barriers that may prevent any further development of DRR and CCA. The information yield comprehensive and relevant. However, time, resources, objectivity, feasibility, and reliability in different contexts are yet to be worked out. These workshops were both sensitizing and reflective. The yielded information will form the basis of drafting a comprehensive TNA report.

Annexure: 4

Draft Outline of Training Module

Module 1- Linking Climate Change Adaptation and Disaster Risk Reduction

Background: The training on Climate Change Adaptation and Disaster Risk Reduction emphasizes awareness and sensitization by providing introductory direct training for development staff and humanitarian workers who are directly working with people whose lives and rights are threatened by disasters and climate change. It is useful for local and district officials who are involved in different operations, design, and planning development actions.

Objective:

- To provide essential introductory information, principles of effective practice, guidelines for action in a range of sectors and settings, case studies and links to useful tools and resources, for the application of an integrated approach to disaster risk reduction and climate change adaptation.
- To foster complementary practices and coordination between multiple actors working towards a common goal.

Duration: This training should be about 2/3 days duration depending on the situation and availability of time/day

Group Size: 30-40 Participants

Target Group: District Level Officers of Line Departments especially climate sensitive sectors including but not limited to Agriculture, Health, PHED, Urban Local Bodies, Disaster Management, Water Resources Animal Husbandry, Rural Development, PWD (Roads, Bridges and Buildings), Energy, Soil Conservation, Social Welfare. NGOs and CBOs working on issues of DRR-CCA can also be included. It would be ideal if participants are nominated keeping an equal number of the representation from each sector/department/thematic area of operation.

Methodology: As this training intends to improve planning and action related DRR-CCA and Development, a combination of participatory and dynamic training tools would be used. While the approach should ideally be directed towards orienting the participants with facts and taking their mental inclination towards synergy and integration, the focus should be on moving from known to unknown. Evidence using A-V tools should be shared to keep the participants involved. However, theme specific changes in training methodology would be appropriate.

Proposed Session Plan for **Linking Climate Change Adaptation and Disaster Risk Reduction**

Day-1

Session I- Climate Change and Disaster Risk

Objective/s of the Session:

- Introduction of Participants with concept, relevance and evidence of climate change and increasing disasters.
- Develop background for evidence based knowledge and skill development DRR-CCA integrated planning and action

No	Theme	Methodology	Required resources	Reference source/s
1	<p>Disaster and climate change risk: Global, India and Odisha (Duration: 45 Minutes)</p> <p>Remark: It should strike a balance between scientific fact sharing as well as being participatory</p>	<p>The session will start with a simple statistical presentation followed by experience sharing through the use of Icebreakers. Facts on Odisha should be briefly debated for holistic and equal understanding as well as perspective development. Icebreaker may use participants by dividing them in couples and may ask for sharing their observation on the impact felt by them. Each one will share the observation of his partner through a cartoon drawn on a paper slip</p>	LCD Projector, Screen, Laptop, Chart paper, Paper slip for each of the participants	<ol style="list-style-type: none"> 1. Strengthening climate change adaptation through effective disaster risk reduction, Briefing Note 3 (UNISDR), 2. Climate Change: New Dimensions in Disaster Risk, Exposure, Vulnerability, and Resilience (IPCC), 3. NAPCC 4. OSAPCC
2	<p>Projections: India and Odisha (Duration: 30 Minutes)</p>	A brief presentation outlining IPCC projection, NAPCC projections and OSAPCC Projections on Global, National and State specific future projections related to climate change. Sector specific projections on key vulnerable sectors should be highlighted.	LCD Projector, Screen, Laptop	<ol style="list-style-type: none"> 1. Climate Change: New Dimensions in Disaster Risk, Exposure, Vulnerability, and Resilience (IPCC), 2. NAPCC 3. OSAPCC
3	<p>Science of climate change (Duration: 30 Minutes)</p> <p>Remark: Through the use of Satellite Image on any 2/3 evidences locating India would be instrumental for initiating sensitization</p>	<p>A PPT outlining the cause and effect relationship between different factors like Sea level rise, Global temperature rise, Declining Arctic sea ice, Glacial retreat, Extreme events, Ocean acidification, Decreased snow cover etc. should be presented with recent satellite images. Here the focus should be on Extreme Events while other factors to be used as supplements</p>	2/3 Recent Colored Picture of signs of Climate change (Soft/Hard copy), LCD Projector, Screen, Laptop	<ol style="list-style-type: none"> 1. Climate Change: Vital Signs of the Planet (NASA), 2. Climate Change: New Dimensions in Disaster Risk, Exposure, Vulnerability, and Resilience (IPCC)
4	Underlying Risk Factors: Dynamic vulnerabilities and capacities (Duration: 15 Minutes)	A summarized PPT on key elements at Risk, Major vulnerabilities and capacities using broad examples and ways ahead	LCD Projector, Screen, Laptop	<ol style="list-style-type: none"> 1. Determinants of risk: exposure and vulnerability (IPCC Chapter 2), 2. An Overview of Environment and Disaster Risk Reduction in the Arab Region - A Community Perspective (UNISDR),

No	Theme	Methodology	Required resources	Reference source/s
				3. Responding to a changing Climate Exploring how disaster risk reduction, social protection and livelihoods approaches promote features of adaptive capacity (ODI), 4. At Risk: natural hazards, people's vulnerability and disasters Second edition (Preventionweb.net))

Session II- Similarities, Differences and Closer Collaboration

Objective/s of the Session:

- To clarify the terminologies and concepts of DRR and CCA
- To strengthen understanding of Similarities and difference between CCA and DRR
- To orient the participants with OSAPCC

1	Key DRR and CCA Terms and concepts (Duration: 60 Minutes) Remark: The choice of approach should be based participants' level of understanding as reflected from the introductory session.	A PPT will outline each term in one slide and its explanation on the other. Asking the participants on what they know (about the terms of screen) and completing their statements with the explanation can be one approach. Another approach can be matched finding where terms and their explanations are noted in different sheets can be handed over to the participants. Based on the content, participants should be grouped and should be asked to find their partners. Each partner should justify their match and thereby the terms which are to be supplemented by the facilitator	Paper slips (Square size), Chart papers, Color pencils, markers, LCD Projector, Screen, Laptop	1. Terminology (UNISDR) 2. Climate Change: New Dimensions in Disaster Risk, Exposure, Vulnerability, and Resilience (IPCC), 3. Key concepts for climate change adaptation (WWF) 4. Promoting ecosystems for disaster risk reduction and climate change adaptation- Opportunities for Integration (UNEP)
2	Similarities and differences between CCA- DRR and Development (Duration: 60 Minutes)	A group exercise may be conducted where participants in a size of 6-8 are grouped and given tasks to find the similarities and differences between DRR and CCA, DRR and Development, CCA and Development. The findings by participants should be supplemented by the Facilitator	Flip Charts, Color pencils, Markers, LCD Projector, Screen, Laptop	Disaster Risk Reduction or Climate Change Adaptation: Are we Reinventing the Wheel? (GSDRC), Linking Climate Change Adaptation and Disaster Risk Reduction (Tearfund)

No	Theme	Methodology	Required resources	Reference source/s
3	Importance of closer collaboration for Odisha (Duration: 30 Minutes)	A presentation detailing the benefits of effective collaboration between DRR, CCA and Development with examples of sector specific benefits (few sector specific examples). The theme should have sector specific coverage explaining why close collaborations between DRR, CCA	LCD Projector, Screen, Laptop	OSAPCC, OSDMP and Economic Survey Reports of Odisha, Annual Plan for Odisha (as a part of Five year Plans)
4	Odisha State Action Plan on Climate Change (Duration: 30 Minutes) Remark: The exercise will be crucial for building a strong understanding and ability to link the OSAPCC with self/departmental functioning	Firstly, a comprehensive orientation on OSAPCC involving details of OSAPCC, sector wise projections and plans should be given to the participants.	Flip Charts, Color pencils, Markers, , LCD Projector, Screen, Laptop	OSAPCC

Session III- Principles and Approaches for DRR-CCA Integration

Objective/s of the Session:

- Participants will understand the principles of an integrated approach to DRR, CCA and Development

1	Need for an Integrated Approach to DRR, CCA and Development (Duration: 15 Minutes)	A brief PPT outlining why there is a need for a synergy between these three sectors with examples of both integrated and un-integrated situations, the present lacunas and the way an integrated approach will address those lacunas	LCD Projector, Screen, Laptop	1. Changing Climate, Changing Disasters: Pathways Towards Integration (IDS), 2. Policy Brief: Getting climate smart for disasters (CDKN), Promoting climate-resilient rural livelihoods through adaptive social protection (ELDIS), DRR & CCA in the Pacific An Institutional and Policy Analysis (UNISDR)
2	Different Approaches for DRR and CCA Integration	Key approaches, including but not limited to Adaptive social protection (ASP) approaches, Participatory learning approaches,	LCD Projector, Screen, Laptop, Hard copy of the	Policy Brief: Getting climate smart for disasters (CDKN), Promoting climate-resilient rural livelihoods through

