SYNERGIZING SDGs, PARIS CLIMATE AGREEMENT AND SENDAI FRAMEWORK FOR DRR – INTEGRATING TO LOCAL ACTIONS: SUB-NATIONAL AND URBAN CONTEXT

CLIMATE RESILIENT *and* DISASTER SAFE DEVELOPMENT

Process Framework Training Manual

Contributors

Anil K Gupta, Swati Singh, Sakshi Katyal, Shashikant Chopde, Shiraz A. Wajih, Amit Kumar

CDKN Climate & Development Knowledge Network

GORAKHPUR ENVIRONMENTAL ACTION GROUP geag

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Process Framework Training Manual

Dr. Anil K Gupta
Head, Division of Policy Planning, National Institute of Disaster Management, New Delhi, India

Swati Singh
Research Consultant

Sakshi Katyal
Jr. Research Consultant

Shashikant Chopde
Research Associate, Institute for Social and Environmental Transition, Colorado, USA (India Office)

Dr. Shiraz A Wajih
President, Gorakhpur Environmental Action Group, Gorakhpur, Uttar Pradesh, India

Amit Kumar
Project Coordinator, Gorakhpur Environmental Action Group, Gorakhpur, Uttar Pradesh, India

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AUTHORS
Anil K Gupta, Swati Singh, Sakshi Katyal, Shashikant Chopde, Shiraz A. Wajih, Amit Kumar

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ORGANIZATIONS

National Institute of Disaster Management,
(Ministry of Home Affairs, Govt. of India)
IIPA Campus, New Delhi – 110002, India.

Gorakhpur Environmental Action Group,
Gorakhpur (UP), India.

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Foreword

Climate change is increasing the frequency of disasters all over the World causing massive destruction in terms of loss of human life, assets and environment. It has been observed in the recent years that climate change has increased the magnitude & frequency of precipitation related disasters like floods, droughts, landslides, typhoons and cyclones. It fundamentally undermines the progress toward development objectives especially in urban areas which are the hotspots of vulnerability to various hazards. Large population density &inappropriate changes in land-use are exacerbating the livelihood challenges causing further issues like poverty, inequality & social disparity. Adaptation to the changing climate across all aspects of disaster risk management is needed to ensure our journey to sustainability & safety together.

Disaster risk reduction (DRR) is an integral part of sustainable development. For all developmental activities to be sustainable, disaster risk must be reduced. Growing climate change awareness, livelihood & sustainability concerns have brought about a second paradigm shift in disaster management approach worldwide. Now the focus is shifting from “disaster event" & “minimising effect of disaster" to “addressing hazards, reducing vulnerability and ensuring sustainability along environment centric approach". This advancement is enhancing the scope of Climate change adaptation (CCA) & DRR convergence. Sendai Framework for Disaster Risk Reduction, 2015-

2030 (SFDRR), Sustainable Development Goals, 2030 Agenda (SDGs) & Paris Climate Agreement, 2015 have made the global community realise and recognise that DRR, CCA & sustainable development are linked to each other. Efforts are continuously increasing to adapt to climate change & reduce the disaster risks but at the same time the economic & social cost of these disasters are increasing year by year. Generally the concepts of CCA & DRR are missing from Urban Developmental Planning Processes like City Development Plan (CDP) &District Development Plan (DDP). There is an excellent scope of integrating & mainstreaming CCA & DRR concerns into these plans with the support & coordination of various line departments, policy makers, planners, scientific fraternity & communities.

The study "Scaling up Sub National Climate and Disaster Smart Development" implemented by Gorakhpur Environmental Action Group (GEAG) & Institute for Social and Environmental Transition US (ISET) with financial collaboration of Price Water House Coopers Services Ltd. London, Climate and Development Knowledge Network (CDKN) & Department for International Development (DFID) for integration of CCA in the District Disaster Management Planning in Puri & Almora districts of Odisha & Uttarakhand states respectively and state level interventions in these states as well as Uttar Pradesh is an invaluable contribution in the domain of climate related disaster risk management.

The present training manual is an outcome of the study and an evolution and process guide manual over the previous version (2014) by contextualising to sub-national and urban context for synergising SFDRR with Paris Agreement and SDGs. Specifically, the manual presents a practical approach of CCA & DRR integration & mainstreaming for an effective and realistic DDMP, learning from Gorakhpur, Odisha & Almora. The process of Shared Learning Dialogues (SLD) with various district departments enhanced the understanding of different elements of vulnerability & put emphasis on further requirements to reduce the disaster risks along with overall development of the region.

NIDM being the national policy think tank & capacity building institute is bringing this training manual along with GEAG & ISET-US to provide training & capacity building support to practitioners, policy makers, officials & academicians to pave a way to mainstream climate & disaster risks in developmental planning. The manual provides the pathways & approaches for integration of CCA & DRR so that we move together in a journey of Climate Smart & Risk Informed Development.

Dr. Anil K Gupta, Head
Division of Policy Planning
National Institute of Disaster Management,
New Delhi, India.

ACRONYMS AND ABBREVIATIONS

ADM-FR	Additional District Magistrate-Finance and Revenue
ACCCRN	Asian Cities Climate Change Resilience Network
BRGF	Backward Region Grant Fund
CBDRR	Community Based Disaster Risk Reduction
CCA	Climate Change Adaptation
CDKN	Climate and Development Knowledge Network
CDPs	City Development Plans
CI	Critical Infrastructure
CIP	Critical Infrastructure Protection
CMP	Crisis Management Plan
COP	Conference of Parties
CRF	Calamity Relief Fund
CRZ	Coastal Regulation Zone
DC	District Collector
DDMA	District Disaster Management Authority
DDMP	District Disaster Management Plan
DEST	Department of Environment, Science and Technology
DM	Disaster Management
DMTs	Disaster Management Teams
DRR	Disaster Risk Reduction
ECO-DRR	Ecosystem Based Disaster Risk Reduction
EIA	Environmental Impact Assessment
GEAG	Gorakhpur Environmental Action Group
GLOF	Glacial Lake Outburst Flood
HFA	Hyogo Framework for Action
HRVC	Hazard, Risk, Vulnerability and Capacity
HWTS	Household water treatment and safe storage
IAY	Indira Awas Yojana
ICDS	Integrated Child Development Services
ICT	Information and Communication Technology
IDA	Integrated District Approach
IMD	India Meteorological Department
IPCC	Intergovernmental Panel on Climate Change
ISET	Institute for Social and Environmental Transition
IWMP	Integrated Watershed Management Programme
JNNURM	Jawaharlal Nehru National Urban Renewal Mission
LLOF	Landslide Lake Outburst Flood
LU	Learning Unit
MDGs	Millennium Development Goals
MDM	Mid-Day Meal Scheme
MoEF	Ministry of Environment and Forest

MGNREGS	Mahatma Gandhi National Rural Employment Guarantee Scheme
MHA	Ministry of Home Affairs
MoUD	Ministry of Urban Development
NAPCC	National Action Plan on Climate Change
NCCF	National Calamity Contingency Fund
NDMA	National Disaster Management Authority
NDMP	National Disaster Management Plan
NDRF	National Disaster Response Force
NGO	Non-Government Organisation
NIDM	National Institute of Disaster Management
NRHM	National Rural Health Mission
NRLP	National Rural Livelihood Project
NRM	Natural Resources Management
NWDPRA	National Watershed Development Project for Rain fed Areas
OSDMA	Odisha State Disaster Management Authority
PMGSY	Pradhan Mantri Gram Sadak Yojana
PRI	Panchayati Raj Institutions
RAY	Rajiv Awas Yojana
RKVY	Rashtriya Krishi Vikas Yojana
SAARC	South Asia Association for Regional Cooperation
SAPCC	State Action Plan on Climate Change
SBM	Swachh Bharat Mission
SCM	Smart Cities Mission
SDGs	Sustainable Development Goals
SDMA	State Disaster Management Authority
SDMP	State Disaster Management Plan
SDRF	State Disaster Response Fund
SFDRR	Sendai Framework for Disaster Risk Reduction
SIRD	State Institute for Rural Development
SLD	Shared Learning Dialogues
SSA	Sarva Shiksha Abhiyan
SW	South-West
TNA	Training and Need Assessment
ToT	Training of Trainers
UIDSSMT	Urban Infrastructure Development Scheme for Small & Medium Towns
ULB	Urban Local Bodies
URDPFI	Urban and Regional Development Plan Formulation and Implementation Guidelines
UT	Union Territories
VSCS	Very Severe Cyclonic Storm
WALMI	Water & Land Management Institute

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Chapter One

MAINSTREAMING CCA-DRR INTEGRATION INTO DEVELOPMENT PLANS

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SECTION: I

Climate Change Adaption Needs for Disaster Resilient Development

A. Risk and Challenges

All over the world, the frequency and the severity of natural disasters, caused by climate related functions and events have been increasing. A natural disaster of great proportions may directly cause massive loss of life, but it also has a huge impact on the socio-economic structure of a society and its opportunities for development. Eco-systems, on which people depend directly for their subsistence and, their environmental resources for development, are also severely damaged by natural disasters. More often than not, the poorest people are hit disproportionately hard in these situations. India is a highly disaster prone country and much of the nation's land mass falls in high risk zones. It is estimated that over 44 million people are affected by natural disasters every year in India (Gupta, et al., 2012). More than 70% of the population and 80% of its geographical area is vulnerable to cyclones, floods, landslides, drought, earthquakes or other localized hazards.

High Power Committee on disaster management (DM) constituted in the year 1999 identified 32 different types of disasters out of which 11 are of hydro-metrological origin, affecting one or other region of the subcontinent. The vulnerabilities to these disasters are compounded by the low socio-economic conditions of the communities, which significantly increase the losses to lives, livelihoods and property. Further it has been recognized that climate-change is going to pose impacts on global and regional scales. Rapid changes in climate have already resulted in glacial retreat, global sea level rise, changes in temperature and rainfall patterns, affecting the natural resources productivity and quality. There is also an observed increase in the frequency and intensity of hydro-meteorological disasters like drought, floods, heat and cold waves, desertification and coastal hazards like cyclone, coastal and sea erosion, storm surges and flooding in several parts of the sub-continent.

B. Needs and Opportunities

While the community at large is trying to adapt itself to these regular occurrences, the economic and social costs to do so continue to mount year after year. There is a need to have an integrated approach with the inclusion of policy makers, planners, scientific fraternity and communities to work together to develop appropriate strategies to mainstream climate change adaptation (CCA) and disaster risk reduction (DRR) into development planning process (Venton & Trobe, 2008).

In India disaster management comes under revenue and relief department whereas climate and related subject comes under the jurisdiction of Ministry of Environment and Forest and respective States' Department of Environment. The Disaster Management Act, 2005 and Disaster Management Policy 2009, envisages disaster risk reduction instead of conventional relief centric approach which has been followed by

state departments since years. It is mandated that every department has to prepare a departmental level Disaster Management (DM) plan and allocate specific budget for DM (preparedness and mitigation as well). The component of CCA in short/medium/long term has not been incorporated in these plans. The 13th Finance commission does have specific allocation for DM capacity building, trainings and non-structural components. Climate change adaptation projects are mainly funded by multinationals or donors and facilitated or implemented through NGO (Non-Government Organization) partners. In India, DM Act is focusing more on disaster preparedness and response. Aspects of climate change mitigation/adaptation as part of disaster management framework are not recognized in the Act although DM act considers damage or loss to environment as disaster. There is no specific provision for assessing environmental damages/restoration of environment after disasters where environment is always at stake after recovery process. Ministry of Environment and Forest is only responsible for chemical disasters which are hazardous in nature. Similarly the Environment Protection Act of 1986 is focused more on chemical/industrial disaster/hazardous waste. Disasters and resultant environmental damages are not addressed even in the environmental laws. However, Wetlands Rules, 2010 and Coastal Regulation Zone notifications do have provisions for hazard mapping and risk assessment.

TABLE 1: COMPARATIVE ANALYSIS OF STATE DISASTER MANAGEMENT PLAN (SDMP) AND STATE ACTION PLAN ON CLIMATE CHANGE (SAPCC) AT STATE LEVEL IN INDIA

	SDMP	SAPCC
Authority	Multi-tier institutional framework National Disaster Management Authority (NDMA), State Disaster Management Authority (SDMA), District Disaster management Authority (DDMA), local authority	Advisory council on Climate change
Chaired by	Prime Minister, Chief Minister, District Collector (DC), Local authority	Prime Minister, Chief Minister
Statutory/legal provision	DM Act, 2005	No legal provisions
Nodal ministry	Ministry of Home Affairs	Ministry of Environment and Forests
Objectives	Comprehensive Disaster Management Plan addressing all natural and human induced hazards and disasters	Identifies measures that promote development objectives while also yielding co-benefits for addressing climate change effectively. It outlines a number of steps to simultaneously advance India's development and climate change-related objectives of adaptation and mitigation.
Departments	Disaster Management and Relief, Revenue	Forest and Environment department, DST (Department of Science and Technology)
	In line with the development plans of the State Five Year Plan	In line with the eight missions of the NAPCC
Point of integration	Emerging concerns of urban, environment, population etc. are included in the proposed guideline	Disaster management has been included as a key area in SAPCC
Financial arrangement	National Calamity Contingency Fund (NCCF), Calamity Relief Fund (CRF), Mitigation fund, 13th finance commission allocations	No such dedicated funds for CCA but other ministries have fund under different missions

Source: Gupta, et al., 2014

Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) approaches are integrated to some extent at national level through India's commitment to Hyogo Framework for Action, 2005-15; the National Action Plan on Climate Change (NAPCC, 2008), and other ministerial level programs. Furthermore, an array of sectoral departments such as Water Supply, Health, Agriculture, Rural Development and Urban Development undertake activities that influence climate and disaster resilience. However, when the overall implementation of such projects and schemes is observed at the state or district level, limited horizontal and vertical coordination exists between departments, especially on integrating DRR and CCA concerns into their sectoral programs. These gaps undermine the ability to translate concepts and DRR or CCA policies into action on the ground.

C. Pathways and Approaches

There are several tools and methods through which DRR and CCA measures have been integrated to reduce the risk of natural disasters. They are:

1) Legal Policy Framework for Disaster Management

Disaster Management Act enacted in 2005 provides institutional framework for disaster management. As provided under the Act, National Disaster Management Authority (NDMA) has been constituted for laying down policy and guidelines for Disaster Management in India. The NDMA has issued several guidelines on various aspects of disaster management. Similarly, State Disaster Management Authorities (SDMAs) and District Disaster Management Authorities (DDMAs) are being constituted for laying down guidelines for state/district level.

2) Environmental and Natural Resource Laws in DRR and Integrating CCA

Regulatory provisions related to environment and natural resources - water, land, agriculture, forests, wildlife, habitats, ecosystems; procedures and planning -Environmental clearance, EIA, audit, risk analysis, land-use and zoning, emergency preparedness; and environmental services - drinking water, sanitation, waste management, preventive-health, including climate mitigation and adaptation etc. although primarily aimed at environmental quality and resource management, play a significant role in addressing hazards, reducing underlying causes of vulnerability and enhancing capacity, and thereby, relate to Disaster Risk Reduction. A detailed training module on role of environmental legislations in DRR has been developed by NIDM jointly with GIZ Germany (Gupta, et al., 2013).

3) Inclusion of DRR into Development Schemes and Projects

For mitigating climatic hazards and minimizing the impacts of hydro-meteorological disasters and for improving livelihoods and overall well-being of people, Central and State Governments have implemented a number of schemes, where activities are facilitated by the involvement of PRIs, NGOs and other non-profit organizations. Some of the important national level programs are JNNURM, Rajiv Awas Yojna, National Rural Health Mission, National Rural Livelihood Program, Sarva Shiksha Abhiyaan (SSA), Indira Awas Yojna (IAY), MGNREGA (Mahatma Gandhi National Rural Employment Guarantee Act), Integrated Watershed Management Programme (IWMP), Urban Infrastructure Development Scheme for Small and Medium Towns (UIDSSMT) etc.

4) Integration of CCA-DRR within policy-Planning Instruments

Instruments useful in the formulation of policy and/or implementation of policy are called 'policy instruments'. Certain important environmental-policy instruments directly useful in developing and implementing CCA and DRR (and their convergence) are discussed in the table 2.

TABLE 2: MODERN ENVIRONMENTAL-POLICY INSTRUMENTS AND THEIR ROLE IN DRR

INSTRUMENT	BRIEF DESCRIPTION/ EXAMPLES	ROLE IN CCA-DRR INTEGRATION
• **Strategic Environmental Assessment (SEA)**	EIA of policies, plans and programmes	Mainstreaming CCA and DRR towards sustainable development with ecosystem approach, climate-risk mitigation and post-conflict recovery context (OECD, 2011)
• **Environmental Impact Assessment (EIA(s)**	Regional EIA, Country EIA, Cumulative EIA, Carrying Capacity Based Planning Process	Anticipation of hazards, risk hotspots, vulnerability – spatial contexts; Projected mitigation and capacities; Residual risks for emergency response/plan
• **Life Cycle Assessment (LCA)**	Environmental impacts during different stages of life-cycle of a material or a major project	Prediction and forecasting of changing patterns of hazards and risk profiles over time to cause a disaster
• **Ecological-footprint**	Human demand of natural resources and ecosystem services bearing to regeneration capacity	Anticipation of ecosystem fragility or biotic pressure on land and water resources that lead to hazards and aggravate disaster risks
• **Environmental Legislation**	Policy Statements, Acts & Rules, Ordinances, Notifications, Standards and Codes, Treaties	Provides legal support for reducing hazard precursors, vulnerability causes; offers capacity and recovery potentials, health, livelihood and sustainability.
• **Auditing / Environmental Management System (EMS)**	Environment audit, Water-balance audit, Safety & Health audit, Eco-auditing	Impact of a strategy or activities of an organization/facility, person or business on environment leading to hazards, vulnerability or mitigation, and related data/documentation
• **Cess / Levees**	Charges for natural resource exploitation, environmental services - water and clean-up, etc.	Reduces pressure on landscape and ecosystems; facilitates conservation – reduces hazard intensities, susceptibility and improves response resources
• **Natural Resource Accounting (NRA)**	Transformation of data on environmental features for use in economic decisions	Assessment of prevailing and anticipation of vulnerability; resilience and recovery potentials
• **Eco-labelling / Eco-mark**	Public information on eco-friendly production and product	Promoting peoples contribution and concern to reducing hazards in nature and disaster prevention
• **Environmental Taxes**	Polluter pays principle; payments to curb the ill-effects on environment	Curbing environmental precursors of hazards and vulnerability; financing mitigation and sustainability

Source: Gupta, et al., 2014 a

D. Process Framework and Lessons

1) Gorakhpur Model – District Level (Riverine Floods)

Gorakhpur is a flood prone district and has been severely impacted by disastrous consequences of the same in the past. Gorakhpur has been one of the pioneer districts that have taken lead role in mainstreaming CCA and DRR concerns into developmental plans to combat the effects of climate induced disasters (GEAG, 2014).