No	Theme	Methodology	Required resources	Reference source/s
	(Duration: 15 Minutes)	Climate Smart Disaster Risk Management (CSDRM) approach etc. to be shared in brief for understanding and consensus. The module should have an elaborated version of each of the approaches for future reference	module/hand out of approaches with the participants	adaptive social protection (ELDIS), Disaster Risk Reduction & Climate Change Adaptation in the Pacific An Institutional and Policy Analysis (UNISDR)
3	Principles of an integrated approach to CCA and DRR (Duration: 15 Minutes)	A brief presentation outlining the ten principles for an integrated approach to DRR and CCA. The module should have a detailed elaboration of these principles.	LCD Projector, Screen, Laptop, Hard copy of the module/hand out of principles with the participants	Towards resilience- A Guide to Disaster Risk Reduction and Climate Change Adaptation (crsprogramquality.org)

Remark: These three themes should be addressed briefly, but with sufficient attention to the conceptual clarity to the participants as it will be essential for DRR-CCA informed and integrated planning

Day-2

Session I- Recall on Terminology and key concepts

Objective/s of the Session:

- The participants will have refreshed their memory related to terminologies, concepts and learning from day 1

1	Recall using Ice Breaker (Duration: 35-40 Minutes) Remark: It should be able to generate the interest of the participant in the coming sessions.	The Ice breaker should have a physical movement based design. The Ice breaker should ensure involvement of all and should allow time and space for sufficient clarification both by the participants themselves as well as by the facilitator	A rubber ball	Nil
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Session II- Key Groups for Reduction and Adaptation

Objective/s of the Session:

- The participants will be able to identify key groups of the population for an integrated DRR-CCA approach
- Participants will be able to prioritize and develop strategy for involvement of key groups

1	Group Exercise on identification of key groups (Duration: 2 Hours)	Participants should be grouped in 4-5 numbers and should be given the task to identify key groups based on the following questions:	Flip Charts, Color pencils, Markers, LCD Projector,	Nil
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No	Theme	Methodology	Required resources	Reference source/s
	Remarks: In the beginning participants should be oriented with the typology of groups and examples of relevance to DRR-CCA for background building	<ol style="list-style-type: none"> 1. Name of the group and the reason for selection as a key group/segment 1. What are the benefits of (particular segment/group) in actions to reduce disaster and climate change risk? 2. What are some of the obstacles in ensuring their involvement and ways to overcome? 3. What will create an enabling environment that facilitates their environment? 	Screen, Laptop	
2	<p>Key groups for DRR-CCA integration (Duration: 30 Minutes)</p> <p>Remark: Based on the experiences shared by the participants, this presentation should clarify and build understanding of the participants on key groups, both as actors and receivers of DRR-CCA services</p>	A brief PPT on who will be the key to integrating DRR-CCA with examples from different segments/groups like Children, Women and men, High-risk groups like PWDs. Elderly, Diseased, indigenous communities, etc. The PPT should also have one case example of differential role/impact of climate change and disasters as well as integration of DRR-CCA from each of the segments/groups. The case should be well elaborated in the module.	LCD Projector, Screen, Laptop, Hard copy of the module/hand out of Case studies with the participants	Practitioner Guidelines for the Integration of Disaster Risk Reduction and Climate Change Adaptation into Sector-Based Programs (Save the Children), Integrating disaster risk reduction and climate change adaptation for sustainable development (UNESCAP), Disaster risk reduction, climate change adaptation and environmental migration- A Policy Perspective (IOM)

Session III- Key Sectors for CCA and DRR

Objective/s of the Session:

- Participants will be able to understand-
 - o Key terms, basic concepts and approaches relevant to key sectors.
 - o Key issues in relation to disaster and climate change risk and the key sectors of food security; livelihoods; natural resource management; water, sanitation and hygiene (WASH); education; health; and protection
- Participants will be able to visualize the entry points and strategies for Integrating DRR-CCA into the sector of their relevance

1	Key sectors affected by and affecting climate	A more detailed presentation on how climate change and disasters are affected by and affecting the	LCD Projector, Screen, Laptop,	OSAPCC, NAPCC, OSDMP, Towards resilience- A Guide to Disaster Risk Reduction
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No	Theme	Methodology	Required resources	Reference source/s
	change and disasters (Duration: 60 Minutes) Remark: The presentation should be able to clarify inward and out-ward links between each sector and DRR-CCA. Sharing local case studies will be crucial here, for highlighting local importance to a few key sectors.	following sectors with field examples both local and global: 1. Food security 2. Livelihoods 3. Natural resource management 4. Water, sanitation and hygiene 5. Education 6. Health 7. Industries and mining 8. Agriculture 9. Infrastructure and Communication etc. 10. Administration and Management etc (the sectors can be either fragmented or new sectors may be added based on grouping of participants)		and Climate Change Adaptation (crsprogramquality.org)
2	Group Exercise on sector assessment (Duration: 2 hours) Remark: This exercise should be facilitated in a way that addresses the planning skills for DRR-CCA integration in local level planning	Asking the participants to re-arrange their sitting position as per the sector that they represent. Each group will form one sector and will assess the impact of disasters and climate change on their sector, key issues emerging from the impact, existing coping measures and what else can be done and how. Once the groups have completed the exercise, they may be asked to select any four principles of integration and suggest actions under each of the principles for integration of DRR-CCA with possible funding sources, beneficiaries, duration, etc. which they will have to present in-tandem.	Flip Charts, Color pencils, Markers, , LCD Projector, Screen, Laptop	Nil
Session IV- Creating an Enabling Environment for CCA and DRR Objective/s of the Session: <ul style="list-style-type: none"> To increase understanding on role as a stakeholder for DRR-CCA inclusive development To identify entry points based on learning so far 				
1	Possible post training roles for	Participants will be presented with few options as role that they can	LCD Projector, Screen,	Integrating Climate Change Adaptation

No	Theme	Methodology	Required resources	Reference source/s
	DRR-CCA integration (30 Minutes) Remark: Roles should be simple and as per the level and capacity of the participants	play for DRR-CCA integration in their respective sectors within their capacity and limitations	Laptop	into Development Co-operation-Policy guidance (OECD)
2	Entry Points to integrate DRR-CCA in respective sector based on learning (45 Minutes) Remarks: Participants must come up with entry points on where and how they will initiate the process of integration.	Participants will be given a piece of paper and will be asked to select any 2/3 roles from the screen. Against each role they should write why this role, how will they initiate, who will be the key supporter, major obstacles and possible ways to overcome.	A2 size papers (One with each participants with pre-printed format as required), LCD Projector, Screen, Laptop	Nil

Note: These are merely suggested sessions which can be re-enforced based on availability and accessibility of resources, context of the locality where training will be scheduled and post module modifications. Use of icebreakers will be crucial as there will be a huge amount of involvement of the participants in all phases of the training.

Module 2- Community Based Adaptation to Climate Change

Background: The training on Community Based Adaptation to Climate Change will be instrumental in fostering thinking and sharing of innovation with grass-root level workforce who are involved with communities or are part of the community and also providing services therein. This will be the basic introduction to the extent to which climate change adaptation can be localized and decentralized.

Objective:

- To strengthen and foster better understanding of climate change adaptation at the local level among the local level workforce. .
- To share innovation and encourage local level actions for incorporation of climate change adaptation in grass-root level developmental interventions.

Duration: 2-3 days face-to-face training in classroom setting, but including a field visit (if possible, to show adaptation measures generally adopted by local communities and/or correlated with adaptation and DRR).

Group Size: 30-40 Participants

Target Group: This Module will be appropriate for DRR, CCA, and development practitioners, agriculture extension workers, community based organisations, and field level professionals who are interested in improving their understanding of climate change adaptation.

Methodology: This will be a highly interactive and participatory training considering the needs, capacity and style of operation of the participants. Facts and techniques will be simplified so as to meet the needs of the participants. High emphasis would be placed on experience sharing with different domains so that practical idea on the theme can be developed. The ultimate aid is not innovate rather to share innovation and thus the focus will be on highlighting the actions and strategies working best in different parts of the world and in the context of Odisha.

Proposed Session Plan for **Community Based Adaptation to Climate Change**

Day-1

Session I- Climate Change: Basic Science

Objective/s of the Session:

- To develop understanding of participants on observed changes in climate and ecosystems, basic variables that constitute climate, differences between climate change and climate variability, natural disasters that are caused by weather and climate, future climate change projections, and their potential impacts.
- To foster understanding of the scientific basis of climate change.

No	Theme	Methodology	Required resources	Reference source/s
1	Recent climate phenomena and climate change: Global, South Asia, National, and State (Duration: 20 Minutes)	After formal introduction this session will focus on sharing basic statistics from different sources reflecting current scenario of Climate Change	LCD Projector, Screen, Laptop, Chart paper, Paper slip for each of the participants	Strengthening climate change adaptation through effective disaster risk reduction, Briefing Note 3 (UNISDR), Climate Change: New Dimensions in Disaster Risk, Exposure, Vulnerability, and Resilience (IPCC)

No	Theme	Methodology	Required resources	Reference source/s
2	Global warming, greenhouse gases, and consequences (Duration 20 Minutes)	A brief PPT on global warming, greenhouse gases and consequences. Participants may be asked to share their opinion of global warming and GHG emission.	LCD Projector, Screen, Laptop, A few Satellite pictures from NASA for discussion	Climate Change: Vital Signs of the Planet (NASA), Managing The Risks Of Extreme Events And Disasters To Advance Climate Change Adaptation (IPCC)
3	Key climate variability and climate change (Duration 20 Minutes)	A brief PPT explaining the key climate variables, differences between climate variability and climate change	LCD Projector, Screen, Laptop	Managing The Risks Of Extreme Events And Disasters To Advance Climate Change Adaptation (IPCC)
4	Climate-related disasters and linkage between climate change, disasters and development (Duration 20 Min.)	A PPT comprising of few statistical arguments describing how climate related disasters are increasing and the relation between climate change and disasters.	LCD Projector, Screen, Laptop	Community-Based Adaptation Toolkit (CARE)
5	Projections of future changes in climate (Duration 20 Minutes)	A PPT describing the major projections related to climate change Global, South Asia, National, and State. Participants may be encouraged in between the session to share what they feel about the future of climate change before moving ahead with the presentation	LCD Projector, Screen, Laptop	Managing The Risks Of Extreme Events And Disasters To Advance Climate Change Adaptation (IPCC), PLA-Community-based adaptation to climate change (IIED) NAPCC, OSAPCC
6	Causes Impacts and vulnerability to climate change (Duration 20 Minutes)	After the projections are sharing a small presentation on what actually caused the climate change, why and where the vulnerability is high and impacts visible as of now	LCD Projector, Screen, Laptop	Climate Change: Vital Signs of the Planet: Causes (NASA), Managing The Risks Of Extreme Events And Disasters To Advance Climate Change Adaptation (IPCC)
7	Key Concepts and Terminology (Duration 30 Minutes) Remarks: More discussion will ensure the involvement and clarification	The basic concepts and terms used in Community Based Adaptation to Climate Change will be discussed with the help of a presentation. This would be more of a discussion where participants will explain their opinion first, followed by complete explanation by the facilitator	LCD Projector, Screen, Laptop	Community-Based Adaptation Toolkit (CARE)
8	An ICE breaking exercise may be a talking game involving physical movement. This should be targeted to increase team familiarity with each other as well as having a breath free for the upcoming session. It should not exceed 30 minutes. Shoe Pile Mingle can be one of the many interesting games that may suit this situation			

Session II- Climate Change and Human Securities

Objective/s of the Session:

- To improve understanding on Climate Change, DRR, CCA and CCM
- To increase understanding impacts of climate change on human securities and different sectors

No	Theme	Methodology	Required resources	Reference source/s
1	Climate Change, DRR and Adaptation (Duration: 30 minutes) Remark: Basic conceptual clarity should be obtained by the end of this session.	A PPT explaining, Climate Change, Disaster Risk Reduction and Adaptation with the use of local/National/regional examples for comprehensive understanding. A re-emphasize on clarifying the basic relation, similarities and differences between DRR, CCA and CCM should be emphasized in the module in detail.	Handouts of case examples, LCD Projector, Screen, Laptop	Community Based Adaptation to Climate Change, A Theoretical Framework, Overview of Key Issues and Discussion Of Gender Differentiated Priorities and Participation (CAPRI), local case studies from NGOs, GOs etc.
2	Sector Specific Impacts of Climate Change and disasters (Duration: 60 minutes)	A PPT covering general as well as specific impacts of CC and Disasters on agriculture, shelter, food security, health, livelihood, education and other critical climate and disaster sensitive sectors with both global and local examples. Few case studies on how Climate Change/Extreme Events affected agriculture in Odisha, Health in Odisha would be worthwhile to share for a live justification. The focus should be more on the discussion as well as also obtaining and involving participants in experience sharing. Agreement and disagreements both should be discussed. Myths if arising during the discussion must be cleared. The module should have a detailed version of sector specific impact at global and local level.	Handouts of sector specific case studies, LCD Projector, Screen, Laptop	Managing The Risks Of Extreme Events And Disasters To Advance Climate Change Adaptation (IPCC), NAPCC, OSAPCC
3	Group Exercise (Duration: 60 minutes) Remarks: This should re-enforce the understanding of	A simple group exercise in perception related to climate change should be conducted. Participants may be divided into 6 groups to compile six tasks based on the concept cleared through the earlier sessions as follows:	Flip Charts, Color pencils, Markers, LCD Projector, Screen, Laptop	Nil

No	Theme	Methodology	Required resources	Reference source/s
	the action of the participant	G1. Visible impact of Climate Change in their locality (District) G2. Who are most vulnerable and why? G3. What changes can occur due to climate change in future G4. Important Role players for dealing with climate change? What role and why G5. What hurdles can increase climate change in the future and how? G6. How climate change scenario can be dealt with in their locality		
4	Odisha State Action Plan on Climate Change (Duration: 30 minutes) Remark: The basic idea will be required for linking their thinking with that of the existing policy of the government	Firstly, a comprehensive orientation on OSAPCC involving details of OSAPCC, sector wise projections and plans should be given to the participants.	Flip Charts, Color pencils, Markers, LCD Projector, Screen, Laptop	OSAPCC

Day-2

Session I- Recall

Objective/s of the Session:

- Participants will be able to recall the concepts and terms explained during 1st day sessions.

1	Recall using Ice Breaker (Duration: 35-40 Minutes) Remark: It will encourage active participation as well as generate interest among all with a sense of competition.	A contest using any popular media quiz show format with a small prize (may be a chocolate) should be one of the options for recall. Participants may stand in a circle and based on a sound will pass one a rubber ball, the person who holds the ball when the sound stops will have to answer a question. Some questions based on previous days' session may appear on screen for the purpose	A rubber ball, A PPT with few questions and few chocolates based on the number of the question	Nil
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Session II- Preparation for Climate Change Adaptation

Objective/s of the Session:

- Participants will develop understanding on preparations for community-based adaptation processes.
- Participants will be able to identify and prioritize actions related to adaptation

No	Theme	Methodology	Required resources	Reference source/s
1	Community based adaptation (Duration: 30 Minutes) Remark: Participants must be able to link the discussion with their professional role and responsibility and should be kept involved in all levels of the discussion	A PPT explaining the concept, needs and benefits, principles of Community Based Adaptation should be explained to the participants. The concept of sustainable livelihood and its relevance to CBA will be introduced in this session along with essential elements of the CBA.	LCD Projector, Screen, Laptop	Community-Based Adaptation Toolkit (CARE), PLA- Community-Based Adaptation Toolkit (IIED)
2	Understanding institutional settings (Duration: 20 Minutes) Remark: The module should name only relevant and applicable institutions in the context of the locality where the training is held to avoid confusions	This session should give the participants a good understanding on actors in CBA, potential roles and responsibility of different actors and their linkages with the community. It should introduce a way and method how to identify enabling and disabling institutions in the community. The session should also provide information on different CBOs and Private Sector Actors and their role in CBA. The Module should have detailed analysis in this regard	LCD Projector, Screen, Laptop, Hard copy of module	E-learning tool-Community Based Adaptation to Climate Change (FAO)
3	Understanding changing risk patterns (Duration: 15 Minutes)	The session will orient the participants on various sources for understanding climate change scenario at country and State level. This session should hold a good number of examples on how climate change scenario can be translated into local level impact	LCD Projector, Screen, Laptop, Hard copy of module	E-learning tool-Community Based Adaptation to Climate Change (FAO), PLA- Community-Based Adaptation Toolkit (IIED), Community-Based Adaptation Toolkit (CARE)

No	Theme	Methodology	Required resources	Reference source/s
		outlooks. The Module should have a detailed list of possible sources, process and methods of obtaining information, use of information etc.		
4	Local situation assessment (Duration: 30 Minutes)	For local situation assessment the essential elements for analysis like livelihood systems and livelihood assets, local perceptions of hazards, risks and climate change, indigenous knowledge of adaptation practices and strategies, current exposure to hazards and current vulnerabilities etc. will be detailed out in this session. In brief the session will describe the essential aspects of local situation assessment conducted as the basis for local CBA Planning	LCD Projector, Screen, Laptop, Hard copy of module	E-learning tool-Community Based Adaptation to Climate Change (FAO)
5	Participatory tools and methods (Duration: 45 Minutes) Remark: The participants through energizers must be kept involved in listening and should be able to choose the tool they need.	This session will give options on a wide range of participatory tools to be used for CBA. The structure will be tabulated with the purpose of each tool. A wide variety of examples of different available tools for climate risk assessment and mobilization for community based adaptation planning will be explained. Depending on participants' background the most relevant tools will be emphasized more in discussion.	Printed tools (Selected ones), LCD Projector, Screen, Laptop	E-learning tool-Community Based Adaptation to Climate Change (FAO), PLA-Community-Based Adaptation Toolkit (IIED), Community-Based Adaptation Toolkit (CARE),
6	Identifying adaptation options (Duration: 30 Minutes)	Considering the opportunities, barriers, costs and limitations of improved adaptation practices, this session will suggest the participants a method and key principles for preparing catalogues for suitable adaptation options for field testing in selected locations, The discussion should be at the level of the participants and the facilitator must translate the module version in to participants	LCD Projector, Screen, Laptop	E-learning tool-Community Based Adaptation to Climate Change (FAO), PLA-Community-Based Adaptation Toolkit (IIED), Community-Based Adaptation Toolkit (CARE)

Lunch Break and Preparation for Field visit.

Post Lunch Field Visit:

The time allowed will be one hour, including logistics arrangement. Materials for Climate Risk Assessment like Chart papers, Flip charts, color pens, color chalks etc. will be kept ready for first field testing. The community to be visited should be from amongst the most vulnerable as well as should have some or the other existence of adaptive measures taken by the community for a better on field justification as well as testing of learning. The Assessment conducted there in would be merely viewed as a learning exercise and purpose of the visit would be to clarify on field questions and doubts from participants. The participants will be again divided in six groups and will use any one tool for their interest and understanding of assessment.