The Gorakhpur case study is one of its own kind where capacities of district level officials were developed in understanding the concepts of CCA and DRR and preparation of department level disaster management plan with special focus on flood. It was observed that, if suitable capacities of the officials are built, they are receptive towards bringing change in the system. In fact, involvement of young scientists in the planning process was another remarkable achievement of the project, which resulted in capacity building of younger generation for mainstreaming CCA and DRR into development planning. Towards the end of the successful implementation of the project at Gorakhpur, the State Government itself promoted the process document and has encouraged other districts of Uttar Pradesh to follow the document for integration of CCA and DRR issues into development planning.

FIGURE 1
COMMUNITY DISCUSSION IN GORAKHPUR, UP

2) Odisha – Puri (Coastal, Multi-hazard—deltaic floods, drought, cyclones, storm surges)

Based on the past experiences to combat natural disasters such as deltaic floods and cyclones that have ravaged densely populated areas of Puri district, the need for an effective and realistic District Disaster Management Plan was felt. GOI-UNDP project on 'Enhancing Institutional and Community Resilience to Disasters and Climate Change (2013-2017)' and CCA-DRR project 'Scaling up sub national climate and disaster smart development in India' by GEAG with support of NIDM and ISET-I funded by CDKN, have provided technical support for strengthening capacity of stakeholders including communities and institutions to fast-track implementation of the planning frameworks on Disaster Risk Reduction and Climate Change Adaptation. Under this initiative, DDMP of Puri is updated with special focus on climate change adaptation. The risk reduction plan of Puri contains ongoing coping mechanisms to reduce the disaster risk in long term with special focus

FIGURE 2
SHARED LEARNING DIALOGUE IN PURI, ODISHA

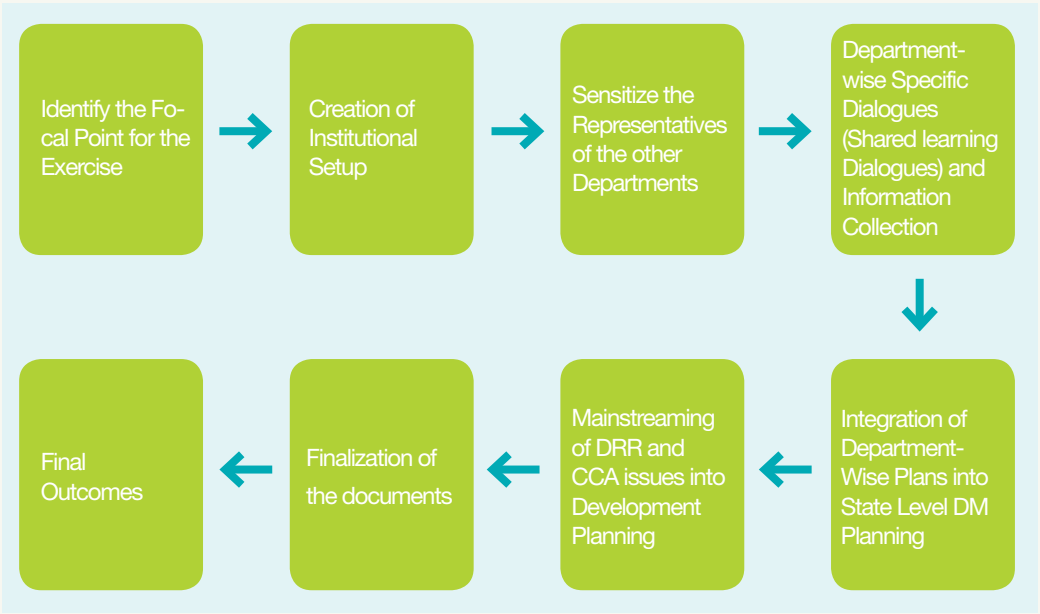
on climate induced disasters. This plan has been prepared after consultations with key line departments. First section of the plan, 'Climate Change Action Plan' describes the impacts and actions to be taken up by these line departments to minimize adverse impacts. Rise in temperature, increase in frequency of storms, flash floods and drought is observed every year in different part of the district. The plan lists major developmental programs and schemes with relative DRR-CCA component.

3) Uttarakhand – Almora (Hills, Multi-hazard-Flash floods, Landslides, water scarcity, hail storm, forest fires etc.)

FIGURE 3: SHARED LEARNING DIALOGUE IN ALMORA, UTTARAKHAND

Uttarakhand which is situated in the Indian Himalayan region is one of the multi-disaster prone states of the country due to its geo-climatic, ecological and socio-economic settings. In the year 2013, the region suffered a major flash flood with huge loss of lives and wide spread destruction (Satendra et al., 2014). Almora is one of the districts in Uttarakhand which is affected by natural hazards like earthquake, LLOFs (Landslide Lake Outburst Flood), GLOFs (Glacial Lake Outburst Flood), avalanches, landslides, cloudburst etc. Human activities like hydropower generation, road and building constructions, river-bed mining, etc. have also contributed to the increased vulnerability of the region. An effort was made to develop a climate resilient DDMP in the district with the support of CDKN and ISET-I. The objective of the plan is to reduce the disaster risks along with overall development of the region. Micro-risk analysis of the region was done and CCA and DRR component was integrated into major development programs and schemes.

FIGURE 4: ESSENTIAL STEPS FOR INTEGRATION OF CCA AND DRR ISSUE INTO DEVELOPMENTAL PLANS AND SCHEMES AT SUB-NATIONAL LEVEL



State	Uttar Pradesh	Odisha	Uttarakhand
District	**Gorakhpur**	**Puri**	**Almora**
Hazards	Riverine flood	Coastal, Multi-hazard—deltaic floods, drought, cyclones, storm surges	Hills, Multi-hazard-Flash floods, Landslides, water scarcity, hail storm, forest fires etc
Lead Agency	DDMA-Gorakhpur	OSDMA-Odisha	DDMA-Almora
Nodal Officer	ADM-FR	Collector and District Magistrate	District Magistrate
Research Institutes/ agencies	GEAG-ISET-NIDM	GOI-UNDP, GEAG-ISET-NIDM	GEAG-ISET-NIDM
Institutional analysis process	Shared learning dialogues (SLD), workshops, policy roundtables, interactive learning sessions, mapping of key systems (departments/ themes)	Shared learning dialogues (SLD), Community Consultation, workshops, policy roundtables, interactive learning sessions	Shared learning dialogues (SLD), workshops, policy roundtables, interactive learning sessions
Climate change component	Trend Analysis, Future Climate Scenario, Hazards Analysis of Major Past Hazards	Trend Analysis, Future Climate Scenario, Hazards Analysis of Major Past Hazards	Trend Analysis, Future Climate Scenario, Hazards Analysis of Major Past Hazards
Point of integration	Schemes for DRR and CCA: Schemes from central and state government with DRR linkages are mentioned. Possible actions under each scheme are mentioned	Risk Reduction Plan of DDMP-Climate change action plan: Climate induced disasters are listed with department specific impacts and exiting coping mechanisms. Schemes for DRR and CCA: Schemes from central and state government with DRR linkages are mentioned. Possible actions under each scheme are mentioned	Schemes for DRR and CCA: Schemes from central and state government with DRR linkages are mentioned. Possible actions under each scheme are mentioned

TABLE 3. APPROACH FOR INTEGRATION OF DRR AND CCA ISSUE IN DEVELOPMENT PLANNING AT SUB-NATIONAL LEVEL: A COMPARATIVE ANALYSIS

4) Delhi Declaration: Risk to Resilience

A National Conference on 'Mainstreaming Climate Change Adaptation and Disaster Risk Reduction into Development Plans' was organized by NIDM on 28 January, 2014 in joint collaboration with ISET, US, and GEAG, Gorakhpur (UP), India. The outcome of the workshop was 'Risk to Resilience Declaration 2014' shortly known as 'Delhi Declaration'. The participants of the workshops pledged to abide by the concerns and take up relevant initiatives,

FIGURE 5: RISK TO RESILIENCE WORKSHOP ON CCA-DRR IN NEW DELHI

actions and strategies to promote the actions towards mainstreaming climate change adaptation and disaster risk reduction into developmental planning at various levels and to encourage a safer habitat in this Declaration. The concerns and actions of the declaration were as below:

Key Concerns

1. Most of the works have been episodic and project driven
2. Lack of inter-departmental/ Inter-agency coordination
3. Lack of institutional memory on experiences gained
4. Lack of data relating to climatic parameters and losses constrain holistic understanding of current and future vulnerability
5. The inappropriate development practices have magnified the disaster risks that will be further be aggravated by Climate Change
6. There is serious disconnect between planning and implementation on the ground.
7. Lack of effective amalgamation of 'top-down' and 'bottom-up' approaches
8. Lack of effective implementation of policies that promote Climate Resilience
9. Lack of periodic updating of vulnerability profiles and risk atlas (e.g. CWC Flood Atlas was prepared almost 16 years back; also, assessment of vunerabilities in the existing structures is limited).
10. Lack of recognition about cascading impacts of failure of one system on other systems
11. Lack of CCA and DRR concerns, individually and combined, in plans, programmes, schemes of various departments
12. Lack of models that demonstrate sustaining high economic growth and being inclusive at the same time in the context of climate change
13. Lack of building codes and design norms for flood resilient housing

Actions

1. Develop compendium of lessons learnt and practices in decentralized resilience planning and housing
2. Developing effective system of documentation (including process and outcomes) in departments.
3. Develop techniques and approaches to understand underlying and systemic causes of vulnerability
4. Develop approaches and techniques for assessing impact of development projects on climate and disaster risks
5. Develop capacity to promote restructuring at local level—constitution of appropriate local institutions that enable preparedness
6. Identify, develop and document suitable models of high economic growth that are inclusive in the context of climate change
7. Systems to be developed and promoted for maintaining local and regional databases on parameters indicating exposure and sensitivity
8. Capacity building of district officials and other relevant stakeholders (including research institutes, Universities and NGOs) on developing climate sensitive DDMP

9. Develop standard designs and guidelines to promote flood resilient housing and designs that promote dealing with increasing heat stress in a eco-friendly way
10. Update vulnerability profiles and atlas at District level and below.
11. Map Vulnerability and Resilience at different levels based on available data with some 'permissible' level of uncertainty.

e. Urban Context, Climate Resilient and Disaster Safe Infrastructure

A diverse set of infrastructure is required for sustenance of social well-being, developmental activities and fulfilling the growing needs of a city. Infrastructure provides critical social and economic services to the cities where they are located and the boundaries of services go to regions beyond that (TERI, 2014). Important physical infrastructure of a city includes water supply, health care, communication, electricity, transport and buildings, etc. In addition, environmental infrastructure such as land and water resources provides foundational support to physical structure. Hence, status of environmental infrastructure is prime in shaping the vulnerability of a city. This infrastructure when impacted by a disaster either natural or climate change induced, disturbs the normal activity of a society and it calls for an emergency assistance. Urban areas and adjoining rural areas share umbilical nature of linkages regarding dependency. While the urban areas depend on sources of water supply in adjoining rural areas, the rural areas depend on the urban areas for employment opportunities and other services like health. Hence, understanding the two-way flow of goods and services across borders of jurisdiction of ULBs is key to understand the nature of rural-urban connect.

The impacts of climate change aggravate the natural hazards like floods, droughts, cyclones, landslides and forest fire. It increases the vulnerability of people by affecting their resources, capacities and critical infrastructure. Climatic and topographic factors also determine the impact of different natural disasters on infrastructure and resources including the critical ones (Bach, et al., 2013). Infrastructure can be prepared to cope with climate change impacts to which it is currently exposed to or may be exposed in future during its long operational existence (Climate Resilient Infrastructure: Preparing for a Changing Climate, 2011). It is the location and design of new infrastructure that determines the probable impacts of climate change on it, while the maintenance and management of existing infrastructure determines its capacity to withstand climate change impacts (TERI, 2014). It is of great importance now to make the infrastructure climate resilient and disaster safe.

1) Building Disaster Safe Infrastructure

Disaster risk is increasing globally threatening the developmental gains, owing largely to a mix of unplanned urban development and leading to critical infrastructure vulnerability. Important infrastructure services are interrupted by disasters and we lose easy access to electricity, health care, telecommunications, transportation or water. Critical Infrastructural facilities are defined as "The primary physical structures, technical facilities and systems which are socially, economically or operationally essential to the

functioning of a society or community, both in routine circumstances and in the extreme circumstances of an emergency. […] Critical facilities are elements of the infrastructure that support essential services in a society. They include such things as transport systems, air and sea ports, electricity, water and communications systems, hospitals and health clinics, and centres for fire, police and public administration services" (UN/ISDR 2009, p. 8 f) (Cited in Bach, et al., 2013).

It is highly important to understand the vulnerability of such critical infrastructures as we are highly dependent on these networks. Vulnerability assessment will be beneficial in the following manner:

I. "Critical Infrastructures generally are high cost and planned for long-term spanning decades. In order to avoid major losses and failures, vulnerability assessments can help to improve the resilience and robustness of such structures in the medium and long-run if being taken into account in planning processes already.

II. Vulnerability analysis can be used in the aftermath of a destructive event where also budgets might increase due to relief funding. Infrastructure might then be built up in a more resilient way or at new locations where they could be less exposed" (Bach, et al., 2013).

The following points should be considered to strengthen disaster resilience of critical infrastructure (UNISDR, 2012)

- To strengthen protective infrastructure, structural and non-structural measures should be combined with city policies, management strategies and plans for geological, climate-related and technological hazards and extremes.
- A risk assessment of each system should be done to review its operation, effectiveness and function. On that basis programmes should be designed to strengthen the malfunctioning infrastructure.
- Physical environmental changes should be recognised which could potentially change the flood patterns and keeping in mind the experiences from past disasters and future projections, an early warning and monitoring system for infrastructure should be established.
- Roads and sites should be designed in such a manner that they remain accessible during emergencies including fire and earthquakes. The seismic codes applicable to the country should be adopted by all public buildings and their compliance must be promoted by all developers and builders.
- Vulnerability analysis of existing infrastructure to natural hazards should be done. Measures should be taken to prevent damage and to increase capital investments for retrofitting or replacing the most critical infrastructure.
- Special programmes should be developed to protect historical buildings and preserving cultural heritage of a city.
- While developing an urban plan some minimum criterion and standards of resilience and safety must be designed.
- Investments should be done to design and construct new sustainable infrastructure at appropriate locations while setting a higher standard of hazards and disaster resilience so that the infrastructure can withstand disruptive events and function effectively during emergency.

- For existing infrastructure an assessment should be conducted to look for maintenance improvement and repair programmes. This would clear the vision of retrofitting, capacity redesign, demolition or replacement of damaged or obsolete structures.
- Avoid usage of those buildings that are already damaged by a previous disaster and if possible consider demolishing at risk infrastructure if it cannot be repaired.

Critical Infrastructure Protection (CIP) Framework

Much has been written in the past 20 years about the deteriorating condition and quality of the nation's roads and bridges and its power and water systems and about the trillions of dollars that it will take to fix them. The issues, however, are much more complex: How we as a nation choose to renew our infrastructure systems in the coming years will help determine the quality of life for future generations. It will also help determine our success in meeting other national challenges, including those of remaining economically competitive and reducing our dependence on imported oil, and of dealing with issues related to global climate change, national security, and disaster resilience.

Significantly reducing greenhouse gas emissions will require that power and mobility be provided in new ways using new systems and technologies. Limiting deaths and injuries, property losses, impacts on ecosystems, and recovery time after natural or human-made hazards requires robust and resilient infrastructure systems. Every year public- and private sector organizations spend hundreds of billions of dollars to operate and maintain power, water, waste water, transportation, and telecommunications systems.

A framework is needed to structure these efforts so that on-going activities, knowledge, and technologies can be aligned and leveraged to help meet multiple national objectives. The essential components of the needed framework are as follows:

- A broad and compelling vision that will inspire individuals and organizations to pull together to help meet the imperatives by renewing the nation's Critical Infrastructure systems. Such a vision would focus on a future of economic competitiveness, energy independence, environmental sustainability, and quality of life.
- A focus on providing the essential services involving water and waste water, power, mobility, and connectivity – in contrast to upgrading individual physical facilities – to foster innovative thinking and solutions.
- Recognition of the interdependencies among Critical Infrastructure systems to enable the achievement of multiple objectives and to avoid narrowly focused solutions that may well have serious, unintended consequences.
- Collaborative, systems-based approaches to leverage available resources and provide for cost-effective solutions across institutional and jurisdictional boundaries.
- Performance measures to provide for greater transparency in decision making by quantifying the links among infrastructure investments, the availability of essential services, and other national imperatives.

(Source: Excerpt from National Research Council (NRC) of the National Academies (2009): Sustainable Critical Infrastructure Systems: A Framework for Meeting 21st Century Imperatives, Report of a Workshop, Washington D.C. Available via: http://www.nap.edu/catalog.php? record_id=12638 last accessed: 02.09.2013.)

TABLE 4:
SUMMARY OF DISASTER SAFE INFRASTRUCTURE IN NATIONAL AND LOCAL LEVEL ACTION TO ACHIEVE SFDRR PRIORITIES

SFDRR Priority	Relevant National and Local Level Actions for Disaster Safe Infrastructure
Strengthening disaster risk governance to manage disaster risk	Addressing disaster risk in publically owned, managed or regulated services and infrastructures
Investing in disaster risk reduction for resilience	To strengthen, as appropriate, disaster-resilient public and private investments, particularly • through structural, non-structural and functional disaster risk prevention and reduction • measures in critical facilities, in particular schools and hospitals and physical infrastructures
Enhancing disaster preparedness for effective response and to 'Build Back Better' in recovery, rehabilitation and reconstruction	To promote the resilience of new and existing critical infrastructure, including water, transportation and telecommunications infrastructure, educational facilities, hospitals and other health facilities, to ensure that they remain safe, effective and operational during and after disasters in order to provide live-saving and essential services. To consider the relocation of public facilities and infrastructures to areas outside the risk range, wherever possible, in the post-disaster reconstruction process, in consultation with the people concerned, as appropriate.