The Post lunch period will be devoted for field visit up to the evening. Preparatory arrangement such as information to the community, travel arrangements, etc. should be made in advance.

Day-3

Session I- Presentation of learning from field visit

Objective/s of the Session:

- Participants will get their findings debated as well as their learning tested and clarified

No	Theme	Methodology	Required resources	Reference source/s
1	Presentation by groups on CRA (Duration: 90 Minutes) Remark: The focus here would be to ensure usability of tools through valid discussion and facilitation	Participants will present their assessment in the way of their learning. They will share the best part as well as a limitation of the tool as experienced by them, which will be discussed and clarified by the facilitator as well as other groups	Prepared presentation on chart papers	Nil

Session II- Implementing Community Based Adaptation in Odisha

Objective/s of the Session:

- Participants will be able to understand and plan for implementation of Community Based Adaptation in their locality with their roles and responsibilities

1	Community mobilization (Duration: 30 Minutes)	The session will explain the basic concept, need and principles for a successful community mobilization in Planning for CBA in Odisha. There are a large number of success stories from within Odisha for successful community mobilization. This session should include at least two such stories	LCD Projector, Screen, Laptop	E-learning tool-Community Based Adaptation to Climate Change (FAO), Women Leadership in Risk Resilient Development (UNISDR), Orissa "Meena Girl" gets international award (UNICEF), Success stories by Anchalik Janaseva Sansthan etc.
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No	Theme	Methodology	Required resources	Reference source/s
		from within Odisha with the process followed and outcome.		
2	Community action plans for adaptation (Duration: 60 Minutes)	The session will CAP as a tool for CBA, the process and steps for creating a good CAP. It is a key tool to guide CBA. Once established, it provides a road map for CBA implementation. Participants must be given a hands on idea to undertake CAP. International guidelines tested in the country should be incorporation ted here.	Projector, Screen, Laptop	E-learning tool-Community Based Adaptation to Climate Change (FAO), Community Based Adaptation: An empowering approach for climate resilient development and risk reduction (CARE), How to respond to Climate Change Impacts In Urban Areas- A Handbook for Community Action (Brandenburg University of Technology Cottbus)
3	Testing adaptation practices (Duration: 45 Minutes)	This session will justify the need why local adaptation need to be carefully tested and analyzed before they are widely recommended. The manner of organizing and setting up demonstrations to test prioritized adaptation options will be explained here in this session. It should include Adaptation and development process, Extension methods and tools and certain Do's and Don'ts presented in a brief manner to the participants. The module may contain a detailed version.	Projector, Screen, Laptop	FAO safeguarding the Global Environment Adapting Agriculture to Climate Change (FAO), E-learning tool-Community Based Adaptation to Climate Change (FAO), Local Adaptation Plans of Action (ELDIS)
4	Monitoring and evaluation (Duration: 45 Minutes)	The session should explain the monitoring, evaluation tools and process for CBA implementation in the context of Odisha	Projector, Screen, Laptop	E-learning tool-Community Based Adaptation to Climate Change (FAO)
5	Summarizing the training (Duration: 20 Minutes)	It would be essential to summarize this training in a meaningful way and taking feedback on learning from participants. The summarization must reflect the entry points for the participants	Projector, Screen, Laptop	Nil

Note: These are merely suggested sessions which can be re-enforced based on availability and accessibility of resources, context of the locality where training will be scheduled and post module modifications. Use of icebreakers/Energizers will be crucial as there will be a huge amount of involvement of the participants in all phases of the training.

Module 3- Climate Smart Disaster Risk Management: Role of Institutions in Adaptation to Climate Change

Background: Various agencies of governmental and non-governmental level are pro-actively involved in disaster risk reduction and are now involved in climate change concerns. However, given the complexity and range of issues involved with disaster risk reduction, climate change adaptation, and development; it has become apparent that a lot more needs to be done to support and strengthen the efforts especially at the ground level. Understanding the threats posed by climate change and disaster risk. CSDRM approach is one such tool that can be used by different Organizations to tackle disasters, poverty and adaptation through improved integration. CSDRM approach is an integrated social development and disaster risk management approach that aims simultaneously to reduce risks, adapt to climate change and development. This training will enable the Institutions to review their existing approach and making them climate smart.

Objective:

- To sensitize the institutions on climate change situation, interaction and interrelation between CCA and DRM.
- To build understanding on Climate Smart Disaster Risk Management approach.
- To enhance understanding of process and methodologies of integrating CSDRM at Institutional Level.

Duration: It should be a 2 days including training in a classroom setup.

Group Size: 30-40 Participants

Target Group: This module will suit participants from community based organizations, NGOs, local government institutions engaged in capacity building and training. Managers and Focal person from the respective institutions would be most appropriate to undergo this training.

Methodology: This will be mostly a methodological training with focus on developing processes and methods for understanding and integrating CSDRM at institutional level. The participants will be moved through a journey from basic thematic sensitization to understanding and integrating a new approach. Both lecture and participatory exercises would be crucial depending on the nature of the session and energizers/ice breakers will be used as per requirement and suitability.

Proposed Session Plan for **Climate Smart Disaster Risk Management: Role of Institutions in Adaptation to Climate Change**

Day-1

Session I- Context for CSDRM and Institutionalization

Objective/s of the Session:

- To sensitize the participants on present climate change situation and build background for CSDRM and Institutionalization through addressing the linkage between climate change and disasters and present challenges

No	Theme	Methodology	Required resources	Reference source/s
1	Global climate change threatens development and livelihoods	A detailed PPT outlining recent statistics and facts about climate change impacts on different sources of livelihood. Discussion of Odisha specific impacts on	LCD Projector, Screen, Laptop	Climate Change: Vital Signs of the Planet (NASA), Managing The Risks Of Extreme Events And Disasters To Advance

No	Theme	Methodology	Required resources	Reference source/s
	(Duration: 30 Minutes)	different livelihood options and sources would be an appropriate tactic to start with.		Climate Change Adaptation (IPCC), NAPCC, OSAPCC
2	Climate change and disasters are linked (Duration: 30 Minutes)	A strategic PPT with statistical arguments justifying the linkage between climate change and disasters both locally and globally. This should start in a discussion mode asking for the participants and moving from known to the unknown	LCD Projector, Screen, Laptop	Managing The Risks Of Extreme Events And Disasters To Advance Climate Change Adaptation (IPCC), OSAPCC
3	The challenges (Duration: 15 Minutes)	A brief presentation describing how climate change and increasing disasters are posing challenges to different spheres of development and different aspects of life.	LCD Projector, Screen, Laptop Nil	Strengthening Climate Resilience- Climate Smart Disaster Risk Management (Community ELDIS) Managing The Risks Of Extreme Events And Disasters To Advance Climate Change Adaptation (IPCC)
4	Ice Breaker (Duration: 15 Minutes) Remark: The exercise will have bodily movement as well mind exercise for increased involvement as well feeling of comfort with fellow participants	Preferably a physical activity like juggling combined with any mind game for increasing focus.		Nil

Session II- Climate Change Adaptation and Disaster Risk Reduction

Objective/s of the Session:

- To familiarize the participants with key terms and concepts related to DRR and CCA
- To clarify the similarities and difference between the two
- To build on the context for CSDRM

1	Concepts and Terminologies (Duration: 60 Minutes)	A PPT explaining key terms and concepts related to CCA and DRR. This can be done in a participatory manner through "Find the match"	Printed Terms and their explanations, LCD Projector,	Terminology (UNISDR)
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No	Theme	Methodology	Required resources	Reference source/s
	Remark: Basic conceptual clarity should be obtained by the end of this session.	approach with a limited number of terms and their explanations. Participants will have two broad categories one having the terms and the other having the explanation who will find their suitable match followed by discussion and clarification	Screen, Laptop	
2	Similarities and Differences (Duration: 30 Minutes)	An objective presentation with tabulated similarities, differences and cross cutting issues in CCA and DRR. This can be presented and discussed for stronger understanding	LCD Projector, Screen, Laptop	Disaster Risk Reduction or Climate Change Adaptation: Are we Reinventing the Wheel? (GSDRC), Linking Climate Change Adaptation and Disaster Risk Reduction (Tearfund)
3	National and State Action Plan for Climate Change (Duration: 30 Minutes)	Eight Missions with the priorities for action in each mission under the NAPCC should be briefly explained through a presentation here in under this theme	LCD Projector, Screen, Laptop	NAPCC
4	Odisha State Action Plan on Climate Change Remark: The basic idea will be required for linking their thinking with that of the existing policy of the government (Duration: 30 Minutes)	Firstly, a comprehensive orientation on OSAPCC involving details of OSAPCC, sector wise projections and plans should be given to the participants.	LCD Projector, Screen, Laptop	OSAPCC
5	Tackling changing disaster risks and uncertainties (Duration: 30 Minutes)	A PPT will explain the actions required for tackling disaster risks and uncertainties in the future. This should be explained in broader context, includes collaboration, assessment, integration and access to information etc.	LCD Projector, Screen, Laptop	Minimum Standards for local climate-smart disaster risk reduction (Climate Centre), Strengthening Climate Resilience- Climate Smart Disaster Risk Management (Community ELDIS)
6	Enhance adaptive capacity (Duration: 30 Minutes)	This thematic presentation should target ways and means for increasing peoples adaptive capacity with focus on the following	LCD Projector, Screen, Laptop	Strengthening Climate Resilience- Climate Smart Disaster Risk Management (Community ELDIS)