(Source: Compiled from United Nations Sendai Framework for Disaster Risk Reduction, 2015-2030)

2) Climate Resilient Infrastructure

Climate change is the reality of present and it is likely to generate possible disasters in the future. Climate change is exerting immense pressures on communities and their supporting resources and infrastructure. Warmer temperatures, changes in the rainfall patterns, prolonged droughts, sea level rise and increased frequency and intensity of extreme climate events are expected to pose a potential risk on operation and maintenance of critical infrastructure. The existing infrastructure is less effective in managing the extreme climate events. For example: floods can damage the basic water infrastructure and it will take years to repair. In the context of the reality of changing climate patterns, DRR initiatives need to be integrated with climate change adaptations. Hotspot analysis, priority actions and local level initiatives will be the key for building climate resilient cities.

How to make the infrastructure climate resilient?

New infrastructure can be made climate resilient by making sure that it is located, designed, built and operated with the current and future climate in mind. To make the existing infrastructure climate resilient, it is important to ensure that the maintenance regimes incorporate resilience to the impacts of climate change over an infrastructure's lifetime.

Examples of innovation/best practice in Climate Resilience Development

Water quality: Household water treatment and safe storage (HWTS)

HWTS treats water in the home to improve the quality of drinking water and reduce waterborne disease. Various treatment technologies can be used, from filters to disinfectants. It is cost effective and there are simple systems available. It improves water quality at the point of use and increases climate resilience because it can still be used when other water sources are affected by a climate hazard, e.g. if a well is contaminated following a flooding event. However, contamination can still occur if systems are not proper.

Water quantity: Rainwater harvesting/collection

Rainwater harvesting increases climate resilience because it expands the capacity to store water. It is an effective option particularly in areas where other water sources are unreliable or are simply not available, for example in sub-Saharan Africa. Rainwater is collected from rooftops to provide water for the household for drinking and other uses such as irrigation. The systems used for harvesting rainwater are decentralised, being managed and operated at the household level. As well as providing a safe and sufficient water supply, rainwater harvesting also reduces the burden of fetching water, meaning that more time can be spent on educational and social activities.

Source: (Elliott, et al., 2011; Van Steenbergen and Tuinhof, 2010).

To achieve this, there are certain possible adaptation measures (Climate Resilient Infrastructure: Preparing for a Changing Climate, 2011)

- Ensuring infrastructure is resilient to potential increases in extreme weather events such as storms, floods and heat waves as well as extreme cold weather.
- Ensuring investment decisions consider changing patterns of consumer demand as a result of climate change.
- Building in flexibility so infrastructure assets can be modified in the future without incurring excessive costs.
- Ensuring that infrastructure organisations and professionals have the right skills and capacity to implement adaptation measures.

The ultimate result will be a more resilient, robust and climate smart infrastructure which will be able to cope up with projected climate impacts e.g. increased flexibility to cope with uncertainty without massive failure and economic cost.

SECTION: II

Synergizing Sustainable Development Goals (SDGs), Paris Agreement and Sendai Framework for DRR in Developing World and Urban Areas, Integrating into Local Actions

a. Disaster Management to Disaster Risk Reduction – Journey to Sustainability and Safety Together

"DRR is the concept and practice of reducing disaster risks through systematic efforts to analyse and reduce the causal factors of disasters. Reducing exposure to hazards, lessening vulnerability of people and property, wise management of land and the environment, and improving preparedness and early warning for adverse events are all examples of disaster risk reduction."[1] The disciplines like disaster management, disaster mitigation and disaster preparedness are included in DRR. In the 1970's the prevalent global paradigm was ad hoc disaster response. A permanent disaster management approach came into existence in 1980's which continuously deals with all aspects of disaster management cycle: preparedness, response, recovery and reconstruction. Continuous efforts are being done for the last twenty five years to address the challenges of repeating disasters and to come out of the cycle of disaster through preventive risk management (HDR, 2016).

The importance of DRR to achieve sustainable development was identified in Millennium Development Summit in September 2010. The High-level Plenary Meeting on accelerating progress towards the achievement of all Millennium Development Goals (MDGs) by 2015 identified that disaster risks are increasing globally due to increasing vulnerability to natural hazards. A risk-sensitive approach would be required for sustainability and accelerated achievement of MDGs.

The Hyogo Framework for Action (HFA), 2005-2015 recognized that DRR is a cross-cutting issue in relation to sustainable development and it is an important element to achieve internationally agreed development goals, including those contained in the Millennium Declaration. Rio+20 or The United Nations Conference on Sustainable Development took place in Rio de Janeiro, Brazil

1 http://www.unisdr.org/who-we-are/what-is-drr. [Accessed 17 June 2016]

in June 2012. Member states of the conference launched a process to develop a set of Sustainable Development Goals (SDGs) that built upon the MDGs and converged with the post 2015 development agenda. The lessons learnt from 1.3 million deaths, 4.4 billion affected people and economic losses worth $2 trillion due to disasters since the 1992 Rio Earth Summit, called for an accelerated implementation on HFA 2005-2015.[2] Rio+20 Outcome Document- The Future We Want -contains a section on DRR which sets out a substantial foundation for consideration on post 2015 framework to guide nations after the expiry of HFA 2005-2015.

b. International Frameworks- Integration of CCA and DRR

The year 2015 was a landmark year for the United Nations and Global Development Agenda. The convergence of interests and global concerns for sustainable development, disaster risk reduction and climate change led to the formation of a new roadmap for a sustainable and safe world together: The Sendai framework for disaster risk reduction, The 2030 agenda for sustainable development and The Paris Climate Agreement. These agreements of global significance provide opportunities to build coherence across different but overlapping policy areas.

1) Sendai Framework for Disaster Risk Reduction, 2015-2030

The Sendai Framework for DRR (SFDRR) was adopted at the Third UN World Conference in Sendai, Japan, on March 18, 2015. It is the successor instrument of HFA 2005-2015 and is founded on elements which ensure continuity with the work done by States and other stakeholders under HFA. It is a non-binding voluntary agreement for 15 years which recognizes the responsibility of States for DRR and the shared responsibility with local government, private sector and other stakeholders. SFDRR improves on HFA by identifying the gaps, good lessons learned and future challenges. Key features of SFDRR are:

- Shifting focus from disaster management to disaster risk management by focusing on the underlying drivers of risk.
- For the first time one global goal and outcome is defined.
- Seven global targets are defined to support the assessment of global progress in achieving the outcome and goal of the present Framework.
- The Framework emphasises the need of strengthening the disaster risk governance by placing governments at the centre of disaster risk reduction.
- A wider scope of DRR focussing on both natural and man-made hazards and related environmental, technological and biological hazards and risks.
- A set of guiding principles are provided for the implementation of Framework.
- Learning from the experience gained by the implementation of HFA and to achieve the expected outcome and goal, the Framework prioritises the actions into four priority areas.
- Along with social vulnerability, great emphasis is given to environmental aspects by strongly recognising that implementation of integrated environmental

2 http://www.unisdr.org/archive/27335

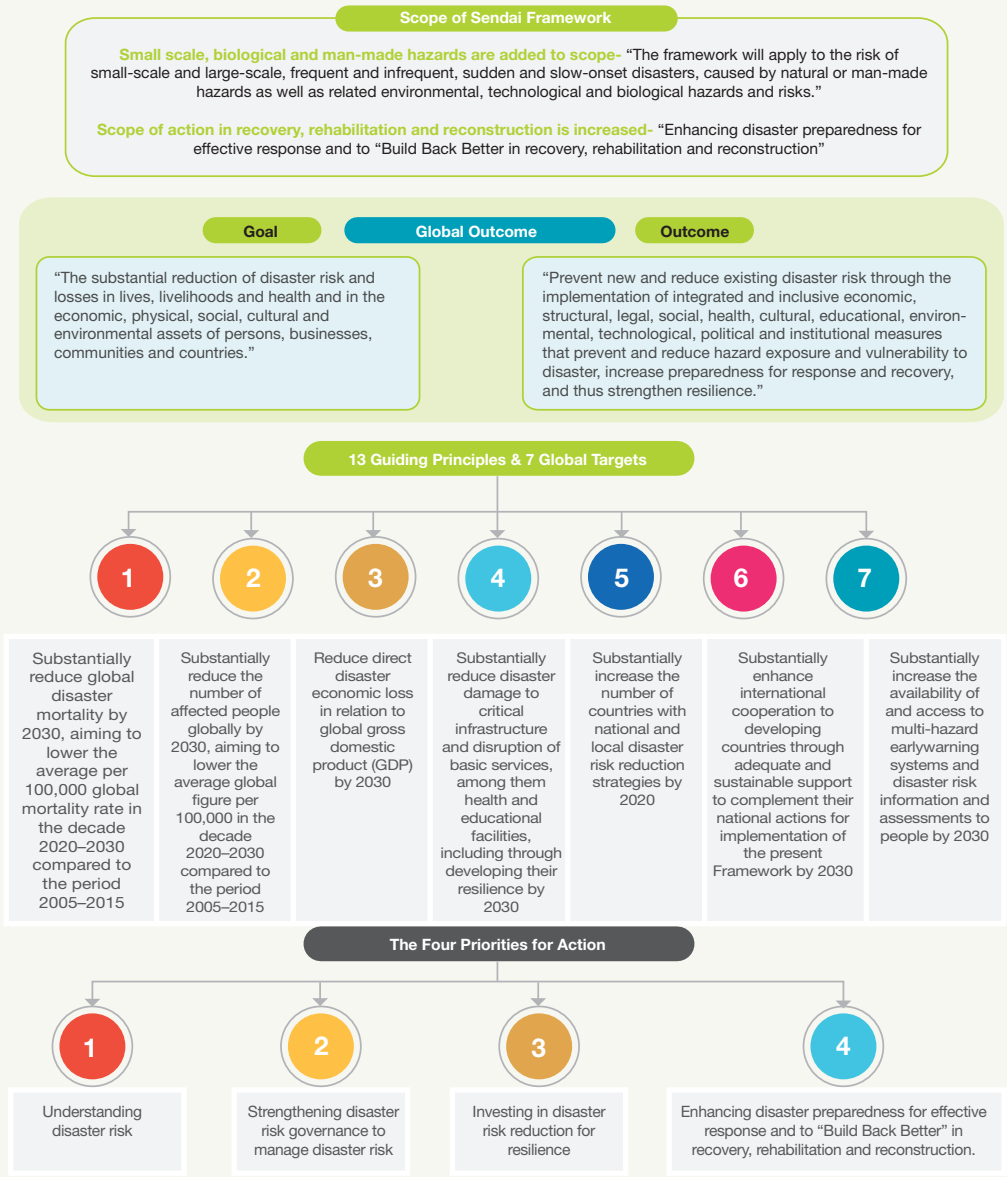
and natural resource management techniques are needed for disaster reduction.

- DRR is identified as a policy concern which cuts across many sectors, including health and education.

According to SFDRR, disaster risk reduction can be achieved by addressing the existing challenges and preparing for future challenges by putting emphasis on monitoring, assessing, and understanding disaster risk and sharing such information.

The Framework highlights that it is "urgent and critical to anticipate, plan for and reduce disaster risk" to cope with disaster. It identifies the importance of strengthening disaster risk governance and coordination across various institutions and sectors. It recognises the primary role of states and the shared responsibility of other stakeholders at different levels. The need for investment in economic, social, health, cultural and educational resilience at all levels is identified. For the enhancement of multi-hazard Early Warning Systems (EWS), preparedness, response, recovery, rehabilitation, and reconstruction, it emphasizes on the need of investments in research and appropriate use of technology.

FIGURE 6: SUMMARY OF SENDAI FRAMEWORK FOR DISASTER RISK REDUCTION, 2015-2030



For further details on SFDRR 2015-2030, Visit www.unisdr.org/files/43291_sendaiframeworkfordrren.pdf

Implementing Sendai Framework in India

India is a signatory to SFDRR and is attempting to comply with it on voluntary basis. The country is making efforts to achieve the global targets by making advancement in the entire disaster management cycle by following the recommendations in the Sendai Framework and by adopting internationally accepted best practices. Recently released National Disaster Management Plan of India (NDMP), 2016, incorporates the approach articulated in Sendai Framework to achieve substantial reduction in disaster risk and losses in lives, livelihoods, and health and in the economic, physical, social, cultural, and environmental assets of persons, businesses, communities, and countries. The NDMP is aligned with the goal and priorities of SFDRR. The integration of four priorities for action under the Sendai Framework into the NDMP, 2016 is given in the following table:

TABLE 5: INCORPORATION OF FOUR PRIORITIES FOR ACTION UNDER THE SENDAI FRAMEWORK IN NDMP

SENDAI FRAMEWORK FOR DRR (2015-2030) PRIORITY	CHAPTERS WITH THE PRIORITY AS ITS DOMINANT THEME
1. Understanding disaster risk	Chapters 2 and 3
2. Strengthening disaster risk governance to manage disaster risk	Chapters 3, 4, 5, 6, 8, and 9
3. Investing in disaster risk reduction for resilience	Chapters 3, 4, 5, 6, 7, and 8
4. Enhancing disaster preparedness for effective response and to 'Build Back Better' in recovery, rehabilitation and reconstruction	Chapters 4, 6, 7, 8, 9, and 10

(Source: NDMP, 2016)

C. Sustainable Development Goals (SDGs) and CCA-DRR: The 2030 Agenda for Sustainable Development

The UN Summit in September 2015 on Post-2015 Development Agenda formally adopted the 'Transforming Our World: The 2030 Agenda for Sustainable Development'. It includes 17 global sustainable development goals with 169 targets. 193 UN Member States endorsed the SDGs at the 70th Session of UN General Assembly. The three focus areas of SDGs are: i) Poverty eradication, ii) Safeguard the planet from degradation while making sure that economic, social and technological advancement occurs in harmony with nature; and (iii) Encouraging global peace and just and inclusive societies.

DRR, CCA & Resilience cut across different aspects and sectors of development. Twenty five targets of the new SDG Framework are directly or indirectly related to DRR in 10 of the 17 SDGs. The agenda identifies and asserts the immediate needs to reduce climate and disaster risk and emphasises resilience building of communities and nations to achieve the SDGs. Explicit references for DRR, CCA and resilience can be observed in goals and targets specially related to poverty, hunger, healthy lives, building resilient infrastructure, education, sustainable management of water, climate change, resilient cities and marine and terrestrial ecosystem. These references show that the new SDG framework is a step further towards DRR and it largely rectifies the drawback of previous development framework i.e. the MDG framework which overlooked the importance of CCA and DRR to reduce the impacts of disasters on societies and economies.

TABLE 6:
DRR-CCA TARGETS IN SDGS AND SENDAI FRAMEWORK

Sustainable Development Goal	Related DRR or CCA target	How Sendai Framework will help to achieve the goal/target
Goal 1: End poverty in all its forms everywhere	Target 1.5	"To achieve this goal and target, Sendai Framework proposes for the promotion and development of social safety nets linked with livelihood enhancement programmes in order to ensure resilience of household and communities to disasters."
Goal 2: End hunger, achieve food security and improved nutrition and promote sustainable agriculture	Target 2.4	"To achieve this goal and target in context of Sendai Framework, relevant actions including strengthening productive assets such as livestock, working animals, tools and seeds are required."
Goal 3: Ensure healthy lives and promote well-being for all at all ages	Target 3.d	"This target in particular is complemented by the outcome of Sendai Framework which has placed strong emphasis on the resilience of health systems and integration of disaster risk reduction into health care provision at all levels."
Goal 4: Ensure inclusive and equitable quality education and promote lifelong learning opportunities for all	Target 4.7 and Target 4.a	"In order to progress these target actions, implementation needs to consider promoting disaster risk knowledge at all levels including in professional education and training as recommended by the Sendai Framework."
Goal 6: Ensure availability and sustainable management of Water and Sanitation for all.	Target 6.3, 6.4, 6.5, 6.6, 6.a and 6.b	"Target 6.6 indirectly provides an opportunity to mainstream ecosystem-based approaches for disaster risk reduction and further highlight their value as a 'win-win' and 'no regrets' solution to the increasing disaster and climate risks underlined in the Sendai Framework."
Goal 9: Build resilient infrastructure, promote inclusive and sustainable industrialization and foster innovation	Target 9.1 and Target 9.a	"In order to progress these targets and goal, the Sendai Framework recommends strengthening disaster resilient public and private investments through structural, non-structural and functional disaster risk prevention and reduction measures in critical facilities, in particular schools and hospitals and other physical infrastructure."
Goal 11: Make cities and human settlements inclusive, safe, resilient and sustainable	Target 11.1,11.3, 11.4, 11.5, 11.b, 11.c	"Measures to achieve these targets and goal, as outlined in the Sendai Framework, require mainstreaming of disaster risk assessments into land-use policy development and implementation, including urban planning, land degradation assessments and informal and non-permanent housing, and the use of guidelines and follow-up tools informed by anticipated demographic and environmental changes."
Goal 13: Take urgent action to combat climate change and its impacts	Target 13.1, 13.2, 13.3, 13.a and 13.b	"In order to achieve these targets and the overall goal, the Sendai Framework recommends to strengthen disaster risk modeling, assessment, mapping, monitoring and multi-hazard early warning systems; promote the conduct of comprehensive surveys on multi-hazard disaster risks and the development of regional disaster risk assessments and maps, including climate change scenarios; and maintain and strengthen in situ and remotely sensed earth and climate observation."

Sustainable Development Goal	Related DRR or CCA target	How Sendai Framework will help to achieve the goal/target
Goal 14. Conserve and sustainably use the oceans, seas and marine resources for sustainable development	Target 14.2	"The Sendai Framework explicitly seeks to account for the environmental damages caused by disasters – in many cases damages are attributable to the removal of disaster waste and to impacts associated with recovery and reconstructions planning that have by-passed existing environmental legislation."
Goal 15. Protect, restore and promote sustainable use of terrestrial ecosystems, sustainably manage forests, combat desertification, and halt and reverse land degradation and halt biodiversity loss	Target 15.1,15.2, 15.3, 15.4 and 15.9	"These targets are also in line with the Sendai Framework's focus on building environmental resilience through the inclusion of ecosystems in risk analysis and planning. As per marine ecosystems, the Sendai Framework proposes similar priority actions for their terrestrial equivalents - mountains, rivers, coastal flood plain areas, dry lands and wetlands, among others."