No	Theme	Methodology	Required resources	Reference source/s
		<ul style="list-style-type: none"> • Experimentation and innovation, • Regular learning and improvement, • Flexible, and integrated policies, • Use tools and methods to plan for uncertainty and unexpected events 		
7	Address poverty and vulnerability and their structural causes (Duration: 30 Minutes)	<p>It should explain interrelation and dynamic coexistence of the poverty, vulnerability and their structural causes with focus on the following:</p> <ul style="list-style-type: none"> • Promote more socially just and equitable economic systems • Forge partnerships • Empower communities and local authorities to influence the decisions of national government. • Promote environmentally sensitive and climate smart development 	LCD Projector, Screen, Laptop	Strengthening Climate Resilience- Climate Smart Disaster Risk Management (Community ELDIS)

Session III- Overview of Climate Smart Disaster Risk Management

Objective/s of the Session:

- Building basic conceptual understanding on CSDRM as an approach

1	Basics of CSDRM (Duration: 60 Minutes)	This session should highlight the objectives, components, and basic principles of CSDRM approach. The focus should be to introduce the concept as a supplementary approach rather than as a substitute for the existing ones. The difference of this with existing ones with the need and benefits for CSDRM approach should be explained here.	LCD Projector, Screen, Laptop	Climate-Smart Agriculture, Managing Ecosystems for Sustainable Livelihoods (FAO), Strengthening Climate Resilience- Climate Smart Disaster Risk Management (Community ELDIS), Climate Smart Community Disaster Management Programme (CDEMA), Towards Climate Smart Disaster Risk Management in Asia (Southasiadisasters.net, AIDMI)
2	Best Practices on CSDRM from	At least 5 case studies of successful implementation of the CSDRM	LCD Projector, Screen,	Strengthening Climate Resilience- Climate Smart

No	Theme	Methodology	Required resources	Reference source/s
	around the World (Duration: 45 Minutes)	approach from across the globe of which at least one from Odisha should be shared in this theme. Participatory discussion on the process and outcome of this should be guided to make the suitability in the context of Odisha	Laptop	Disaster Risk Management (Community ELDIS), Building climate resilience at the state level: Disaster risk management and rural livelihoods in Orissa- Strengthening Climate resilience (Community ELDIS available at Slideshare)
3	Implementation of CSDRM (Duration: 30 Minutes)	This theme should give a basic idea on minimum standards, do's and don'ts of implementing CSDRM in integration with existing programs of the Institutions	LCD Projector, Screen, Laptop	Minimum Standards for local climate-smart disaster risk reduction (Climate Centre)

Day-2

Session I- Recall

Objective/s of the Session:

- Participants will be able to recall the concepts and terms explained during 1st day sessions.

1	Recall using Ice Breaker (Duration: 35-40 Minutes) Remark: It will encourage active participation as well as generate interest among all with a sense of competition.	A contest using any popular media quiz show format with a small prize (may be a chocolate) should be one of the options for recall. Participants may stand in a circle and based on a sound will pass one a rubber ball, the person who holds the ball when the sound stops will have to answer a question. Some questions based on previous days' session may appear on screen for the purpose	A rubber ball, A PPT with few questions and few chocolates based on the number of the question	Nil
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Session II- Components for Institutionalizing

Objective/s of the Session:

- To build understanding on integration of CSDRM in the Institution/Organization
- To orient the different components, tools and frameworks for integrating CSDRM in the Institution/organization

1	Self-assessment (Duration: 30 Minutes)	This session will guide the participants how they can do an assessment of the present situation of the Organization. This will also provide the principles,	LCD Projector, Screen, Laptop	Changing Climate, Changing Disasters: Pathways Towards Integration (IDS), Getting Climate Smart for Disasters', Climate Smart Disaster Risk
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No	Theme	Methodology	Required resources	Reference source/s
		necessary processes and steps for doing self Assessment. The example of self assessment done in any Organization in Odisha/India will be shared here		Management Approach in Community Based Organization-A Report (CDKN)
2	Planning and Design (Duration: 20 Minutes)	Keeping in mind the 5 CSDRM Landmarks (integrate, interlink, improve, innovate and invest) and organisation's mission and goals, the planning and design will be explained to the participants through a brief presentation.	LCD Projector, Screen, Laptop, Hard copy of module	Changing Climate, Changing Disasters: Pathways Towards Integration (IDS), Getting Climate Smart for Disasters', Climate Smart Disaster Risk Management Approach in Community Based Organization-A Report (CDKN)
3	Pathway for Integration (Duration: 15 Minutes)	This theme will address the options and key questions to be considered in designing an integrated pathway. The participants will be given an orientation on how to select an integrated pathway based on the self assessment, setting of indicators and action components which ever is applicable as per role and function of the Organization. The selection of Integration pathways obviously depends on the goal and functions of the Organization. Components for integration will be explained in detail	LCD Projector, Screen, Laptop, Hard copy of module	Changing Climate, Changing Disasters: Pathways Towards Integration (IDS), Getting Climate Smart for Disasters', Climate Smart Disaster Risk Management Approach in Community Based Organization-A Report (CDKN)
4	Monitoring and reviewing progress: constructive (Duration: 45 Minutes)	The session should be focused on how the M&E frameworks will support learning and space to gather evidence that will allow for improved practice of CSDRM. This session will introduce some of the tools and frameworks as well as guidelines that will be helpful for Monitoring and Reviewing progress of the CSDRM integrated approach	LCD Projector, Screen, Laptop	Getting Climate Smart for Disasters', Climate Smart Disaster Risk Management Approach in Community Based Organization-A Report (CDKN)

Session II- Capacity Building

Objective/s of the Session:

- Building understanding of the participants on identification of communities, risk assessment, community capacity building and participatory M&E for CSDRM

No	Theme	Methodology	Required resources	Reference source/s
1	Identify vulnerable communities and prioritize where to act (Duration: 30 Minutes)	This session will elaborate the methodology for selection of the vulnerable community and prioritizing area of action. The selection criteria as well as prioritization criteria should be presented in generic manners which can be specified through experience sharing contextual discussion during the session	LCD Projector, Screen, Laptop	The CSDRM Planning, Monitoring and Evaluation Process-Strengthening Climate Resilience (Community ELDIS)
2	Conduct or reviews existing risk assessment (Duration: 50 Minutes)	Some of the Participatory tools for conducting/reviewing risk assessment with a CSDRM lens will be shared with the participants with the strength and limitation of each tool shared. At least five such tools can be shared	LCD Projector, Screen, Laptop	Climate Vulnerability and Capacity Assessment (CVCA) Handbook (CARE), Community-Based Disaster Risk Management Field Practitioners' Handbook (ADPC), PLA
3	Build community capacity on climate smart DRR (Duration: 2 Hours)	This session will be done through a group exercise. The participants in a group of 5-6 will be asked to define their identified actions with the target group, required resources, possible sources of funding and challenges for building community capacity on CSDRM which they will present in groups. The module should reflect standards for CSDRM in community with aspects and approaches for capacity building which the facilitator will reflect after the presentation	Chart papers, color pens and markers, LCD Projector, Screen, Laptop	Building climate resilience at the state level: Disaster risk management and rural livelihoods in Orissa- Strengthening Climate resilience (Community ELDIS available at Slideshare)
4	Participatory monitoring and evaluation (Duration: 45 Minutes)	This session will present the CSDRM M&E framework as participatory and based on ADAPT principles which will allow a rethinking in existing approaches to M&E and will open new avenues for program development considering climate change and disasters	LCD Projector, Screen, Laptop	The CSDRM Planning, Monitoring and Evaluation Process-Strengthening Climate Resilience (Community ELDIS), Getting Climate Smart for Disasters', Climate Smart Disaster Risk Management Approach in
5	Summarizing	The training should be summarized with key learning and action points as derived during the training. Each training should have an approach of Pledge so that the learning stays sustainable	A Chart paper with key components on which the participants will ensure their pledge	Community Based Organization-A Report (CDKN) Nil

Note: These are merely suggested sessions which can be re-enforced based on availability and accessibility of resources, context of the locality where training will be scheduled and post module modifications. Use of icebreakers/Energizers will be crucial as there will be a huge amount of involvement of the participants in all phases of the training.

Module 4- Climate Risk Management in a Changing Environment

Background: This course is designed for the persons who want to know more about climate change and climate risk management in term of technical. The course will illustrate climate risk management in urban and rural settings, focusing on the sector challenges. The course participants will be guided through a number of interactive sessions that will enable them to acquire scientific knowledge to assess climate risks and reduce climate risks strategically through: climate risk management planning, implementation and mainstreaming climate risk management into development policies and programs at different levels. Broadly, the course intends to harmonize the climate risk management, disaster risk reduction and development planning enable a holistic approach to sustainable development.

Objective:

- To build understanding on the science, systems and societal issues of climate change, impacts of climate change and their linkages with climate induced extreme events;
- To build familiarity of participants with the climate change planning processes for designing climate risk management policies, strategies, programs and interventions at the local level.
- Identify a menu of options for climate risk management in a given context. Share good practices and lessons learned in climate risk management from different contexts.
- To develop relevant skills for effective planning incorporating CRM in developmental context

Duration: It should be a 3 day training with enumerable practical exercises within a classroom setup. .

Group Size: 30-40 Participants

Target Group: Possible target group for this module can be a broad group with diversified background. These are as follows:

- Government officials from different departments; disaster response and risk reduction practitioners, policy makers, climate change offices attached to authorities
- Humanitarian agencies (DRR, CCA, environmental and development agencies)
- Academic institutions such as Universities, research institutes or training institutes on DRR, CCA
- Private sector such as insurance and construction industries
- Media institutions working on climate change adaptation, disaster risk management.

Methodology: The training will be conducted through a combination of interactive sessions and exercises. The participants will be guided through technical information sharing, sharing of best practices and theme based group activities that will shape the aforesaid objectives of the training. Energizers will also play a crucial role in keeping the participants involved and motivated. The skill development in planning will be ensured through hand-on planning exercises. Theme specific methodologies are explained in detail in the session plan.

Proposed Session Plan for **Climate Risk Management in a Changing Environment**

Day-1

Session I- Basic Concepts and Terminologies in Climate Risk Management & Fundamentals of Climate Change Science

Objective/s of the Session:

- To familiarize the participants with terms, concepts and scenario of climate change at global, national and local level.

No	Theme	Methodology	Required resources	Reference source/s
1	Defining weather, climate and climate change (Duration: 20 Minutes)	Though the module will have a detailed explanation, after introduction session using ice breaker, the first technical presentation will be on clarifying basic terms associated with climate change. This will be done in an interactive manner involving question-answer technique followed by explanation	LCD Projector, Screen, Laptop	Climate Change: New Dimensions in Disaster Risk, Exposure, Vulnerability, and Resilience (IPCC)
2	Science behind climate change: greenhouse effect etc. (Duration: 20 Minutes)	This session will not only give a theoretical orientation on causes and impacts of climate change, but also will showcase evidences as captured by satellite and will explain the science behind in a common man's language	LCD Projector, Screen, Laptop	Climate Change: Vital Signs of the Planet: Causes (NASA), Managing The Risks Of Extreme Events And Disasters To Advance Climate Change Adaptation (IPCC)
3	Climate Change and climate variability (Duration: 20 Minutes)	A brief presentation will follow the climate change science explaining different factors, conditions and differences between CC & CV	LCD Projector, Screen, Laptop	IPCC Fourth Assessment Report: Climate Change 2007 (Chapter 9.1), Understanding climate variability and climate change (FAO)
4	Emerging directions of Climate Risk Management practice (Duration: 45 Minutes)	This presentation will compile two broad aspects as follows: <ul style="list-style-type: none"> Climate change and extreme events Linkage and overlap of CCA and DRR The broader context of new and emerging priorities and developments in the field of CRM will be briefly introduced here in this chapter	LCD Projector, Screen, Laptop	Disaster Risk Reduction or Climate Change Adaptation: Are we Reinventing the Wheel? (GSDRC), Linking Climate Change Adaptation and Disaster Risk Reduction (Tearfund)
5	Group Exercise (Duration: 60 Minutes) Remark: This would act as summarization of the 1st session as the discussion is guided in that way	A group exercise as a follow up of the above sessions should be conducted. Each group consists a minimum of 5 members. The group will discuss, identify and present the following: <ol style="list-style-type: none"> Key threats of CC in their locality. Most affected and most vulnerable Existing efforts (If any) Results visible (If any) Limitations and challenges 	Chart paper, color pens and markers, LCD Projector, Screen, Laptop	Nil

Session II- Climate Change Projections (Odisha and India) and Decision Support Tools in Climate Risk Management

Objective/s of the Session:

- To introduce some of the emerging facts of climate change scenario in India and Odisha
- To orient different models of climate projection and the process of downscaling global and regional models into local climate scenario.

No	Theme	Methodology	Required resources	Reference source/s
1	Emerging facts on climate change in Odisha and India (Duration: 60 Minutes)	This session should be short and crisp presenting some of the interesting and emerging facts and trends of climate change in India and Odisha in particular. A basic idea on how climate change is affecting India and Odisha is expected to be developed from this session. The facilitator may use a chart paper for writing the experiences and opinion of the participants in this regard as s/he moves from their understanding (Known) to unknown facts.	Chart Paper/White Board, Marker, LCD Projector, Screen, Laptop	NAPCC and OSAPCC
2	Overview of climate modeling for climate risk management (Duration: 50 Minutes)	This session will be presented in a way of technical knowledge sharing. This will include an overview of projection and modeling of climate change and its impacts. Projection of future climate change: General Circulation Model, Regional Circulation Models, Atmospheric and Oceanic Models, etc. will be introduced in the best understandable manner to the participants	LCD Projector, Screen, Laptop	1. Chapter 9- Evaluation of Climate Models (IPCC), 2. Global Climate Models and Their Limitations by <i>Anthony Lupo (USA)</i> , <i>William Kininmonth (Australia)</i> , <i>J. Scott Armstrong (USA)</i> , <i>Kesten Green (Australia)</i> (nippcreport.org)
3	Use and applications of the projections and climate model outputs in planning and policy formulation (Duration: 50 Minutes)	This session should entail the various uses and applications of varied modeling approaches in policy formulation and planning at national, state and local level. The attempt should be made by the facilitator to emphasize more on local level use and the available approaches for achieving the same.	LCD Projector, Screen, Laptop	Applying Climate Information, For Adaptation Decision-Making developed under National Communications Support Programme (UNFCCC), India's GHG Emissions Profile- Results of Five Climate Modelling Studies (Climate Modelling Forum of India)
4.	A physical movement based energizer to allow a change in thoughts as well as refreshment. Preferably if the exercise involves both physical movements to increase breathing as well as a mind game to increase concentration. This should be done in the next fifteen minutes.			

No	Theme	Methodology	Required resources	Reference source/s
5	<p>Accessing Local Climate Scenarios and Climate Risk Mapping (Duration: 50 Minutes)</p> <p>Remark: Preferably a demonstration based on downscaled climate modelling output for local climate scenario would be very effective for understanding.</p>	<p>This session will focus more on the use of different climate information for local level planning in Odisha. It should include the following;</p> <ul style="list-style-type: none"> Downscaling of global and regional climate models into local climate scenarios Overview to a downscaled climate modelling output for local climate scenario <p>The session should generate at least a will to explore options for downscaling modeling data for local planning.</p>	LCD Projector, Screen, Laptop	<ol style="list-style-type: none"> Chapter 9- Evaluation of Climate Models (IPCC), Applying Climate Information For Adaptation Decision-Making developed under the National Communications Support Programme (UNFCCC)

Day-2

Session I- Recall

Objective/s of the Session:

- Participants will be able to recall the lessons learnt during 1st day sessions.

1	<p>Recall using Ice Breaker (Duration: 35-40 Minutes)</p> <p>Remark: It will encourage active participation as well as generate interest among all with a sense of competition.</p>	<p>A contest using any popular media quiz show format with a small prize (may be a chocolate) should be one of the options for recall.</p> <p>Participants may stand in a circle and based on a sound will pass one a rubber ball, the person who holds the ball when the sound stops will have to answer a question. Some questions based on previous days' session may appear on screen for the purpose</p>	A rubber ball, A PPT with few questions and few chocolates based on the number of the question	Nil
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Session II- Climate Change and Urban Built Systems

Objective/s of the Session:

- To build understanding on different aspects of climate change risk on the urban built environment,
- To exemplify the risk through case studies and most threatened sectors and aspects.

1	Overview of the urban settings	This session in an interactive manner will present an overview	LCD Projector, Screen,	1. Fact Sheet: Climate Change Impacts and
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No	Theme	Methodology	Required resources	Reference source/s
	and climate change impacts on the built systems (Duration: 50 Minutes)	<p>of how climate change is affecting the built environment in an urban setting. This session should illustrate the following broader aspects:</p> <ul style="list-style-type: none"> • Housing and public amenities / urban settlements / heat island • Urban infrastructure, common amenities, drainage and flood controls • Water, sanitation and hygiene and health <p>The participants will be taken through a journey in the form of interrelated facts rather than explanation of isolated elements and should be able to visualize a broader picture</p>	Laptop LCD Projector, Screen, Laptop	<p>Adaptation For Urban Regions (climateontario.ca)</p> <p>2. Building Knowledge for a Changing Climate Adaptable Urban Drainage - Addressing Change In Intensity, Occurrence And Uncertainty Of Stormwater (EPSRC/UKCIP)</p> <p>3. From practice to theory: Emerging lessons from Asia for building urban climate change resilience (ACCRN).</p>
2	Managing megacities / coastal cities in a changing climate (Duration: 50 Minutes)	Case study example of climate risk management in urban built systems. Preferably detailed case study and critical overview of a case study on urban climate risk management. The case study should be taken from amongst those under ACCRN and should be selected based on highest possible relevance to urban setup in Odisha	Chart paper, color pens and markers, LCD Projector, Screen, Laptop	<p>1. Asian Cities Climate Change Resilience Network: Responding to the Urban Climate (Institute for Social and Environmental Transition)</p> <p>2. Resilience Projects as Experiments: Implementing Climate Change Resilience in Asian Cities (ACCRN)</p> <p>3. The Impact of Urban Heat Islands. Assessing Vulnerability in Indonesia (ACCRN)</p> <p>4. Losing Ground- Two Cities and their Tryst With the Future (TERI)</p> <p>5. Promoting Periurban Agriculture in Flood-Prone Areas of Gorakhpur, India (ACCRN)</p>
3	Group Exercise (Duration: 15 Minutes) Remark: This would make the	<p>Five groups will take five Big cities/towns of Odisha and will assess the following as per their experience and knowledge:</p> <p>1. Visible impacts on built environment</p>		Nil