(Source: Compiled from Transforming Our World: the 2030 Agenda for Sustainable Development, 2015 and Disaster Risk Reduction & Resilience in the 2030 Agenda for Sustainable Development, 2015)

d. Paris Climate Agreement and Disaster Resilience

The Paris Agreement on Climate Change was adopted at the UN Climate Change Conference held in December 2015. The agreement was adopted by 195 countries and called for a commitment to work together in order to safeguard the planet, promote sustainable human development and build more resilient and equitable world for all. In Paris, the member countries agreed to:

- Hold the increase in global average temperature to well below 2°C above pre- industrial levels and to pursue efforts to limit the increase to 1.5°C.
- The agreement is a first ever goal for global adaptation. Building on The Cancun Adaptation Framework 2010, which is based on DRR, this agreement considers enhancing adaptive capacity, strengthening resilience and reducing vulnerability to climate change.
- *"Enhance understanding, action and support with respect to loss and damage associated with the adverse effects of climate change with focus on early warning systems and emergency preparedness, comprehensive risk assessment and management and risk insurance facilities, climate risk pooling and other insurance solutions."*[3]

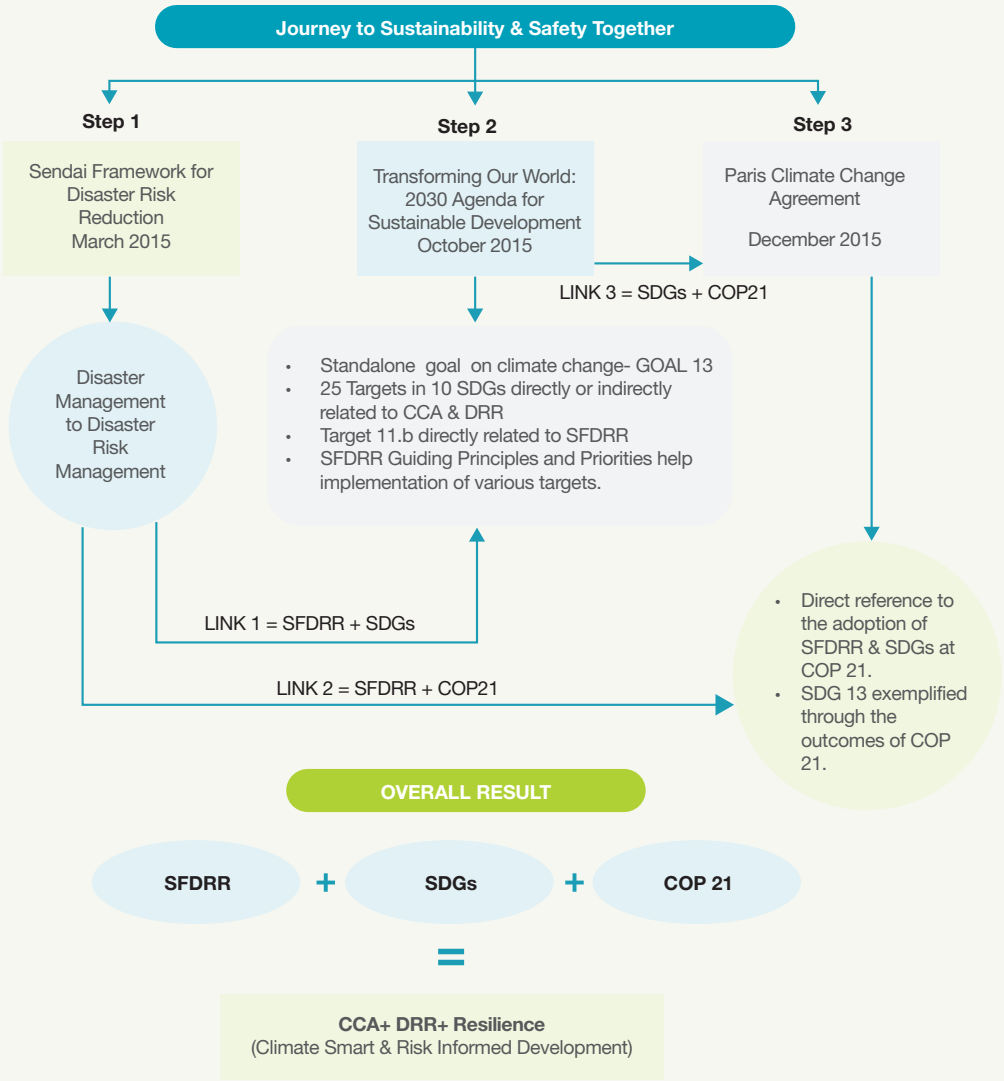
Paris Agreement is legally binding to all the parties unless specifically excluded. It contains all greenhouse gas emissions from all sectors and human activities, sources and sinks. The agreement will bring about a process of maintaining a balance between mitigation and adaptation. In future approaches of climate adaptation, the loss and damage caused by disasters will be better incorporated to accomplish the goal of climate resilience. The preamble of agreement mentions about the adoption of Sendai Framework for Disaster Risk Reduction. There is a

3 http://www.usicomos.org/wp-content/uploads/2016/03/Sendai-Framework-and-Cultural-Heritage-UNISDR.pdf. Accessed 17 June 2016

synergy in the language of agreement and goals of SFDRR to reduce risks and disaster losses. The role of sustainable development in order to reduce the loss and damage associated with climate change impacts, including extreme events and slow onset events is given great importance. National ratification by governments and implementation of national climate action plans are the steps towards implementing Paris Agreement.

e. Synergizing SDGs, Paris Climate Agreement and Sendai Framework

There is a growing global consensus that disaster risk reduction, climate change adaptation and sustainable development are linked to each other. Many evidences of linkages between the three agendas are observed while studying the Sendai Framework for Disaster Risk Reduction 2015-2030, Sustainable Development Goals 2030 and the Paris Climate Agreement 2015. All of them share a common aim of making the development sustainable. Commitment to the goals and their implementation must become a global priority. To ensure the achievement of SDGs, it is very important to consider current and future challenges caused by disasters and climate change.



SECTION: III

Capacity Building: Needs and Recent Strategies

a. Mitigating Risks of Disaster and Extreme Events through CCA-DRR Integration- Training and Education Needs

Achieving the goal of a holistic approach to disaster risk reduction and climate change adaptation as mentioned in Sendai Framework and Paris Climate Agreement, needs an efficient framework of institutional setup with competent professionals, educators/trainers and field practitioners in different aspects of the disaster management. It is also important to have adequate capacities to ensure the disaster mitigation and management actions do not create future risks or jeopardize the sustainability of the natural resource of the livelihood systems. Enhancing the capacities for DRR and CCA is long and slow process and thus requires commitment from various stakeholders (Amaratunga, 2011). According to UNDP, capacity development is defined as "the process through which individuals, organizations and societies obtain, strengthen and maintain the capabilities to set and achieve their own development objectives over time" (UNDP, 2010). It is therefore necessary to identify the existing deficiencies in the system, based on experience with respect to previous disasters as well as the emerging needs of changing disaster risk scenarios. For example, the growing challenges due to climate-change impacts, urban agglomeration, human displacement due to climate change and related disasters, environmental degradation, and industrial development.

Rationale and objectives for Training and Need Assessment (TNA)

Frequent disasters and the coping capacities have identified the gaps in the existing process and systems of various stakeholder groups. Increasing intensities of climate induced disasters and related impacts of climatic variability pose additional challenges to development and overall wellbeing of communities. Looking into the capacity gaps, a systematic approach towards long term capacity building across governance levels and stakeholder groups is required. The specific objectives for TNA are:

- Identification of stakeholders of CCA and DDR with their respective roles at policy and planning, supervisory/middle and operational level;
- Identification of the key issues related to disaster risks and climate change in the State, its vulnerability to such events/changes;
- Analysis of the institutional set up for DM within the State - the roles and functions of stakeholders at various levels and look at the required competencies for each (as per the Disaster Management Act 2005);

Common training components across all sectors

- Awareness and sensitization program on DRR & CCA issues
- Awareness on National/International policies of Govt. of India on DRR and CCA
- Development of Departmental Plan for DRR and CCA/ SOP
- Training on HRVC analysis with respect to climate change adaptation and Disaster Risk Reduction issues
- Mainstreaming development schemes/project in DRR and CCA Plan well as streamlining the plans at all levels
- Training on search& rescue and first aid
- In ongoing/ existing training programs, 1-2 sessions may be kept specifically for DRR/ CCA
- Development of tools for Monitoring, Assessing and evaluating implementation of DRR/ CCA Plan
- Allocation of 10% of flexi fund under Central Sponsored Schemes.

Source: GoI-UNDP (2013-17). Training needs assessment of Tripura State (Draft).

- Identification of the specific areas/ themes for learning identified by practitioners/ stakeholders;
- Identification of gaps in terms of knowledge, skills and aptitude, and needs of key sectors for DRR and CCA (required as per the Disaster Management Act 2005 and for effective implementation of the State Action Plan on Climate Change, especially the CCA aspects;
- Mapping and review of currently available trainings/learning opportunities for DRM practitioners as well as those in identified sectors/Departments, within the State and outside;
- Identification and review of agencies, institutions, collaborations and networks for developing contextualized DRR/CCA learning tools/modules; and
- Provision of 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.

b. National Disaster Management Plan

National Disaster Management Plan of 2016 is one of the recent and excellent planning frameworks of India in the field of disaster management. The plan has been aligned with the Sendai Framework of Disaster Risk Reduction 2015-2030, Sustainable Development Goals and Paris Agreement on Climate Change and emphasizes on improving the governance of disaster risk reduction and climate change adaptation. Capacity development has been incorporated as an important theme across all the thematic areas of action including training programs, curriculum development, awareness, mock drills and large scale disaster response exercises. **The plan emphasizes on the overall development through three key aspects namely; prevention or mitigation for disaster risk reduction, effective preparedness, response and recovery and build back better (BBB).** The plan has different mandates for capacity building for all stakeholders including communities, rural and urban local bodies, central ministries, departments and agencies as well as state governments on the basis of proper capacity development needs assessment.

C. National DM Act, National DM Policy and DM Guidelines

Disaster risk reduction and climate change adaptation is a broad subject rooted in environmental systems, community action, and wisdom tools. Capacity to manage disaster risks and emergencies require knowledge, skills, resources, motivation and attitude at different levels. It includes training, education, guidelines and legislation, policy support for actions, and systemic accountability. Therefore, need for capacity assessment, resource mobilization, training, education and information, form a core agenda for improving effectiveness of disaster management. Higher education and research/innovation capacities are the basic requirements for evolution of discipline from theories to practical solutions, development of professional expertise, trained professionals, and soundness in decisions and actions. Organizations and reorganization of systems, framework, tools, mandate, accountability and authorities at various levels also form part in the capacity building for the sustainability of efforts (Concept note, NIDM). The components of capacity building and trainings have been envisaged in policy, act and various guidelines of NDMA.

Disaster Management Act, 2005

Capacity building and trainings have been important part of DM Act, 2005. Specific provisions related to training and capacity building in the Act are as below:

TABLE: 7 PROVISIONS RELATED TO TRAINING AND CAPACITY BUILDING IN DM ACT, 2005

Specific Sections of the Act	Provisions related to training and capacity building
2 (b)(i)(ii)	Identification of existing resources and resources to be acquired or created
2 (b)(iii)	Organization and training of personnel and coordination of such trainings for effective management of disasters.
10(2)(j)	National Executive Committee shall plan and coordinate specialized training program for disaster management for different levels of officials, employees and voluntary rescue workers.
23(4)(d)	State disaster management plan to include the capacity building and preparedness measures
30(2)(xii)	District Disaster management Authority to organize and coordinate specialized training programs for different levels of officers, employees and voluntary rescue workers in the district
31(3)(c)	District Disaster Management Plan to include the capacity building and preparedness measures required to be taken by the Departments of the Government at the district level and the local authorities in the district to respond to any threatening disaster situation or disaster.
37(1)(a)(iii)	Every Ministry or Department of the Government of India shall prepare disaster management plan specifying its roles and responsibilities in relation to preparedness and capacity building to deal with any threatening disaster situation or disaster.
40(1)(a)(iv)	Every department of State Government shall prepare a disaster management plan which shall include the capacity building and preparedness measures component
42(9)(a to k)	National Institute of Disaster Management shall develop training modules, undertake research and organize training programs

National Disaster Management Policy, 2009

The approach to capacity development and training needs as per the National Disaster Management policy, 2009 are:

TABLE: 8
PROVISIONS RELATED TO TRAINING AND CAPACITY BUILDING AS PER NDMP, 2009

S.no	Provisions related to training and capacity building
1	According priority to training for developing community based DM systems for their specific needs in view of the regional diversities and multi-hazard vulnerabilities.
2	Conceptualization of community based DM systems at the National level through a consultative process involving the States and other stakeholders with the State and Local level authorities in charge of implementation.
3	Identification of knowledge-based institutions with proven performance.
4	Promotion of International and Regional cooperation.
5	Adoption of traditional and global best practices and technologies.
6	Laying emphasis on table-top exercises, simulations, mock drills and development of skills to test the plans.
7	Capacity analysis of different disaster response groups at State/ District/Local levels.

National Disaster Management Authority (NDMA) guidelines: NDMA as the apex body is mandated to lay down the policies, plans and guidelines for disaster management and to ensure timely and effective response to disasters. NDMA has issued various guidelines on disasters like drought, flood, urban flooding, landslides, heat waves etc., from time to time, where training and capacity buildings are the important. Key intervention areas for management of different disasters have been identified from the respective NDMA guidelines as shown in the table below.

TABLE: 9
LIST OF INDICATIVE KEY FUNCTIONS/ INTERVENTIONS IN MANAGEMENT OF DIFFERENT DISASTERS

Disaster type	Pre-disaster	During-disaster	Post-disaster	Capacity building components
Landslides	Slope failure risk assessment, land stability, landscape ecology, slope protection bioengineering, rehabilitation, Warning and alert	Search and Rescue, Debris removal, Rehabilitation, Relief, transport/ road management	Mass stabilization, geo-bioengineering, eco-rehabilitation, landscape management.	Landslides education to professionals and communities (including schools and colleges), specialized trainings to professionals, development of knowledge products, upgradation of institutions, establishment of landslide disaster knowledge network.
Flooding	Catchment rehabilitation, soil & water conservation, climate-change adaptation, risk analysis, early warning, zoning, resistant housing, cropping, river basin management, bank stabilization, siltation check, Community preparedness	Evacuation, Search & Rescue, Relief – water & sanitation, food and food safety, waste and environmental health; Law & order control, transport, panic management	Rehabilitation, Eco-rehabilitation, Crop-adjustments, Reconstruction & recovery	Flood education in schools and colleges, capacity building of professionals, research and development, documentation and dissemination.

Disaster type	Pre-disaster	During-disaster	Post-disaster	Capacity building components
Urban flooding	Heat-island, urban drainage, solid waste, sewage and run-off management, land-use master plan, wetlands, rainwater harvesting, risk analysis, alert & warning, Climate-change adaptation	Alert & warning, Traffic management, Floodwater relief, Food, water & sanitation; environmental health	Rehabilitation, Site clean-up; Drainage improvement, landscape regulation and ecosystem functions	Urban flood education, documentation, capacity development of institutions (ULBs) and communities, conducting mock drills, strengthening network of civil society organizations, awareness at various levels.
Earthquake	Risk zonation, Building design/ structure, Materials, Construction/ Safety-audit, Retrofitting. Personal safety behavior	Evacuation, Search & Rescue, Debris removal, Medical response. Shelter management	Trauma care, Maintenance / re-building, Retrofitting, Recovery	Earthquake education in schools and colleges, technical education, training to artisans, capacity building of professionals, research and development, documentation and dissemination.
Drought	Risk and vulner-ability analysis, Land & water, Forestry & grassland manage-ment, Land-use al-ternatives, Cropping models, Resistant crops, Soil conserva-tion, watershed, wet-lands & wastelands, Food, fodder & fuel storage, Climate-change adaptation, insurance	Cropping adjust-ments, Irrigation, Water use – reuse, recycling, Environmental health, Relief – food, sanita-tion, medicine, employment	Crop and liveli-hood recovery, Environment – vegetation, water & health management, land-use	Drought education, training of trainers in drought management, identification of training needs and specific area like natural re-sources management, insurance, use of in-formation technology, groundwater manage-ment, livestock, agro forestry, employment generation schemes etc.; strengthening of Administrative Training Institutes, awareness generation, documen-tation and dissemina-tion
Cyclone / coastal hazards	Coastal protection, mangrove and coral reefs, Dune and sand flora, Erosion con-trol, Sewage and waste management, cyclone shelters, housing design, preparedness & communication	Alert & warning, Communication, Response S&R, Medical, relief – Water, food, sanitation, debris, waste manage-ment	Rehabilitation, Replanting trees and gardens, Sustainable recovery.	Development of technical capacity development plans, launch of commu-nity based disaster management activities in cyclone vulnerable areas, strengthening of techno-legal at state/ district/ local authori-ties.

Source: Various guidelines of NDMA (http://ndma.gov.in/en/ndma-guidelines.html)

d. Training Strategy on CCA-DRR Integration into Development Plans

There is a need for sector specific trainings with respect to integration of CCA and DRR for the stakeholders in the state. The sector specific training strategy could be as below:

TABLE: 10
LIST OF TRAINING NEEDS RELATED TO CCA-DRR

Nature/type of training	Training needs related to CCA-DRR
Sensitization/ Awareness Generation	• Periodic conduct of awareness and sensitization programmes on DRR & CCA issues at State, Deptts, District, Sub-Division, Block and Panchayat levels. • Programme on the basics of Disaster Management • Sensitisation on the provisions of Disaster Management Act, 2005
Trainings on Generic topics	• Community Based Disaster Preparedness • Earthquake Risk Management -Cyclone Flood Risk Management • Landslide Risk Management • Fire Risk Management • Financial Strategies and Disaster Auditing • Early Warning System • Role of Information Technology on Disaster Management • Environmental Health with respect to Disasters, Emergencies and Conflicts • Legal framework and policies for Disaster Mitigation and Management • Integrating Climate Change Adaptation and Disaster Risk Management • Urban Risk Management • Housing and Personal Safety and Local Emergency Preparedness
Trainings on specific tasks	• Low cost and disaster resistant housing construction • Forestry and Disaster Management • Impacts of Natural Disasters on Wildlife and Mitigation Strategies • Landslide mitigation by modern techniques including bioengineering • Damage and Impact Assessment after disasters • Emergency Operation Centre Management • Handling and maintenance of Critical Equipment for the SDRF, DMTs and volunteers • Role of Media in Disaster Management for Journalists • Forest Fire Management for Joint Forest Management Members • Emergency Management for Dams and Reservoirs • Database for Disaster Management with respect to DRR & CCA • Water and Sanitation Management with respect to post disaster response • Conducting Hazard Risk Vulnerability and Capacity (HRVC) assessment with respect to DRR & CCA

Nature/type of training	Training needs related to CCA-DRR
Specialized trainings on Cross Cutting themes	• Gender and Disaster Management • Mainstreaming of DRR & CCA in Development Planning • Geo Informatics and Disaster Management • Ecosystem Approach in Mitigation and Management of Hydro-climatic disasters • Climate Change and Disaster Management • Integration of Disaster Risk and Climate Change Resilience in Rural Development Policies & Programmes • DRR strategies for sustainable development – planning and policy instruments • Creation of culture of safety through Knowledge and Education • Forestry as livelihood in climate change adaptation • Use of solar energy as climate change adaptation • Climate Change and Impact of Vector borne diseases

Source: Based on Training needs assessment of Tripura State (draft).

Chapter Two

TRAINING MANUAL

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LU (c) Mainstreaming CCA and DRR into Developmental Planning (Case Study of District Level Departmental Planning – Gorakhpur)
(iv) Module 2: Sub-national Developmental Plans 41
LU (a) Planning and Financial Framework at State Level – Need & Scope of CCA-DRR Integration
LU (b) CCA-DRR into Policies, Plans and Programmes of Government
LU (c) Sector Cluster Strategies (Infrastructure/Industry & Commerce, Environment/Natural Resources, Social Welfare Sectors)
LU (d) Implementation of Sub-national/State level CCA-DRR strategy (Group Exercise)
(v) Module 3: Urban Development (City and Town Plans) 47
LU (a) Urban Master Plans (Town and Country Planning)
LU (b) Environmental Services and Natural Infrastructure (Water, Solid waste, Wetlands, Public health)
LU (c) Livelihood and Urban Economic Resilience (Group Exercise)
(vi) Module 4: Infrastructure Safety and Resilience 54
LU (a) Understanding Infrastructure Vulnerability to Climate Risks
LU (b) Identifying Critical Infrastructure and their Inter-dependency
LU (c) Planning Disaster Safe and Climate Smart Infrastructure Systems
LU (d) Group Exercise: Case Study Simulation
(vii) Module 5: National and International Perspective 62
LU (a) Synergies in SDGs, Paris Climate Agreement and Sendai Framework for DRR
LU (b) CCA-DRR integration into National Policies, Plans and Guidelines
LU (c) Regional and International Agreements (For e.g., Bangkok declaration of Asian Ministerial Conference, Bay of Bengal Initiative, SAARC Charter, etc.)

SECTION: I

Training Design and Training Plan

Improving the capacity of the State Disaster Management Authorities (SDMAs) towards integration of CCA & DRR concerns represents a potential point of entry for addressing the gaps as discussed in the part 1 of the manual. The SDMAs are State level organizations established in all Indian States, where all the departments converge. Hence, it offers a unique platform for integration of CCA & DRR approaches.

Aim

"To promote and support training capacity building on mainstreaming of DRR-CCA integration into developmental planning with focus on sub-national and urban area contexts"

Given the above backdrop, the training manual has been designed to focus on following two central research questions:

- *What are the systemic factors within regions that contribute to resilience or exacerbate vulnerability?* Detailed analysis in a specific geographic region/sub-national level to improve the ability to identify practical points where interventions could build resilience as well as the capacity of the specific departments that might need to be involved.
- *What specific policy innovations could help to bridge the **vertical gap** between the integrated national policy framework and local contexts and the **horizontal gap** between actions within sectoral development programs to integrate DRR and CCA practice?* In answering this we intend to focus on the potential role of the SDMAs as key bridging organizations.

Key objectives

At the end of the training participants will be able to

- Enumerate the linkages of CCA, DRR and sustainable development and their associated impacts and challenges with special focus on cities and town planning.
- Identify the scope and pathways for mainstreaming CCA and DRR into Sub-national development plans.
- Analyze pathways, approaches, process of mainstreaming CCA and DRR concerns into development planning with special focus on Integrating CCA and DRR in city and town planning.
- Describe the Infrastructure Safety and Resilience and its practical framework.
- Link National and International Perspectives in relation to CCA and DRR.
- Promote "Practice to Policy Approach" in CCA-DRR integration through pilot studies.

Target Groups/Audience

The manual is developed looking to the performance gaps and training needs of the following target participants:

(i) Senior to middle level officials from the state and district level officials from line departments or

(ii) Executives/professionals from other Government agencies/boards, programmes/ schemes, including public sector undertakings,

(iii) Members/representatives of non-governmental and community organizations engaged in activities related to assessment, planning, implementation or monitoring of any aspect of disaster management, environment and development, and

(iv) Faculty members/professionals from training, education and research centres and other master trainers related to environment/ecology, disaster management, rural development, urban planning, health, forestry, land and water, agriculture, housing, etc.

(v) Private Sector: Officials/professionals involved in water supply, environmental-health, waste management, power, industries, communication, risk management, etc.

Contents and Structure of the Manual

The training manual on mainstreaming CCA & DRR concerns into development planning offers a training tool along with course guidelines and contents for promoting an integrated approach. This is to enable the participants develop a holistic view of addressing challenges posed by the climate change and extreme events through development process. The manual provides a good mix of theoretical and practical exercise developed from literature available on the subject across a range of sources. The Training Manual consists of five modules:

1. Overview, Basics and Scope of Mainstreaming Adaptation for DRR, El-nino Preparedness
2. Sub-national Developmental Plans
3. Urban Development (City and Town Plans)
4. Infrastructure Safety and Resilience
5. National and International Perspective

The details of Modules with Learning Units (LUs):

Module 1: Overview, Basics and Scope of Mainstreaming Adaptation for DRR, El-nino Preparedness

LU:(a) Climatic hazards, extreme events, disasters, vulnerability and context of sustainable development

LU:(b) Understanding climate change adaptation for disaster resilience, in El-nino/La-nina and Normal Periods

LU:(c) Mainstreaming CCA and DRR into Developmental Planning (Case Study of District Level Departmental Planning – Gorakhpur)

Module 2: Sub-national Developmental Plans

LU:(a) Planning and Financial Framework at State Level – Need & Scope of CCA-DRR Integration

LU:(b) CCA-DRR into Policies, Plans and Programmes of Government

LU:(c) Sector Cluster Strategies (Infrastructure/Industry & Commerce, Environment/Natural Resources, Social Welfare Sectors)

LU:(d) Implementation of Sub-national/State level CCA-DRR strategy (Group Exercise)

Module 3: Urban Development (City and Town Plans)

LU:(a) Urban Master Plans (Town and Country Planning)

LU:(b) Environmental Services and Natural Infrastructure (Water, Solid waste, Wetlands, Public health)

LU:(c) Livelihood and Urban Economic Resilience (Group Exercise)

Module 4: Infrastructure Safety and Resilience

LU:(a) Understanding Infrastructure Vulnerability to Climate Risks

LU:(b) Identifying Critical Infrastructure and their Inter-dependency

LU:(c) Planning Disaster Safe and Climate Smart Infrastructure Systems

LU (d) Group Exercise: Case Study Simulation

Module 5: National and International Perspective

LU:(a) Synergies in SDGs, Paris Climate Agreement and Sendai Framework for DRR

LU:(b) CCA-DRR integration into National Policies, Plans and Guidelines

LU:(c) Regional and International Agreements (For e.g., Bangkok declaration of Asian Ministerial Conference, Bay of Bengal Initiative, SAARC Charter, etc.)

Conclusion and Summing-up, Post-training assessment and Course Follow-up Recommendations

Tips to use the Module for Training

Each learning unit has been developed to enable learning through discussions, presentations and involvement of the trainee groups. Following are the important methods that can be applied to make the learning easy and interesting for the participants:

(i) **Question-Answer/Quiz Sessions:** these sessions have been kept to evaluate understanding of concepts of disasters, climate change and development.

(ii) **Group discussions/work/:** Group activity is included in each learning unit to facilitate knowledge on developing skills related to analysis, planning and formulating strategies.

(iii) After each group work, **a presentation session** has to be included, to motivate the participants in knowledge grasping, participation and sharing.

(iv) **Table-top/classroom exercises** to enhance ability of focused discussion in the group.

(v) **Field Visit to be organized**, to facilitate understanding of data collection, group reality and situation analysis.

(vi) **Case studies to provide live examples** from the field so that knowledge could be connected with the ground reality.

(vii) **Duration of Training Programme:-** The entire course programme covering 5 modules is designed to be implemented in 5 days. In principle each module may be allocated one day and the session duration may vary in range of 45 minutes to 120 minutes based on the emphasis of context and situation as per recommendations of training need analysis. The course duration may be shorter if targeted at policy makers orientation, and may be longer if targeted at participation of directly relevant professionals, and duration of sessions may be adjusted accordingly. Besides, each of module, and every session theme in a session also possess potential of independent implementation as per need, target group or task, time and resources available. The design can also serve as curriculum for long term degree/certificate diploma after desired customization.

Selection of Trainees

The criteria for selecting the trainees may be as given below:

Target level of Trainees	Senior to Middle level officials/professionals/agency representative
Nature of the Group	Heterogeneous (from various departments, agencies and academic institutions), with representation of women colleagues.
Qualification	At least graduation and preferably post-graduation, having written and spoken ability in English/Hindi. Computer knowledge is desirable.
Medium of Instructions	Mainly English with blend of Hindi or preferred local language

Pre-requisite for the Trainer/Course Faculty

A team consisting of minimum three faculties may be required to organize the training programme. One of the team members shall be from the region where training is being planned. Other criteria for course faculty/trainer may be as follows:

Eligibility	Expert of Disaster Management with a good knowledge on Environment & Climate change/Natural Resource Management and Developmental Planning Issues
Training Approach	Friendly and informal approach and have ability to involve heterogeneous group at a single platform
Challenges to be addressed by the trainer	Motivating the participants to bring them at similar level of knowledge and experience sharing.
Strategies to overcome the challenges	Provide reading materials during registration (or preferably can be mailed in advance). Involve the participants through group exercise, video clippings and quiz sessions, etc.

Expected Benefits

(i) Capacity of the Government officials/ DM Professionals/Environmental Scientists and Managers/Planners and other stakeholders developed in understanding local issues of CCA & DRR mainstreaming into planning.

(ii) The overall capacity of administration, academic institutions and non-governmental organizations improved in planning, coordination and strategy making.

(iii) Overall sensitization of departments to understand their role in CCA & DRR issues and knowledge on addressing these issues with more abilities.

(iv) Improved ability to collaborate with the each other both horizontally and vertically for achieving sustainable development at district level.

Instructions for Manual Use

(i) The manual can be implemented at state level or departmental level (National or state/UT level with suitable modification utilizing its flexibility). For example, SDMAs can take lead in organizing training programs for such heterogeneous group through coordinating with the line departments, academic institutes and other agencies. At national level, courses may be organized by Ministries, Institutes/Universities and leading NGOs, whereas at state level the course may be organized by State Administrative Institute, SIRD, WALMI, Forest Institute, Ecology Commission, Environment Directorate, Council for Science & Technology or Disaster Management Institute/ Centre.

(ii) Learning shall be facilitated by a trained trainer in relevant subject and preferably in a Training of Trainers (ToT) course on this module. Appropriate resource persons shall be selected and invited as speakers/moderators for taking up the case studies and field surveys based technical sessions. It is advisable to conduct a Training of Trainers (ToT) courses in every State in order to build their capacities in conducting training programs at sub-national level.

(iii) Each learning unit include case studies, group work etc. The course facilitator shall ensure that each module of the manual has been taught in light befitting the target group's background, time and resources available.

(iv) Entire manual is designed in a way to complete it within the given duration of about 5 days, depending upon the field visit exercise.

(v) At the end of the training, a feedback session shall be conducted by the facilitators in order to understand the opportunities and shortcomings of the manual. These feedbacks shall be complied and appropriately included in the future training programs.

Action Plan/Post-Training Assignment

It is well understood that training has more impact on the ground if a mechanism for follow-up is in place. During the first activity in this module, participants review the gaps identified throughout the training in order to identify the changes they might be able to make in their own departmental/organizations' work. Working as a group, they will:

(i) Identify areas for future action;

(ii) Develop criteria for prioritizing future actions;

(iii) Prioritize these actions according to the criteria;

(iv) Create an action plan (and framework for writing an assignment)

(v) Assignment submission guidelines.

This Module presents an opportunity for capturing the motivation that participants have at the end of training and for them to go back with a tool – the action plan – to help them to focus on changes they want to make when faced with the day-to-day challenges of work. The action plan should help them build these changes into their routines, creating demands and eventually those of the department/organization.

SECTION: II

Pre Training Assessment

Context and description of the Session

The session shall consist of either written or oral question-answer/discussion round to understand the perception level of the participants before the training course. This would be repeated at the end of the course (post training session) during valediction to understand the impact of the course by facilitation a comparison of entry and exit behavior of the participants. A film can also be shown to trigger the expression of participants' prevailing knowledge and/or perception on aspects of climate change and disaster risks.

Learning Objectives

- To compare the entry and exit behavior of the trainees
- To evaluate the knowledge and skills gained from the training
- To assess perceived competency of participants on climate change and disaster risks
- To carry out a formal internal evaluation methodology using questionnaires

Methodology

- Question-answers
- Discussion
- Ice-breaking games
- Film Show

Guidance

- Questionnaire based assessment of the participants perception at the entry level (and also at the exit level) may be carried out.
- The questions shall be identified/framed by the course director/coordination team looking into the course module's scope, participants profile and duties/ background, and context of the film being screened.
- It is advised that the course coordinator / trainers keep pre-developed notes as own tips and hints for delivering course session.
- The resource person for this session is expected to have a broad knowledge of all aspects associated with climate change and disaster risks and the national and international framework for dealing with the subject, ideally a team of two or three resource persons drawn with background of environment & earth science, environmental law, and geo informatics, having prior experience of disaster management.

SECTION: III

Module 1

Overview, Basics and Scope of Mainstreaming Adaptation for DRR, vis a vis El-nino/La-nina Preparedness

Context and description of the Session

A basic training module on integrating climate change adaptation and disaster risk reduction as an overview or refresher course for sensitization of disaster management and climate professional/officials and other officials of general administration, industrial associations/corporations, academicians, NGOs, etc. at sub-national level.

There are 3 Learning Units delineated to draw this module:

LU (a) Climatic hazards, extreme events, disasters, vulnerability and context of sustainable development

LU (b) Understanding climate change adaptation for disaster resilience in El-nino/ La-nina and Normal Periods

LU (c) Mainstreaming CCA and DRR into Developmental Planning

Learning Objectives

- To describe climate change, it causes and its main effects.
- To describe the impact of climate change at global and national level and community (including key sectors such as health, agriculture, fisheries, water, environmental management etc).
- To define and distinguish between climate change adaptation (CCA) and disaster risk reduction (DRR)
- To explain the main approaches to address climate change (adaptation and mitigation) and process to integrate these responses into DRR initiatives.
- To describe key regional and national climate change initiatives.

Methodology

- Film on climate change
- Perception check questionnaire (or question-answer session)
- Lecture/power point presentation
- Case study (preferably based on film)
- Group exercises
- Experience sharing
- Discussion

Guidance

- Sharing expectations from both sides, from participants as well as from the faculty/ trainers and course director/coordination team is important to start from and finally arrive at a common point of learning scope to be fulfilled during the course.
- Other expectations regarding punctuality of the participants during the sessions and associated activities, response, discipline, etc. need to be shared during this information round

LU (a) Introduction to climatic hazards, extreme events, disasters, vulnerability and context of sustainable development

Context and description of the Session

This session focuses on the conceptual understanding and inter-relationship between disaster, development and climate change. Over the decades, with the increasing physical and financial losses due to increasing frequency of disasters, planners and policy makers have shifted focus towards inclusion of disaster management in development practices. In fact certain studies have proved that climate change have also enhanced frequency of disasters and its losses. This learning unit includes several terminologies and concepts related to DRR and CCA which are essential to create an understanding towards disaster management and risk reduction. Many of these terminologies are used quite often. However, this part is essential to introduce definition and concepts related to disaster management as a subject. The terminologies that needs to be defined in this session are hazard, vulnerability, disasters, risks, exposure, sensitivity, climate change, DRR, CCA, DM cycle, mitigation, adaptation, hydro-meteorological disasters and its relationship with climate change, sustainable development etc.

Learning Objectives

- To learn basic concepts of disaster risk reduction, climate change adaptation and development.
- To know issues of Climate Change in Disaster Risk and Development
- To learn climate change and its inter-relation with Disaster Risk Mitigation and Sustainable Development
- To learn about Climate Resilience Framework

Methodology

- Lecture and power point presentation
- Question-answer sessions
- Discussion

Guidance

- The first session include theoretical mode of teaching. However, informal discussions shall be facilitated by the trainers to make the sessions interesting.
- A table-top exercise and quiz session have been suggested to facilitate the discussions.
- The session could be divided into three presentations i.e., Concept & terminologies, Issues of Climate Change on Disaster Risk & Development context and Climate Change and its inter-relation with Disaster Risk Mitigation & Sustainable Development.
- Handout on DRR and CCA terminology can be given to trainees

Recommended Readings

- UNISDR (2009). Terminology on Disaster Risk Reduction. Retrieved from http://www.unisdr.org/files/7817_UNISDRTerminologyEnglish.pdf.
- IPCC (2012).Glossary of terms. In: Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation [Field, C.B., V. Barros, T.F. Stocker, et al. (eds.)]. A Special Report of Working Groups I and II of the Intergovernmental Panel on Climate Change (IPCC). Cambridge University Press, Cambridge, UK, and New York, NY, USA, pp. 555-564. Retrieved from https://www.ipcc.ch/pdf/special-reports/srex/SREX-Annex_Glossary.pdf.