No	Theme	Methodology	Required resources	Reference source/s
	participants visualize the use and need of the lessons learnt	2. Existing efforts 3. Challenges 4. Required changes in intervention 5. Important stakeholders This would be a very generic exercise conducted to ensure involvement and application of gaining knowledge on immediate ground.		
Session II- Climate Change and Rural Ecosystems Objective/s of the Session: <ul style="list-style-type: none"> To sensitize the participants on climate change impacts in rural setting To infringe thinking points for improved CRM in rural setting 				
1	Overview of the projected issues of climate change and rural ecosystems (Duration: 60 Minutes)	Firstly, this session will provide a generic overview on how climate change is affecting rural ecosystem and livelihood followed by an orientation on sustainable livelihoods, agriculture and food security in the context of climate change. This session may start from a competition where participants as an individual will be broadly divided into two groups and each individual will be provided a piece of paper. The individual participants in group 1 will be asked to draw any one impact/individual on any aspect of rural ecosystem. While the individuals in Group II will be asked to write any one impact. The outputs from this exercise can be placed on a huge board/wall and will be contextualized by the facilitator through discussion in his session	1 A4 size sheet/participant, 3 colored pens (Different colors) /participants LCD Projector, Screen, Laptop	1. How are climate change challenges impacting agro-ecosystems and rural livelihoods? A case study from India on adaptation applying a trans-disciplinary approach (Academia.edu) 2. Understanding how rural communities cope with climate change (ATREE) 3. Adaptation to Climate Change with a Focus on Rural Areas and India (NIDM) 4. Climate change: Building the resilience of poor rural communities (IFAD) 1. How are climate change challenges impacting agro-ecosystems and rural livelihoods? A case study from India on adaptation
2	Case study on climate management in rural settings (Duration: 120 Minutes)	Detailed case study and critical overview of an agricultural climate risk management project should be presented here in this session. At least five case studies will be discussed and then evaluated by	Hard copy of five case studies, Chart paper, Markers, color pens, LCD	applying a trans-disciplinary approach (Academia.edu) 2. Growing rice with less water: case studies from India (CGIAR)

No	Theme	Methodology	Required resources	Reference source/s
		<p>participants on the following aspects:</p> <ol style="list-style-type: none"> 1. Best part 2. Limitation 3. Reliability 4. Possibility for replication in Odisha and why? <p>This can be done by a group exercise by forming five groups among participants.</p>	Projector, Screen, Laptop	

Day-3

Session I- Recall

Objective/s of the Session:

- Participants will be able to recall the lessons learnt during 1st day sessions.

1	Recall using Ice Breaker (Duration: 35-40 Minutes)	This would be a participatory movement exercise where participants will stand in two rows one person facing the other. There will be a box containing questions thrown in angles based on a sound may be a clap. Where the clap stops, the person holding the box will open and answer the question and will pass on.	A Paper box with chits (questions)	Nil
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Session II- Climate Risk Management Planning and Implementation

Objective/s of the Session:

- Orientation of elements involved in planning and implementation of CRM

1	Climate Risk Management Planning Processes at the national level, sub-national and district levels (Duration: 40 Minutes)	This chapter will give a detailed orientation on institutions, approaches, strategies, methods and tools of planning for effective CRM	LCD Projector, Screen, Laptop	<ol style="list-style-type: none"> 1. National Systems for Managing the Risks from Climate Extremes and Disasters: (IPCC; Chapter 6) 2. Climate Change and Disaster Risk Management (FAO)
2	Climate forecasts and applications for proactive risk management (Duration: 40 Minutes)	The session will target orientation to the climate forecasting tools and applications and the importance of risk management. Description of various types of climate forecast products	LCD Projector, Screen, Laptop	<ol style="list-style-type: none"> 1. Applications of Climate Forecasts for Agriculture (WMO) 2. Climate Forecast Applications Network (CFAN)

No	Theme	Methodology	Required resources	Reference source/s
		including short, medium, seasonal, long-range etc. will be explained. The example of our success story of use of climate forecast as an important tool for CRM will be included in this chapter		3. Climate Profile of India (IMD)
3	Integration of climate change adaptation in urban built environment and local development programs (Duration: 40 Minutes) Remark: This session should be flexible in terms of implementation based on analysis of the participants and need based energizers are to be used. Exercise may also conducted for meeting the thematic concern	This chapter should explain the process and steps to be followed for integration of CCA in the urban built environment. One or two success stories would be effective for sharing as "Real Established Platform". Basics of Climate proofed housing and infrastructure, Urban drainage and flood controls and Public health infrastructure should be elaborated	Chart paper, color pens and markers, LCD Projector, Screen, Laptop	<ol style="list-style-type: none"> 1. Fact Sheet: Climate Change Impacts and Adaptation For Urban Regions (climateontario.ca) 2. Climate Change Adaptation in Urban Systems: Strategies for Planning Regimes (Tony Matthews, Griffith University) 3. Building Knowledge for a Changing Climate Adaptable Urban Drainage - Addressing Change In Intensity, Occurrence And Uncertainty Of Stormwater (EPSRC/UKCIP) 4. From practice to theory: emerging lessons from Asia for building urban climate change resilience (ACCRN) 5. Incorporating built environment factors into climate change mitigation strategies for Seoul, South Korea: A sustainable urban systems framework - S W Shin (Arizona State University, School of Sustainability), J S Golden and J H Jo -
4	Integration of climate risk management in rural development and ecosystem-	This session should first set few example based theoretical explanations on certain aspects of CCA in rural settings such as, Agriculture based adaptation, Incorporation of climate forecasts	Hard copy of module for reference, LCD Projector, Screen, Laptop	<ol style="list-style-type: none"> 1. How are climate change challenges impacting agro-ecosystems and rural livelihoods? A case study from India on adaptation applying a

No	Theme	Methodology	Required resources	Reference source/s
	based programs focusing on agriculture and livelihoods (Duration: 60 Minutes) Remark: This session should be flexible in terms of implementation based on analysis of the participants and need based energizers are to be used. Exercise may also conducted for meeting the thematic concern	for selection of livelihood options including selection of crops, Crop insurance and microfinance for climate resilience, Farmer's field schools and data advocacy for climate resilience, Followed by this discussion there should be sharing Concrete examples of two climate forecast applications one in rural setting and another in urban settings. Though it is technical but attempt should be made to keep it according to the level of the participants		trans-disciplinary approach (Academia.edu) 2. Understanding how rural communities cope with climate change (ATREE) 3. Adaptation to Climate Change with a Focus on Rural Areas and India (NIDM) 4. Climate change: building the resilience of poor rural communities (IFAD)
5	Climate resilience indicators (Duration: 30 Minutes)	This session should provide an overview on climate resilience and guidelines for developing indicators on the following: 1. Climate resilience indicators in urban built environment 2. Climate resilience indicators in rural agriculture based environment The module should have a richer text version of different possible indicators. While the idea during facilitation would be to secure basic understanding among participants to be able to define climate change resilience indicators in rural and urban contexts.	Hard copy of module for reference, LCD Projector, Screen, Laptop	1. Climate change adaptation indicators A Logic framework assessment and indicator analysis of Sida's bilateral and regional contributions under the framework of the Climate Change Initiative 2. Indicators of Urban Climate Resilience Greg Guibert (ISET/NCAR) 3. Measuring resilience: progress to date and proposed methodology- by Nick Brooks, Eunica Aure & Martin Whiteside (UK-AID)
6	Crosscutting issues to address climate change, Climate Risk Management and socially vulnerable	This presentation should explain the cross cutting issues in CCA, CRM and socially vulnerable groups, including issues of Gender, children, elderly, differently able people. Other marginalized groups, etc.	Hard copy of module for reference, LCD Projector, Screen, Laptop	1. Managing the Risks from Climate Extremes at the Local Level (IPCC - Chapter-5) 2. OSAPCC, 3. OSDMP, 4. A guide to mainstreaming

No	Theme	Methodology	Required resources	Reference source/s
	groups (Duration: 60 Minutes)	Extreme events and findings of SREX report should also be highlighted in this context. It should address how Early warning system development and contingency planning for effective response to changing hazardous environment, A brief on the Economics of Climate Change and Climate Risk Management and Trans-boundary factors related to Odisha and India		guiding principles disaster risk reduction and climate change adaptation (IFRC) 5. Disaster and Climate Risk Management Capacity Assessment and Plan in Uganda (UNDP)
7	Climate Risk Communication (Duration: 30 Minutes)	This session should explain the process and techniques for climate risk communication at national and sub-national level as well as at local levels. Things to be considered for developing credible and relevant approaches for communicating climate risks that are grounded in decision-making processes and priorities of targeted stakeholder groups should be incorporated in this session.	LCD Projector, Screen, Laptop	1. Managing the Risks from Climate Extremes at the Local Level (IPCC - Chapter-5) 2. Communicating Climate Risks Insights Gained through the ACCCA Project (START) 3. Building Shared Understanding and Capacity for Action: Insights on Climate Risk Communication from India, Ghana, Malawi, and Mongolia (IJOC).
8	Summarizing the training (Duration: 30 Minutes)	The training should be summarized with key possible action points from both facilitator and the participants	LCD Projector, Screen, Laptop	Nil

Note: These are merely suggested sessions which can be re-enforced based on availability and accessibility of resources, context of the locality where training will be scheduled and post module modifications. Use of icebreakers/Energizers will be crucial as there will be a huge amount of involvement of the participants in all phases of the training.