LU (b) Understanding climate change adaptation for disaster resilience, in El-nino/ La-nina and Normal Periods

Context and description of the Session

Natural disasters have always claimed a heavy toll on human life and caused enormous economic damaged throughout the history of mankind. Amidst all natural as well as anthropogenic disasters, hydro-meteorological disasters are most recurrent and pose major impediments to achieve sustainable development. El Nino Southern Oscillation (Christ child), is an unusual warming of sea surface waters in eastern and central equatorial Pacific associated with changes in wind patterns that impact weather in many parts of the world. It generally has an adverse effect on the Indian monsoon as it weakens the south-west monsoon and results in drought condition (Saini and Gulati, 2014). Research has shown there is an association between El Nino and deficient rainfall in India (Manocha, March 15, 2014). The five major droughts of the past 20 years—1982, 1987, 2002, 2004, 2009, 2015—were accompanied by El Nino. However, all El Nino years doesn't leads to drought. A research analysis between 1880 and 2004 by Indian Institute of Tropical Meteorology shows that in 13 instances of El Nino occurrence, India experienced normal monsoon rainfall, while in 10 instances rainfall was below normal. However, 2015 El Nino phenomenon have been one of the reasons for devastating Chennai Flood that crippled the entire city along with poor infrastructure development.

Learning Objectives

- To describe El nino and La nina episodes.
- To learn about climate change and extreme weather events.
- To analyze relationship between climate change and El Nino episodes

Methodology

- Lecture
- Power point presentation
- Question-answer sessions
- Case study-Chennai Floods

Guidance

- It is important for trainers to develop a conceptual understanding of El nino and La nina episodes and its linkages with extreme weather events
- It is recommended to read articles on El nino and Indian weather and develop an analytical framework for trainees to understand the concepts.
- Articles from the recommended readings can be taken as references.

Recommended Readings

- Cai,W; Borlace, S;Lengaigne,M et al. (2014).Increasing frequency of extreme El nino events due to greenhouse warming. Nature Climate Change, 4, pp.111-116. doi:10.1038/nclimate2100.
- Saini, S and Gulati, A. (2014). El Nino and India Droughts-A Scoping Exercise. (Working Paper no. 276). Retrieved from http://www.icrier.org/pdf/working_paper_276.pdf.
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LU (c) Mainstreaming CCA and DRR into Developmental Planning (Case Study of District Level Departmental Planning – Gorakhpur)

Context and description of the Session

Change in climate and weather patterns have predicted increased exposure and vulnerability due to extreme events such as high intensity floods, frequent droughts and increase air temperature etc. As per IPCC 2013 report, increased exposure and vulnerability are generally the outcome of skewed development processes such as those associated with environmental degradation, rapid and unplanned urbanization in hazardous areas, failures of governance, and the scarcity of livelihood options for the poor. Increasing global interconnectivity and the mutual interdependence of economic and ecological systems can have sometimes contrasting effects, reducing or amplifying vulnerability and disaster risk. Countries more effectively manage disaster risk if they include considerations of disaster risk in national development and sector plans and if they adopt climate change adaptation strategies, translating these plans and strategies into actions targeting vulnerable areas and groups. Hence, closer integration of CCA and DRR measures, along with the incorporation of both into local, sub-national, national, and international development policies and practices, could provide benefits at all scales, which has been demonstrated through a case study of Gorakhpur district in Uttar Pradesh.

Learning Objectives

- To identify similarities and differences between CCA and DRR
- To know key policy documents on disasters and climate change
- To learn about main actions undertaken for CCA and DRR mainstreaming at district level through Gorakhpur case study

Methodology

- Case study presentation
- Question answer sessions
- Video clipping of process documentation
- Film on Gorakhpur floods- ISET-I, GEAG, NIDM

Guidance

- The session is intended to cover basic concept of CCA and DRR and develop a critical thinking to allow for group discussions and reflections.
- Hand out on Gorakhpur case study can be given to participants

Recommended Readings

- Gupta, A.K., Nair, S.S., Wajih, S.A., Chopde, S., Gupta, G. and Aggrawal, G. (2014). Mainstreaming Climate Change Adaptation and Disaster Risk Reduction into District Level Development Plans. NIDM New Delhi (India), GEAG Gorakhpur (UP, India) and ISET-I, Colorado (US), P 114.

SECTION: IV

Module 2:
Sub-national Development Plans

Context and description of the Session

For mitigating climatic hazards and minimizing the impacts of hydro-meteorological natural disasters and for improving livelihoods and overall well-being of the people, central and state Governments have implemented a number of policies, plans and schemes, whose activities are facilitated further by the involvement of PRIs, NGOS and other non-profit organizations. As envisaged in the DM Act, 2005, the ongoing schemes and programmes can be used as entry points for mainstreaming Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) measures into development planning. An approach to mainstream CCA & DRR measures into the ongoing developmental program may be delineated as following:

i. Classification of key programmes/projects at ministerial level along with the area of implementation.

ii. Integration of structural and non-structural measures in the programme objectives. Guidelines shall be prepared for identifying structural and non-structural measures in programmes/schemes.

iii. The state/national authority shall coordinate at ministerial and state level for promoting CCA & DRR measures through developmental programmes.

iv. Certain fund shall be allocated in each of the programmes for implementing CCA & DRR measures within departmental plans.

This module consists of 4 Learning Units:

LU (a) Planning and financial framework at state level-need and scope of CCA-DRR integration

LU (b) CCA-DRR into policies, plans and programs of Government

LU (c) Sector cluster strategies (infrastructure/industry and commerce, environment/natural resources, social welfare sectors)

LU (d) Implementation of sub-national/state level CCA-DRR strategy (Group Exercise)

Learning Objectives

- To explain techno-legal and institutional framework for effective planning, implementation and finance.
- To analyse inclusion of multi-sectoral DM concerns into the developmental process and mitigation measures through schemes and projects.
- To describe integration of disaster risk reduction planning and policies in a holistic, participatory, inclusive and sustainable manner.
- To learn local adaptation practices used by the local communities to reduce impacts of climate change and DRR measures

Methodology

- Lecture/power point presentation
- Case study (preferably based on film)
- Group exercises
- Experience sharing
- Discussion

Guidance

- This module includes knowledge sharing sessions on various schemes and programmes being run in the specific states.
- The facilitators shall have in depth knowledge of various schemes and policies.

LU (a): Planning and financial framework at state level-need and scope of CCA-DRR integration

Context and description of the Session

The Disaster Management Act, 2005 provides for Disaster Response Fund (DRF) and Disaster Mitigation Fund (DMF), each at the national, state and district levels. As per Section 46(l) and section 48(l) (a) of the Act, the National Disaster Response Fund (NDRF) and State Disaster Response Fund (SDRF) were constituted by the Ministry of Home Affairs (Disaster Management Division). The 13th Finance Commission has allocated funds to the state governments as capacity building grants. At the State level, a provision has been made to provide immediate support to the distressed people affected by the natural calamities, or road, air or railways accidents, under the Chief Minister Relief Fund. MPLADS works can also be implemented in the areas prone to or affected by the calamities like floods, cyclone, tsunami, earthquake, hailstorm, avalanche, cloud burst, pest attack, landslides, tornado, drought, fire, or chemical, biological and radiological hazards. Lok Sabha MPs from the non-affected areas of the State can also recommend permissible works up to a maximum of Rs.10 lakh per annum in the affected area(s) in that State. Apart from these, there are various central sponsored schemes and programs where CCA and DRR can be integrated at state level for e.g. NREGS, IAY, MDM etc.

Learning Objectives

- To know the financial and human capacity requirements of integrating CCA-DRR at sub-national level
- To learn various schemes and plans for financial inclusion
- To learn how different types of investments can reduce disaster risks

Methodology

- Lecture
- Power point presentation
- Question answer sessions
- Discussion

Guidance

- The session will cover macroeconomic effects of disasters and provide trainees with economic approaches for the implementation of DRR-CCA measures from various ongoing schemes.
- In this context trainees shall understand that with ongoing population growth, overuse of natural resources, and climate change impacts costs of disasters will likely increase. This is one of the mechanisms for mitigating climate change and reducing disaster risks.
- In this context, cost-benefit analysis of DRR measures is an important instrument for decision making.
- Handouts containing brief of policies and plans (Provided as Annex 2)

Recommended Readings

- Ministry of Home Affairs, GoI.(2011). State level programs for Strengthening Disaster Management in India. Retrieved from http://ndmindia.nic.in/dm-booklet-080211.pdf.
- Expenditure Budget (GoI): Plan Outlay 2015-16. Retrieved from http://indiabudget.nic.in/ub2015-16/eb/po.pdf.

LU (b): CCA-DRR into plans, policies and schemes of government

Context and description of the Session

For mitigating climatic hazards and minimizing the impacts of hydro-meteorological natural disasters and for improving livelihoods and overall well being of the people, central and state Governments have implemented a number of schemes, whose activities are facilitated further by the involvement of PRIs, NGOS and other non-profit organizations. Formulating integrated environment-sustainable livelihoods-DRR strategies require not only a balance between the interests of society, the economy and the environment, but also between the diverse interests of various stakeholders. The challenges posed are beyond the capacity of any single institution to address effectively; therefore, promoting effective participation by all stakeholders in DRR requires approaches that are multi-sectoral. This session discusses the challenges and opportunities for mainstreaming Eco-DRR into development policies, programs and plans. This session is divided between a theoretical overview and practical examples like Gorakhpur case study.

Learning Objectives

- To learn the importance of cross sectoral partnerships for successful CCA-DRR, socio-economic and political challenges

Methodology

- Lecture
- Power point presentation
- Question answer sessions
- Discussion

Guidance

- This session is intended to give background on how CCA can be mainstreamed into both development policies and DRR actions.
- It provides many hands on examples, most which are also presented in detail in the session handout.
- Handouts containing brief of policies and plans

Recommended Readings

- ADPC (2010). First Regional Training Course of the RCC on Mainstreaming Disaster Risk Reduction into National Development Processes. Participant's Workbook. Regional Consultative Committee (RCC) on Disaster Management.
- Gupta, A.K., Nair, S.S., Wajih, S.A., Chopde, S., Gupta, G. and Aggrawal, G. (2014). Mainstreaming Climate Change Adaptation and Disaster Risk Reduction into District Level Development Plans. NIDM New Delhi (India), GEAG Gorakhpur (UP, India) and ISET-I, Colorado (US), P 114.

LU (c): Sector cluster strategies (infrastructure, industry, commerce, environmental, social welfare sectors

Context and description of the Session

Following the session on mainstreaming DRR into CCA and sustainable development policies and planning, this session is intended to give an overview of different sectoral strategies and policy frameworks at sub-national level. It covers policy instruments for CCA-DRR; major actors in DRR and environmental management; interagency mechanisms; stakeholder analysis; organizational/ institutional assessments, partnerships and networking at sub-national level.

Learning Objectives

- To identify the key actors needed to promote CCA-DRR in development, and each of their key roles and responsibilities
- Learn about major collaborative platforms for CCA-DRR at sub-national levels
- Identify existing resources and capacities that may be harnessed for CCA-DRR in development

Methodology

- Lecture
- Power point presentation
- Discussion

Guidance

- This session is intended to consider sectoral strategies and policy context in which it is possible to mainstream CCA with DRR.
- The handouts given should provide more in-depth information on the sectors for mainstreaming, for discussion and further research.

Recommended Readings

- UNDP United Nations Development Programme (2010). Mainstreaming Disaster Risk Reduction into Development at the National Level. A Practical Framework. UNDP Bureau for Crisis Prevention and Recovery.

LU(d): Implementation of sub-national/state level CCA-DRR strategy (Group Exercise)

Context and description of the Session

For identification of areas for mainstreaming of CCA and DRR into developmental plans divide the class room in the groups of four persons. Each group shall be given details of any ongoing flagship scheme. Each group shall propose mainstreaming of structural and non-structural measures into the ongoing schemes. The same shall be discussed in the class and finalized as draft recommendations.

Learning Objectives

- To create experienced hands on identification of sectoral gaps and integration of CCA & DRR into development planning.
- To learn mainstreaming of DRR & CCA concerns into departmental plans and ongoing schemes/projects.
- To learn preparation of sub-national level development plan with inclusion of DRR and CCA concerns.

Methodology

- Chart paper, sketch pens
- Database on different departments, agencies and NGOs, types of disasters, state DM Plans, state map
- Power point presentation
- Discussion

Guidance

- Divide the class into 4 groups. Provide relevant material such as state profile, institutional setup, database on different departments, agencies and NGOs, types of disasters, state DM Plans, state map etc.
- Each group shall conduct preparation strategy for the same state, so that innovative ideas could be evolved.
- The groups shall identify the nodal officer in-charge, stakeholders viz. line departments, local technical agencies, NGOs and academic institutes which could be involved into the planning process.
- Propose an institutional structure for implementation of the project including monitoring committee, project cell and approving committee etc. Identify the schemes/projects running within the departments and propose measures for mainstreaming DRR & CCA concerns.
- Identify visible gaps and issues in the SDMPs.
- Also, draw a time-line chart with achievable mile stones.

SECTION: V

Module 3:
Urban Development (City and Town Plans)

Context and description of the Session

Cities are home to 50% of world's population and is expected to grow by 75% by 2050 (UN, 2012), which will have huge impact on environment, natural resources and increase the risks of disasters. An analysis of Indian census data from 1901 to 2011 shows that number of urban agglomeration/towns and cities has grown from 1827 in 1901 to 7935 in 2011 and population residing in these urban areas has increased from 25.8 million in 1901 to 377 million in 2011. Currently 31.16% of the total population of the country resides in urban areas and this is likely to increase in coming years intensifying the stress on its resources, if not managed sustainably.

While urban areas are hotspots for climate risks, they are also the sources of options to increase our capacity to cope with climate hazards. There is no doubt that urban areas can be dangerous places to live and work; their populations can be very vulnerable to extreme weather events or other hazards with the potential to become disasters. However, the same concentration of people, infrastructures and economic activities in urban centres that may create weaknesses in the face of climate change hazards gives them strengths by making it possible for them to create economies of scale or proximity or for the creation of many the measures that may reduce risks from extreme weather events. Furthermore, when provided with policies focused on enhancing sustainability and moving from disaster response to disaster preparedness, urban settlements can increase their effectiveness at coping with climate hazards.

Urban areas also are major employment/ economic opportunity hubs especially for people from adjoining rural areas. There is significant exchange of goods and services across borders of ULB between the ULB and rural areas. Hence any disruption to urban areas has potential to impact the rural population. Thus, it is important to consider this aspect when dealing with urban risks.

This module is developed as a tool for mainstreaming disaster risk reduction (DRR) and climate change adaptation (CCA) into city development plans (CDPs) and their implementation strategies in India.

This module consists of three Learning Units:

LU (a) Urban Master Plans (Town and country planning)

LU (b) Environmental services and natural infrastructure (water, solid waste, wetlands, public health)

LU (c) Livelihood and urban economic resilience (Field visit)

Learning Objectives

- To explain the approaches and methods for disaster management and their implementation in the context of urban risk management and climate change adaptation.
- To describe the nature, extent of threat and significance of countermeasures required for urban risk mitigation.
- To identify the disaster management interventions required to deal with urban risks
- To explain the need and nature of integration of urban risk concerns into the urban development process to achieve the goal of sustainable development.

Methodology

- Lecture/power point presentation
- Case study
- Group exercises
- Experience sharing
- Discussion

Guidance

- This session aims at discussing the what, why and how of mainstreaming DRR and CCA into city development.
- The facilitators shall have in depth knowledge of various schemes and policies.

LU (a): Urban Master Plans

Context and description of the Session

India is growing fast in terms of population as per the recent projections made by United Nations. Therefore, proper planning should be done by taking cognizance of projections made for the future; otherwise the country will face unmanageable concentrations of population. Master plans have failed in our country because they are rigid and obsolete. They have been unable to cope up with the pace of growth of Indian cities. Lack of regional planning approach has led to haphazard proliferation of slums. As per the 12th Five Year Plan of India, very few Indian cities have 2030 master plans that take into account basic services like water, sanitation, food, transportation, roads etc. This is the time to move a step ahead from master plans towards an integrated development of "smart cities" which aims at developing the urban ecosystem by strengthening institutional, physical, social and economic infrastructure. Ministry of Urban Development (MoUD) has already taken a step by releasing a new Urban and Regional Development Plan Formulation and Implementation Guidelines (URDPFI) in 2015. The objective of this plan is to replace the existing 1996 guidelines for formulating master plans and to promote and facilitate planned and integrated urban development in all cities of the country. Under URDPFI, 2100 master plans have been notified out of total 7933 cities and towns.

Learning Objectives

- To know the importance of urban planning in mitigating disaster risks.
- To learn strategic planning process which allow local authorities to identify and focus on key disaster risk reduction priorities and explore what resources (human, economic, technology and natural) are available locally.

Methodology

- Lecture
- Power point presentation
- Question answer sessions
- Discussion

Guidance

- It is important to think about implementing concrete disaster risk reduction measures throughout the entire planning process rather than waiting until the plan is completed.
- Priority should be on actions for which resources and local capacity already exist, those which can and will quickly demonstrate visible results.
- This will motivate all stakeholders and create awareness on the importance of disaster risk reduction in the city.
- When this is recognized through collective consensus, the chances are much greater that the actions will be productive and sustainable.
- Hands out on plans and policies can be given to participants (See Annex 1)

Recommended Readings

- Bandyopadhyay, C (2014): Training Module on Urban Risk Mitigation. National Institute of Disaster Management, New Delhi - 110 002, Pages 138.
- NIDM (2014). Mainstreaming Disaster Risk Reduction (DRR) and Climate Change Adaptation (CCA) into City Development Plans (CDPs).

LU (b): Environmental services and natural infrastructure

Context and description of the Session

Ecosystems are dynamic complexes of living communities and their non-living environment interacting as functional unit. Ecosystems are basis of life and livelihoods and provide essential ecosystem services for existence and socio-economic well being under four major categories: provisioning, regulating, supporting and cultural services (Gupta and Nair, 2012; Singh, et al., 2014). According to Millennium Ecosystem Assessment Report, 2005, approximately 60% of the ecosystem services have been degraded or used unsustainably; protection from natural hazard being one of the degraded services. One of the important findings of the report says that in the past 50 years humans have changed ecosystems more rapidly and extensively than in any comparable period of human history which has resulted into substantial and irreversible loss in the diversity of life on earth. The term "Ecosystem Based Disaster Risk Reduction" refers to the use of natural environment or systems as a way to buffer worst impact of changing climate, extreme weather events and related hydro-meteorological disasters. The basic objective of the approach is to maintain the resilience of natural ecosystems and their services to help communities to survive and cope up with the extreme events. This LU emphasizes on the importance of protecting environment and ecosystem for supply of basic services at urban level.

Learning Objectives

- To know the importance of urban systems for DRR at sub-national level and the specific needs of cities as drivers of risk but also as opportunities to reduce risk
- To gain knowledge on interaction between urban areas and the surrounding ecosystem and provide an overview of the different actors and institutions at sub-national level.
- To enable trainees to identify and understand tools for urban ecosystem management.