Annexure: 5

Sample Datasheet for Evaluation of Trainees

Personal Details									
No.	Name of Participant	Occupation group	Organisation /Deptt.	Age /Gender	Area	Block/ Taluka	District	Telephone No.	Email ID
Training Information									
	Website	Training topic	Institute Provided Training	Start Date	End Date	Training Venue			
Rate on a scale of 1-5									
	Conceptual Understanding	Able to communicate clearly and effectively	Able to Demonstrate	Able to put in practice	Ability to lead and related activities				

Annexure: 6

Glossary of Terms

- 1. Climate Change:** A change in the state of the climate that can be identified (e.g., by using statistical tests) by changes in the mean and or the variability of its properties and that persists for an extended period, typically decades or longer. Climate change may be due to natural internal processes or external forcings, or to persistent anthropogenic changes in the composition of the atmosphere or inland use.
- 2. Climate Extreme (extreme weather or climate event):** The occurrence of a weather or climate variable above (or below) a threshold value near the upper (or lower) ends of the range of observed values of the variable. For simplicity, both extreme weather events and extreme climate events are referred to collectively as 'climate extremes.'
- 3. Disaster:** Severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery.
- 4. Disaster Risk:** The likelihood over a specified time period of severe alterations in the normal functioning of a community or a society due to hazardous physical events interacting with vulnerable social conditions, leading to widespread adverse human, material, economic, or environmental effects that require immediate emergency response to satisfy critical human needs and that may require external support for recovery.
- 5. Disaster Risk Management:** Processes for designing, implementing, and evaluating strategies, policies, and measures to improve the understanding of disaster risk, foster disaster risk reduction and transfer, and promote continuous improvement in disaster preparedness, response, and recovery practices, with the explicit purpose of increasing human security, well-being, quality of life, resilience, and sustainable development.
- 6. Adaptation:** In human systems, the process of adjusting to actual or expected climate and its effects, in order to moderate harm or exploit beneficial opportunities. In natural systems, the process of adjustment to actual climate and its effects; human intervention may facilitate adjustment to expected climate.
- 7. Resilience:** The ability of a system and its component parts to anticipate, absorb, accommodate, or recover from the effects of a hazardous event in a timely and efficient manner, which includes ensuring the preservation, restoration, or improvement of its essential basic structures and functions.
- 8. Climate:** Climate in a narrow sense is usually defined as the average weather, or more rigorously, as the statistical description in terms of the mean and variability of relevant quantities over a period of time ranging from months to thousands or millions of years. The classical period for averaging these variables is 30 years, as defined by the World Meteorological Organization. The relevant quantities are most often surface variables such as temperature, precipitation, and wind. Climate in a wider sense is the state, including a statistical description, of the climate system. In various chapters in this report, different averaging periods, such as a period of 20 years, are also used.
- 9. Climate Projection:** A projection of the response of the climate system to emissions or concentration scenarios of greenhouse gases and aerosols, or radiative forcing scenarios, often based upon

simulations by climate models. Climate projections are distinguished from climate predictions in order to emphasize that climate projections depend upon the emission/concentration/radiative-forcing scenario used, which are based on assumptions concerning, e.g., future socioeconomic and technological developments that may or may not be realized and are therefore subject to substantial uncertainty.

- 10. Climate Variability:** Climate variability refers to variations in the mean state and other statistics (such as standard deviations, the occurrence of extremes, etc.) of the climate at all spatial and temporal scales beyond that of individual weather events. Variability may be due to natural internal processes within the climate system (internal variability), or to variations in natural or anthropogenic external forcing (external variability).
- 11. Disaster Risk Reduction (DRR):** Denotes both a policy goal or objective, and the strategic and instrumental measures employed for anticipating future disaster risk; reducing existing exposure, hazard, or vulnerability; and improving resilience.
- 12. Tropical Cyclone:** The general term for a strong, cyclonic-scale disturbance that originates over tropical oceans. It is distinguished from weaker systems (often named tropical disturbances or depressions) by exceeding a threshold wind speed. A tropical storm is a tropical cyclone with one-minute average surface winds between 18 and 32 m s⁻¹. Beyond 32 m s⁻¹, a tropical cyclone is called a hurricane, typhoon, or cyclone, depending on geographic location.
- 13. Sustainable Development:** Development that meets the needs of the present without compromising the ability of future generations to meet their own needs.
- 14. Risk Transfer:** The process of formally or informally shifting the financial consequences of particular risks from one party to another, whereby a household, community, enterprise, or state authority will obtain resources from the other party after a disaster occurs, in exchange for ongoing or compensatory social or financial benefits provided to that other party.
- 15. Sea Level Change:** Changes in sea level, globally or locally, due to (i) changes in the shape of the ocean basins, (ii) changes in the total mass and distribution of water and land ice, (iii) changes in water density, and (iv) changes in ocean circulation. Sea level changes induced by changes in water density are called steric. Density changes induced by temperature changes only are called thermosteric, while density changes induced by salinity changes are called halosteric.
- 16. Mitigation (of climate change):** A human intervention to reduce the sources or enhance the sinks of greenhouse gases.
- 17. Mitigation (of disaster risk and disaster):** The lessening of the potential adverse impacts of physical hazards (including those that are human-induced).
- 18. Impacts:** Effects on natural and human systems. In this report, the term 'impacts' is used to refer to the effects on natural and human systems of physical events, of disasters, and of climate change.
- 19. Greenhouse Effect:** Greenhouse gases effectively absorb thermal infrared radiation, emitted by the Earth's surface, by the atmosphere itself due to the same gases, and by clouds. Atmospheric radiation is emitted to all sides, including downward to the Earth's surface. Thus, greenhouse gases trap heat within the surface-troposphere system. This is called the greenhouse effect. Thermal infrared radiation in the troposphere is strongly coupled to the temperature of the atmosphere at the altitude at which it is emitted. In the troposphere, the temperature generally decreases with height. Effectively, infrared radiation emitted to space originates from an altitude with a temperature of, on average, -19°C, in balance with the net incoming solar radiation, whereas the Earth's surface is kept at a much higher temperature of, on average, 14°C. An increase in the concentration of greenhouse gases leads to an

increased infrared capacity of the atmosphere and therefore to an effective radiation into space from a higher altitude at a lower temperature. This causes a radiative forcing that leads to an enhancement of the greenhouse effect, the so-called enhanced greenhouse effect.

- 20. Hazard:** The potential occurrence of a natural or human-induced physical event that may cause loss of life, injury, or other health impacts, as well as damage and loss to property, infrastructure, livelihoods, service provision, and environmental resources.
- 21. Early Warning System:** The set of capacities needed to generate and disseminate timely and meaningful warning information to enable individuals, communities, and organizations threatened by a hazard to prepare and to act appropriately and in sufficient time to reduce the possibility of harm or loss.
- 22. Coping Capacity:** The ability of people, organizations, and systems, using available skills, resources, and opportunities, to address, manage, and overcome adverse conditions.
- 23. Coping:** The use of available skills, resources, and opportunities to address, manage, and overcome adverse conditions, with the aim of achieving basic functioning in the short to medium term.
- 24. Local Disaster Risk Management (LDRM):** The process in which local actors (citizens, communities, government, non-profit organizations, institutions, and businesses) engage in and have ownership of the identification, analysis, evaluation, monitoring, and treatment of disaster risk and disasters, through measures that reduce or anticipate hazard, exposure, or vulnerability; transfer risk; improve disaster response and recovery; and promote an overall increase in capacities. LDRM normally requires coordination with and support from external actors at the regional, national, or international levels. Community-based disaster risk management is a subset of LDRM where community members and organizations are in the center of decision making.
- 25. Adaptive Capacity:** The combination of the strengths, attributes, and resources available to an individual, community, society, or organization that can be used to prepare for and undertake actions to reduce adverse impacts, moderate harm, or exploit beneficial opportunities.
- 26. Climate Proofing:** Ensuring that current and future development policies, investments, or infrastructure are resilient to climate variability and change, reducing climate-related risks to acceptable levels.
- 27. Climate Risk:** Likelihood of a natural or human system suffering harm or loss due to climate variability or change.
- 28. Mal-adaptation:** Changes to a system or human actions that inadvertently increase vulnerability to climate-related hazards; these may be beneficial in the short-term but erode adaptive capacity in the longer-term.
- 29. Vulnerability:** The exposure and sensitivity of a system (or population) to external shocks and stresses, such as climate impacts, mitigated by the ability of that system to adapt.

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OSDMA

Odisha State Disaster Management Authority

Odisha State Disaster Management Authority

Rajiv Bhawan, Unit -5

Bhubaneswar, Odisha, India Pin Code: 751001

Phone: 0674-2395398/ 2395379

Fax: 0674- 2391871

Email: osdma@osdma.org

Website: www.osdma.org