Methodology

- Lecture
- Power point presentation
- Case study: East Delhi Wetland
- Question answer sessions
- Discussion

Guidance

- In this session trainees shall learn about the importance of Eco-DRR for urban regions and understand that the urban ecosystems and the periphery are important factors which determine urban disaster risk.
- They should be sensitized on important factors for adequate urban (ecological) planning to minimize disaster risk, the involved actor groups and institutions.

Recommended Readings

- Estrella, M. & Saalismaa, N. (2012).The Role of Ecosystem Management for Disaster Risk Reduction. In Gupta, A.K., & Nair, S.S (Eds.), Ecosystem Approach to Disaster Risk Reduction (pp.5-44). National Institute of Disaster Management, New Delhi.
- Gupta, A.K. and Nair, S. S. (Eds.).(2012). Ecosystem Approach to Disaster Risk Reduction. National Institute of Disaster Management, New Delhi.
- Millennium Ecosystem Assessment, (2005). Ecosystems and Human Well-being: Synthesis. Island Press, Washington, DC.
- Sudmeier-Rieux, K. (2013).Ecosystem Approach to Disaster Risk Reduction: Basic Concepts and Recommendations to governments, with a special focus to Europe. European and Mediterranean Major Hazards Agreement (EUR-OPA).
- Singh, S., Nair, S.S., & Gupta, A.K. (2013). Ecosystem Services for Disaster Risk Reduction: A Case Study of Wetland in East Delhi Region, India. Global Jour. on Human Social Science, Geog., Geo-Sciences, Env.Disaster Mgt, 13 (4), 37-47.

LU (c): Livelihood and urban economic resilience

Context and description of the Session

The last session of this module is planned to give a field exposure to the participants. It is better to plan a field visit at the end of module as a touristic outing with participants which will have a clear link to the module contents. Various activities and discussions during field visit will clarify the doubts of participants and enhance their knowledge about the previous concepts. While planning the visit, the trainer needs to assess the feasibility of visit. Appropriate objectives & context of the visit needs to be identified. The field visit can be carried out at any place relevant to this module and where appropriate field visit sites are available.

The following criterion must be followed while choosing a field visit site:

- The site selected must be relevant for the module contents and previous experience of participants. The focus should be learning of new concepts and methodologies.
- The logistical feasibility like distance, accessibility, security & cost etc. must be kept in mind.

A proposed field visit with Methodology and Learning Objectives is given below. Likewise, other type of field visits may be carried out as per the place/ region where the course will be administered:

Field visit to a wetland site which may be a natural wetland or a constructed wetland may be conducted to enable the participants to understand the role of ecosystems and ecosystem services in disaster risk reduction and mitigation (Floods, Droughts & Epidemics etc.). The visit will enable the participants to become familiar with the concepts of Eco-DRR; Community Based Disaster Risk Reduction (CBDRR) and importance of land-use planning in DRR. It will enable the participants to understand the challenges in implementing ecosystem approaches and advantages of protecting the ecosystems for livelihood of the people.

"Wetland ecosystems are crucial to our natural wealth. They provide us with services worth trillions of US dollars every year entirely free of charge making a vital contribution to human health and well-being (Ramsar Convention, 1971). Wetlands are one of the most productive ecosystems of the world which along with supporting unique flora and fauna, provide a range of ecosystem services (MA, 2005). Wetland ecosystems contribute to reducing disaster risk by serving as natural protective barriers or buffers and thus mitigating hazard impacts (Gupta & Nair, 2012). Well managed ecosystems can provide natural protection against common natural hazards, such as landslides, flooding, wildfires, storm surges and drought (Rieux et al., 2009)" (Singh, et al., 2013).

Methodology:

- A well planned preparation in terms of logistics and preparation of participants is required prior to the field visit. The resource persons, communities and other stakeholders who will be consulted during the visit should be informed prior to visit so that they can understand the purpose of visit and help to achieve the goal of this visit.

- The trainer should give an introduction of the site to be visited. The discussion should clearly mention the objectives of the field visit followed by a Question/ Answer session to satisfy the queries of participants.
- The participants will be divided into groups with tasks assigned on different aspects, to cover multiple dimensions of ecology & disaster risks. For example a group may be assigned the task to interact with the community members living along the wetland site.
- Transect walk should be carried out across the wetland site to identify and explain the relationships among floodplains, natural vegetation, cultivation, human activities & settlement pattern and understand the various ecosystem services provided by the wetland. It will help to understand the natural resources, current land-use pattern, vegetation, changes in the physical features and cropping systems, social differentiation and mobility in urban/rural communities living there.
- The trainers should facilitate the participants to understand how unsustainable land use planning degrades the natural infrastructure.
- A field survey will help to understand the perception of communities living on the fringes of wetland on ecosystem services provided by the wetland and disasters faced by them. This will also give knowledge about CBDRR where communities are involved in sustainable management of natural resources and trying to adapt to climate change to improve the livelihood resilience.
- The participants will prepare brief reports after returning from field visit and give a power-point presentation on the next day so that each and every participant will be able to learn about all the objectives of this visit.

Learning Objectives

- To understand the role of ecosystems and ecosystem services in hazards & disaster risk reduction and mitigation in urban/rural areas.
- To analyse the vulnerability of natural infrastructure due to natural & anthropogenic causes (disasters either natural or climate induced, unsustainable land use planning & developmental activities in urban areas).
- To identify community based methods for DRR along the natural infrastructure that increase community resilience to climatic risks.
- To define the needs & modes to integrate Eco-DRR in urban planning processes

Methodology

- Lecture/Presentation cum briefing about the field visit
- Group Discussion/Formation
- Field survey documents
- Travel Map/ Route Map
- Cameras
- Case studies relevant to the planned visit
- Film Shows/ Slide Show of relevant pictures

Guidance

- The participants are requested to wear comfortable sports shoes while transect walk. The trainer should inform about field visit in advance so that participants can prepare accordingly.
- **Resource Persons:** Field visit resources may include field guides with diverse areas of expertise. For example: Ecologists, Conservationists, Social Experts and Ornithologists etc. who are well aware about the present field visit site. These resource persons can guide the participants to understand the socio-ecological aspects in a better way.
- **Field Survey:** A small survey questionnaire can be prepared before proceeding for the field visit so that participants can interact with communities living around and the officials present there. The resource team & the participants can interact with the communities in flood plains. This will help to understand the concept of CBDRR and achievement of Objective 3.
- **Presentations:** The trainer should encourage participants to explore beyond the objectives of field visit and take photographs so that presentations can become more effective.
- **Research Proposals:** The participants should be encouraged to submit research proposals after coming back from field visit so that the issues requiring further scientific research may come in limelight. They should give a brief Statement of Purpose & a Research Methodology based on their observations.

Recommended Readings

- Singh, S., S.S. Nair & A. K. Gupta (2013) Ecosystem Services for Disaster Risk Reduction: A Case Study of Wetland in East Delhi Region, India. National Institute of Disaster Management, India. Global Journal of Human Social Science. Management. Volume 13, Issue 4, Version 1, 12p.
- Gupta, A.K. and Nair, S. S. (Eds.) (2012). Ecosystem Approach to Disaster Risk Reduction. National Institute of Disaster Management, New Delhi.
- CNRD-PEDRR (2013) Disasters, Environment and Risk Reduction – Eco-DRR Master's Module, Instructor's Manual. Cologne and Geneva: Center for Natural Resources and Development, Partnership on Environment and Disaster Risk Reduction.

SECTION: VI

Module 4:
Infrastructure Safety and Resilience

Following the previous module on Urban Development in context of City & Town Planning, this module is intended to give a detailed introduction to the concepts of importance of infrastructure services, disaster safe infrastructure, concepts of resilience and climate resilient infrastructure. It will help to build an approach for understanding infrastructure vulnerability to various climate risks. At the end of session the trainees will have a good idea of how disaster safe & climate resilient infrastructure can be planned for urban areas.

Urban areas in India are highly industrialized and the societies depend heavily on the functioning of infrastructure services such as electricity or telecommunications which also facilitate the operation of other services like transport, health systems or sewage treatment. This infrastructure when impacted by a disaster either natural or climate change induced, disturbs the normal activity of a society and it calls for an emergency assistance. Therefore, it is of great importance now to understand the vulnerability of critical urban infrastructure against these two kinds of disasters. To address the vulnerability of critical infrastructure, a framework for identification of critical infrastructure is required in various city development plans in India and integration of those measures, policies and programmes within these plans will lead to disaster safe & climate smart infrastructure. Besides prevention and preparedness, also reconstruction and recovery processes offer opportunities to reduce infrastructure vulnerability and to build back better and safer.

This module can be used to train officials from national, sub-national and municipal agencies, representatives from local associations, development partners and private sector involved in building and maintaining critical infrastructure. The module will significantly contribute to capacity building & training related programme within and outside countries.

The module will be delivered through four learning units as follows:

LU (a) Understanding Infrastructure Vulnerability to Climate Risks

LU (b) Identifying Critical Infrastructure and their Inter-dependency

LU (c) Planning Disaster Safe and Climate Smart Infrastructure Systems

LU (d) Group Exercise: Case Study Simulation (For example, Highway, Hydropower, Irrigation, Airport, etc.)

Learning Objectives

- To explain the impact of climate change induced disasters on urban infrastructure.
- To explain the impacts of natural disasters on urban infrastructure
- To develop an understanding of critical infrastructure and their interdependencies in urban areas.
- To come up with strategies to reduce the vulnerability of critical infrastructure.
- To identify the ways to integrate the issues of disaster safe and climate smart infrastructure in urban planning processes.

Methodology

- Film Screening on a climate change induced or natural disaster showing impacts on infrastructure
- Perception check questionnaire (or question-answer session)
- Lecture/power point presentations
- Case study simulation (preferably based on film)
- Group exercises
- Experience sharing
- Discussion

Guidance

- The trainer should have in-depth knowledge of various concepts of infrastructure safety against disasters and climate risks.
- The module is designed to have a lot of discussion rather than just giving theoretical knowledge.
- The trainer is advised to encourage trainees to share their experiences during different sessions.
- Case studies and group discussions are recommended to conduct more comprehensive training.

LU (a): Understanding Infrastructure Vulnerability to Climate Risks

Context & Description of Session

Climate change is the reality of present and it is likely to generate possible disasters in future. Climate change is exerting immense pressure on communities and their supporting resources, capacities and infrastructure. Warmer temperatures, changes in the rainfall patterns, prolonged droughts, sea level rise and increased frequency and intensity of extreme climate events are expected to pose a potential risk on operation and maintenance of critical infrastructure.

The existing infrastructure is less effective in managing the extreme climate events. For example: floods can damage the basic water infrastructure and it will take years to repair. It is the location and design of new infrastructure that determines the probable impacts of climate change on it while the maintenance & management of existing infrastructure determines its capacity to withstand climate change impacts.

Learning Objectives

- To develop a basic understanding of various types of urban infrastructure.
- To identify climate risks in urban areas.
- To learn the basic concept of climate vulnerability, its components & its characterisation with respect to infrastructure services.
- To know how different climate risks in urban areas impact the vital infrastructure.

Methodology

- Question Answers/ Quiz for basic concepts
- Discussions
- Lecture
- Power Point Presentation

Guidance

- This session is intended to give conceptual clarity about urban infrastructure & various climate risks faced by it. It will cover the basic definition of vulnerability to climate change. The three components of vulnerability i.e. exposure, sensitivity & adaptive capacity should be discussed in brief in the context of urban infrastructure.
- The session being the first learning unit of this module should be taken up in a discussion mode so that trainees can come out with their own ideas and experiences in understanding different climatic risk in urban areas & vulnerability of infrastructure to these risks.
- Lecture and Presentation should be as pictorial and understandable as possible to set the context for next Learning Units in this module.
- Hand Out- A case study of any climate change induced disaster to understand infrastructure vulnerability.

Recommended Readings

- Secretary of State for Environment, Food and Rural Affairs, HM Government, 2011. Climate Resilient Infrastructure: Preparing for a Changing Climate, (Cmnd 8065). United Kingdom: Crown. Available at: https://www.gov.uk/government/uploads/system/ uploads/attachment_data/file/69269/climate-resilient-infrastructure-full.pdf
- TERI, 2014. Planning Climate Resilient Coastal Cities: Learnings from Panaji and Visakhapatnam, India
- Asian Development Bank. Guidebook: Increasing climate change resilience of urban water infrastructure-Based on a case study from Wuhan City, People's Republic of China. Mandaluyong City, Philippines: Asian Development Bank, 2013.

LU (b): Identifying Critical Infrastructure and their Interdependency

Context & Description of Session

Identifying the critical infrastructure (CI) & their interdependency in urban areas are very essential as urban population is highly dependent on these services. CIs are usually divided into physical and socio-economic infrastructure systems. Physical CI encompasses all basic services such as electricity and water supply, waste (water) management, transport or information and telecommunication technologies. Socio-economic infrastructures include facilities such as hospitals and schools and also public administration, disaster management services and recreational areas. They may exist in public or private sectors, depending on how they are owned, managed and regulated. In some cases, CIs are managed with shared competences between public and private sectors. Finally, the degree of criticality of an infrastructure is determined by its significance in relation to the effects on society (in case of its failure).

A modern, efficient, networked infrastructure creates interdependencies within and between infrastructure for example in the energy, ICT, transport and water sectors. Each sector depends on the other sectors' resilience and it is essential that these interdependencies are both understood and managed to improve the resilience of infrastructure. A challenge that needs to be addressed is the risks that the impacts of climate change pose to interdependencies. For example, climate change may reduce the availability of cooling water for an inland power station, affecting its ability to generate electricity. To reduce the disaster risk & increase resilience it is highly important to first identify the critical infrastructure and this can be done on the basis of vulnerability assessment.

Learning Objectives

- To learn the concept of critical infrastructure (CI) with definitions of CI, relevance of this in context of urban areas.
- To identify CI in urban areas
- To know the complexities of CIs & their interdependencies in urban areas
- To learn how vulnerability analysis of CI can be conducted.

Methodology

- Lecture
- Power Point Presentation
- Discussion
- Question Answer session
- Flipchart activity

Guidance

- The trainer can discuss various definitions of CI from different countries to give a basic overview of concept.
- An assessment of participant's perception about CI & its interdependencies can be carried out by trainer.
- Different threats to CI by natural and climate induced hazards should be discussed in details.
- Different hazard specific indicators & methods for vulnerability assessment should be discussed in brief while discussing one example in detail for example: Pluvial Flooding
- The trainer can also use a case study example - Cyclone Phailin-Lessons to reduce the infrastructure vulnerability.
- A flipchart activity can be conducted at the beginning of session. Trainees can be divided into groups and each group can be asked to identify a particular critical infrastructure say water supply or electricity. The groups can be asked to draw all the components of that particular infrastructure & the interdependencies of other infrastructure on a flipchart and then indicate various natural & climatic risks on each component and corresponding vulnerability. The trainer should develop an approach for understanding the causes of vulnerability.
- Case study hand out-Uttarakhand Disaster- How power generation & distribution was affected and how the hydro-power plants, reservoirs and gridlines were damaged in turn affecting the communication & other critical resources needed for emergency & relief operations. (Interdependency of Critical Infrastructure Failure).

Recommended Readings

- Bach C., A.K. Gupta, S.S. Nair and J. Birkmann, 2013: Critical Infrastructures and Disaster Risk Reduction. National Institute of Disaster Management and Deutsche Gesellschaft für Internationale Zusammenarbeit GmbH (GIZ), New Delhi, 72p.
- http://beckfordconsulting.com/wp-content/uploads/2008/10/Modernising-National-Infrastructure-Draft-2009.pdf

LU (c): Planning Disaster Safe and Climate Smart Infrastructure Systems

Context & Description of Session

The Indian scenario of cities and buildings reflect lack of disaster risk reduction concerns in the planning and construction process. The biggest challenge is to make all structures, residential, social or economic safe from disaster risks. CI has to be considered in the field of disaster risk reduction more systematically. In close cooperation with suppliers and planning agencies, the vulnerability of CIs should be assessed and taken into account. This is especially true for rapidly growing economies such as India which are shaping the set-up of cost-extensive and long-lasting infrastructures now. Vulnerability assessments for CI can help to improve planning processes and adaptation strategies. The results of vulnerability assessment of CI learnt in LU(b) can be used to improve the resilience & robustness of infrastructure in medium and long-run if being taken into account in planning processes. Vulnerability analysis can be used in the aftermath of a destructive event where budgets might also increase due to relief funding.

The economic losses from disasters show continuous increase over the years for events of the same severity because of the high investment in the built environment often lost due to disasters. Appropriate policies, plans and implementation strategies need to be developed at various levels to improve the resilience of CI. For India, one example for such policies is the standard operating procedure (SOP) for drinking water supply and sanitation services during natural hazard which was released by the Department of Drinking Water and Sanitation, under Ministry of Rural Development in Government of India released in 2011.

Spatial planning and construction in urban areas need to be sensitive to disaster risks and ensure safer constructions. This presupposes strict disaster sensitive urban planning initiatives that incorporate risk reduction and disaster safety. A good way to begin would be to critically assess the risks to a locality and then plan for quick response facilities and further risk reduction. For individual buildings too, strict adherence to building bye-laws and structural safety features on the basis of risk assessment is required (Bandyopadhyay, 2014).

Learning Objectives

- To learn basic characteristics of disaster safe & climate smart/resilient infrastructure.
- To know Critical Infrastructure protection in the context of Disaster Risk Reduction (DRR) and the different dimensions of vulnerability reduction at which action is possible.
- To get on overview of the proactive planning & investments for climate change adaptation by increasing infrastructure resilience

Methodology

- Lecture
- Power Point Presentation
- Question Answers
- Group Discussions on particular topics on policy planning given by trainer
- Activity –Opinion Survey

Guidance

- For pro-active planning of disaster safe and climate resilient infrastructure various types of policy initiatives should be discussed like information based policies, regulation based policies and direct investments to upgrade the existing infrastructure. This should be discussion based learning where trainees will give their opinions on existing and new policy requirements.
- The provisions of disaster safe infrastructure in Sendai Framework for Disaster Risk Reduction can be discussed to set the context.
- CIP framework can be discussed in detail.
- The case study of rural drinking water supply & sanitation services during natural hazards can be discussed and scope out implementation of such schemes in urban areas for various other vital infrastructure services.
- An experience sheet can also be circulated among participants to identify issues in urban planning and disaster safe & climate smart construction.
- A methodology for prioritization on investment decisions on strengthening critical infrastructure against climate & disaster risk can be planned by taking opinion of experts.
- Hand Outs- Indian Urban Planning Scenario Case studies, Critical Infrastructure Protection (CIP) Framework

Recommended Readings

For Case Studies:

- Gupta, A.K., Nair, S.S., Singh, S., Chaturvedi, A., Arora, R., Saluja, S., Mundra, N., and Mewes, H., 2014. Strengthening Climate Resilience through Disaster Risk Reduction: Approach in Andhra Pradesh and Tamil Nadu in India – Experience and Lessons. Special Technical Paper, GIZ - IGEP and NIDM, New Delhi, P 36.
- Government of India (2011): Standard Operating Procedure for Responding to Natural Disasters – Rural Drinking Water Supply and Sanitation, Ministry of Rural Development, Department of Drinking Water and Sanitation.
- Gupta, A.K., Nair, S.S., Wajih, S.A., & Dey, S. (2013). Flood Disaster Risk Management: Gorakhpur Case Study (Training Module). National Institute of Disaster Management, New Delhi and Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) GmbH, Germany, 116 p.

Other Readings:

- Bandyopadhyay, C., 2014: Training Module on Urban Risk Mitigation. National Institute of Disaster Management, New Delhi - 110 002, Pages 138.
- United Nations Sendai Framework for Disaster Risk Reduction, 2015-2030.
- Moench, M., 2009. Adapting to Climate Change and the Risks associated with Other Natural Hazards: Methods for Moving from Concepts to Action, The Earthscan Reader on Adaptation to Climate Change, pp. 249-280, Earthscan, London.
- NDMA guidelines on management of Cyclone, flood, drought & other type of disasters, Available at: http://nidm.gov.in/guidelines.asp

LU (d): Case study simulation

Context and description of the Session

The last session of the module is intended to impart a long lasting impact of this learning activity. It is also a kind of evaluation of trainees on their learning from previous sessions.

The session can be planned in form of various activities where the trainees will come up with their own innovative ideas for infrastructure safety & resilience.

ACTIVITY 1: Film Screening

A case study may be screened as a short film or documentary of any natural or climate induced disaster. The trainer may divide the class into three groups. Out of this, three models can be developed on a chart paper where the trainees will apply the knowledge gained through each LU. One model will show the various components of an infrastructure service & climate risk on each component. Second model will find the ways to identify critical infrastructure in the present case study, its interdependencies and an innovative vulnerability assessment technique. The third group may be given the task of policy planning to integrate CCA & DRR concerns relating to infrastructure in urban master plans relating to that particular case study.

ACTIVITY 2: Logic Model

The trainees can be divided into groups with each group focusing on a particular critical infrastructure (Hydro-power, Hospital, Transport, Airport) relating to a particular natural or climatic disaster. The trainees need to develop a logic model where they plan to implement a strategy/programme to safeguard the infrastructure before the disaster. A list of planned inputs like investments, human resources, equipment etc.; activities; output; outcome and final impact for disaster safe and climate smart infrastructure should be noted down on a chart paper to give a final logic model.

The trainer can give different case studies or a single case study may be given to the entire class divided into groups for a comparative evaluation of innovative ideas.

Learning Objectives

- To apply the knowledge gained through previous LUs into real life examples.

Methodology

- Discussion
- Film screening
- Experience Sharing

Guidance

- Officials can share their experiences about good lessons & best practices adopted by their respective departments to enhance infrastructure safety & resilience.
- Case Study- Preferably a film Screening, Hand outs of other case studies-Cyclone Hudhud can be given to participants.

SECTION: VII

Module 5:
National and International Perspective

Following the session on mainstreaming of DRR into CCA and sustainable development policies and planning, this module is intended to give an overview of the main actors and policy frameworks from the international to the national level. It covers policy instruments for CCA-DRR; major actors in DRR-CCA and environmental management; organizational/ institutional assessments at different scales: international, national, local partnership and networking.

This module consists of 3 learning units:

LU (a) Synergies in SDGs, Paris Climate Agreement and Sendai Framework for DRR

LU (b) CCA-DRR integration into National Policies, Plans and Guidelines

LU (c) Regional and International Agreements (For e.g., Bangkok declaration of Asian Ministerial Conference, Bay of Bengal Initiative, SAARC Charter, etc.)

Learning Objectives

- To learn about major collaborative platforms for DRR and CCA at global, regional and national levels
- To learn about major partnerships on Eco-DRR
- To identify the key actors needed to promote CCA-DRR in development, and each of their key roles and responsibilities.

Guidance

- This session is small and intended to consider the international and regional policy context possibility to mainstream CCA with DRR.
- The trainers should have good understanding about key regional agreements and role of India towards climate change and disaster risks reduction.

LU (a): Synergies in SDGs, Paris Climate Agreement and Sendai Framework for DRR

Context and description of the Session

The importance of DRR to achieve sustainable development was identified in Millennium Development Summit in September 2010. The High-level Plenary Meeting on accelerating progress towards the achievement of all Millennium Development Goals (MDGs) by 2015 identified that disaster risks are increasing globally due to increasing vulnerability to natural hazards. The Hyogo Framework for Action (HFA), 2005-2015 recognized that DRR is a cross-cutting issue in relation to sustainable development & it is an important element to achieve internationally agreed development goals, including those contained in the Millennium Declaration. The United Nations Member states at the Rio+20 conference in 2012, launched a process to develop a set of Sustainable Development Goals (SDGs) that built upon the MDGs and converged with the post 2015 development agenda. 2015 was a landmark year for the United Nations and global development agenda. The convergence of interests & global concerns for sustainable development, disaster risk reduction and climate change led to the formation of a new roadmap for a sustainable and safe world together: The Sendai framework for disaster risk reduction, The 2030 agenda for sustainable development and The Paris Climate Agreement. These agreements of global significance provide opportunities to build coherence across different but overlapping policy areas.

Learning Objectives

- To build understanding and synergy between international conventions to develop a framework for CCA and DRR integration

Methodology

- Lecture
- Power point presentation
- Question answer sessions
- Discussion

Guidance

- This session is intended to consider various international conventions, agreement and framework and possibility to mainstream CCA with DRR.
- The trainers should have good understanding about various climate and disaster related conventions and framework
- Handouts

Recommended Readings

- Various convention websites can be referred like https://sustainabledevelopment.un.org/sdgs.
- http://unfccc.int/paris_agreement/items/9485.php.
- http://www.unisdr.org/we/coordinate/sendai-framework.
- A brief account has been given in the section one of this module.

LU (b): CCA-DRR integration into national policies, plans and guidelines

Context and description of the Session

In India, disaster management is dealt by the Union Ministry of Home Affairs at national level and Revenue and Relief/Disaster Management Department at States/Union Territories. Whereas climate and related subject comes under the jurisdiction of Ministry of Environment, Forests and Climate Change (MoEF&CC) at national level, but it is concern of the State Department of Environment at the state level and below. The DM Act 2005 and Disaster Management policy 2009, emphasize on DRR instead of the conventional response and relief centric approach previously followed by the State Departments. Now, it is mandated that every Ministry/department prepares a department level DM plan and allocate specific budget for DM (preparedness and mitigation as well). However, most line departments are yet to come up with their departmental plans with DM component. The component of CCA in short / medium / long-term has not been incorporated in these plans.

The 13th Finance Commission made specific allocation for DM capacity building, trainings and non-structural components. However, there has been no dedicated finance available for strategic and Human resource development (training, education and capacity building, policy planning, etc.) related to CCA. Certain departmental plans have also made allocations for disaster management. CCA projects, on the other hand, are mainly funded by multinationals or donors and facilitated or implemented through NGO partners.

In India the DM framework, at the implementation level still focus primarily on disaster preparedness and response. Aspects of climate change mitigation/ adaptation as part of disaster management framework are not recognised in the DM Act, although the DM Act defines 'damage or loss to environment' as 'disaster', gives a key emphasis on prevention-mitigation and capacity building, and refers to 'sustainability', 'land-use' and 'environment' in context of planning DM measures. However, there is no specific provision for assessing environmental damages/ restoration of environment after disasters despite the fact that environment is always at stake during relief, recovery and reconstruction process. This actually leads to again rebuilding risk and results in aggravated or new disaster risks for the future. MoEF&CC is the nodal Ministry designated for chemical disasters and (now also for) forest fires. The Environmental Protection Act 1986 (EPA) though covers issues and aspects related to various climate related hazards and factors of environmental vulnerability in indirect ways, visible emphasis in terms of DRR in climate change context has been lacking. Disasters and resultant environmental damages are addressed inadequately and remain unclear even in the recent environmental laws in the country. However, Wetlands Rules, 2010 and Coastal Regulation Zone (CRZ) notifications have specific provisions for hazard mapping and risk assessment. CRZ notifications help in mitigation efforts but it is not included explicitly which is causing challenges in implementation. Forest Policy has effectively touched upon the issues related to various hydro-climatic disasters, whereas the National Environmental Policy (NEP) 2006 clearly relates with other policies related to natural resources, viz. water, agriculture, urban sanitation, forests, etc. and offers a framework for mainstreaming CCA and DDR together into various actions of development, welfare and infrastructure development (Gupta, et al., 2012b)

Learning Objectives

- To learn the existing policy framework for environment and NRM and strengths in addressing DRR.
- To introduce examples of key provisions for DRR in laws and policies and case laws.

Methodology

- Lecture
- Power point presentation
- Question answer sessions
- Discussion

Guidance

- This session is intended to consider various national laws, policies and guidelines and possibility to mainstream CCA with DRR.
- The trainers should have good understanding about various laws and guidelines in Indian context.

Recommended Readings

- Gupta, A.K., Nair, S.S. & Singh, S. (2013). Environmental Legislation for Disaster Risk Management, National Institute of Disaster Management & Deutsche Gesellschaft für internationale Zusammenarbeit GmbH (GIZ), 108 p.
- Various guidelines released by NDMA available on http://www.ndma.gov.in/en/

LU (c) Regional and International Agreements

Context and description of the Session

This session is intended to focus on key Regional and International Agreements for e.g. Bangkok Declaration of Asian Ministerial Conference (The Asian Declaration), Bay of Bengal Initiative for Multi Sectoral Technical and Economic Cooperation (BIMSTECH), SAARC Charter, etc. and India's stand on integration of CCA and DRR into developmental planning.

Learning Objectives

- To learn about regional and international agreements and its role in integration of CCA-DRR.
- To know the role of India in promoting such initiatives for protection of natural resources and reducing disaster risks through cooperation and partnership.

Methodology

- Lecture
- Power point presentation
- Question answer sessions
- Discussion

Guidance

- This session is small and intended to consider the international and regional policy context possibility to mainstream CCA with DRR.
- The trainers should have good understanding about key regional agreements and role of India towards climate change and disaster risks reduction.

Recommended Readings

- http://www.bimstec.org/index.php?page=overview
- http://saarc-sec.org/SAARC-Charter/5/

Chapter Three

CONCLUSION AND SUMMING-UP, POST-TRAINING ASSESSMENT AND COURSE FOLLOW-UP RECOMMENDATIONS

Conclusion and Summing-up, Post-training Assessment and Course Follow-up Recommendations

Context and description of the Session

Participant's feedback on the program-design, contents, learning and resources, are important for the continuous improvement of the course and its delivery. Besides, it also generates new and innovative ideas and options for diversifying the courses for effective and objective course delivery. Feedback of the course faculty/coordinators on the course participants and overall conduct of the course will also be important at the end. A pre-developed feedback format shall be given to the participants for their entries before the valedictory session, which shall be later analyzed and be used in developing summary course-report.

Valedictory session is important which can be chaired by the host institute's Director/ Head or Secretary/Commission of Relief/Labour/Environment or a senior academic faculty on related subject. Alternatively the course Director shall preside the session. A brief course report following the welcome note will be followed by few brief feedback rounds from the participants and messages of long-term interaction and continuous learning on the subject. Valedictory session shall aim at generating the feeling that the training objectives shall be fulfilled by putting in-use of the lessons discussed in the course, and by initiating a process of effective risk management and response on a routine basis. A formal vote of thanks shall be given at the end to express gratitude towards the participant's organizations, host institution, collaborators, resource persons, associates, team and all other whose contribution was important in making the course a success.

Learning Objectives

- To review and understand the suitability of course design and contents for future courses
- To review and enlist the possible improvements/changes and diversifications in the course design and deliveries
- To assess possible cooperation, network and future strategies of applying the course lessons in line functions and practice.

Methodology

- Brief addresses
- Discussion.
- Course feedback and lessons
- Course brief-report
- Roadmap for implementing knowledge and skills
- Broad guidelines for future strategies

Guidance

- Course coordinator shall coordinate the session with positive attitude for furthering the integration of CCA and DRR into developmental plans and policies by generating long-term and effective strategies of cooperation among stakeholders at sub-national levels.
- Coordinator shall extend thanks to all including dignitaries, team of faculty and all associates personally after the session.

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- Venton, P & Trobe,S.L.(2008). Linking Climate Change Adaptation and Disaster Risk Reduction. Tearfund: London. Retrieved from http://www.preventionweb.net/files/3007_CCAandDRRweb.pdf

WEBSITE RESOURCES:

- https://www.gfdrr.org/sites/gfdrr/files/Philippines-Forum-on-Safe-and-Resilient-Infrastructure.pdf
- http://www.unisdr.org/files/26462_handbookfinalonlineversion.pdf
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- https://www.unisdr.org/we/advocate/climate-change
- https://www.unisdr.org/archive/45308
- http://www.unisdr.org/who-we-are/what-is-drr
- https://sustainabledevelopment.un.org/frameworks/sendaiframework
- http://www.preventionweb.net/english/hyogo/mdg/introduction/?pid:235&pil:1
- http://www.unisdr.org/we/advocate/sustainable-development
- http://sd.iisd.org/policy-updates/national-reporting-under-the-international-climate-regime-towards-implementation-of-the-sustainable-development-goals/
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- http://www.preventionweb.net/english/professional/news/tags/index.php/pw:rioplus20/Rio%20plus%2020%20&%20Disaster%20Risk%20Reduction%20in%20the%20%20News
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ANNEXURE: 1
Gorakhpur Case study

District Level Departmental Planning

Gorakhpur is flood prone district of Uttar Pradesh. Mapping of key departments, analysis of vulnerabilities under climatic conditions, analysis of institutional arrangements and analysis of current planning process was done as a part of research project by NIDM, ISET and GEAG. In order to meet out the objective specific methodology was developed and implemented. A broad glimpse of objectives, data sources and methods adopted for conducting the study is given as below:

TABLE 11: OBJECTIVES, DATA SOURCES AND METHODS APPLIED IN GORAKHPUR CASE

Objectives	Data Sources	Methods
To understand the factors within the flood prone districts of Gorakhpur that contributes to resilience or exacerbates vulnerability.	• Review of secondary sources exposure and fragility of key systems considering the recent events of floods of 2007 and 2008. • Reports generated on climate change by ISET/ GEAG or any other local agency. • Past records on failures across the systems/ departments	• Mapping of key departments such as water supply, health, power, communication, housing and agriculture etc. at district level. • Analysis of their vulnerability in terms of exposure, fragility or failure rates and risks to flooding under current and projected changes in climate. • Overlaying of the climate change projections on current vulnerability mapping for systematic resilience planning process developed by ISET/ ACCRN for evaluation of impact of Climate Change on key systems. • Analysis of climate change impacts which causes failure of key natural or social systems.
To understand specific policy innovations that could help to bridge the vertical gap between the integrated national policy framework and local contexts and the horizontal gap between actions within sectoral development programmes to integrate DRR and CCA practice	• Collection of District Disaster Management Plans of the districts of Uttar Pradesh • Collection of byelaws, codes and regulatory framework of various sectors. • Collection of information on various ongoing sectoral programmes	• Institutional analysis through shared learning dialogue, workshops, policy roundtables and interactive learning sessions with the government organizations (including DDMA, SDMA, NDMA and allied government departments and Ministries) at state and national levels. • Desk review of District Disaster Management Plan of the selected district/s including review of ongoing sectoral schemes, techno-legal framework. • Understanding relationship between departmental programmes and reduction/ exacerbation of climate vulnerability by using Causal-loop-diagramming tool of GEAG.
To build capacity of scientists and engage young researchers from two key academic institutions for promoting DRR and CCA by seeking contributions development and sharing = of knowledge.	• Identification of academic and research institutes located in the concerned district/s.	• Creating a pool of young scientists and researchers engaged in academic institutes and universities. • Engaging researchers as interns and involving them in regular interactive sessions organized through workshops in universities on the theme of integration of DRR and CCA in development processes.

Objectives	Data Sources	Methods
To document and disseminate the lessons learned from the case study		• Documentation and dissemination of knowledge obtained from objectives (1 to 3) through Shared Learning Dialogues (SLDs) as a tool for combining local knowledge with global science on climate change • Workshops at district, state and national levels.

Processes Adopted for Mainstreaming CCA & DRR concerns into Development planning

The project team carried out mainstreaming of DRR and climate change concerns into district level development planning through the following steps. A brief description of activities under each step has been given below:

1. Initial Planning

Initial planning was carried out in close consultation with various line departments at district level. The project team provided support to the district administration for maintaining coordination and preparation of department wise plan. This support helped government to establish regular communication and sharing of information between research team and district level departments. A database was prepared by collecting data on frequency and history of natural hazards and their impacts for analysis of issues and gaps at various levels.

2. Project Initiation workshop

After completing initial planning, a project launching workshop was organised by the GEAG and DDMA with the concerned line departments. The meeting was chaired by the Additional District Magistrate of Gorakhpur. Almost 54 government officials from various departments participated in the workshop and expressed their view point of implementation of the pilot project.

During the project launching workshop, it was observed that the government officials from various line departments were not have clarity about to process of preparation of Disaster Management plan with the concerns of climate change inculcated into it. After initial consultation dialogue, it was decided to provide additional dialogues with the line departments to facilitate the DM plans with climate change perspective.

Flood Risk Management in Gorakhpur

The District Disaster Management Authority (DDMA) in Gorakhpur is responsible for preparation and implementation of the Disaster Management Plan for the district. The DDMA has a Disaster Management Cell, which comprises representatives of all important state line departments for coordination and implementation of Disaster Management Plans. The Irrigation Department is responsible for maintenance of embankments and flood warning systems. Under the State Water Policy, it is also doing water resources planning and management at the catchment level and resettlement and rehabilitation in case of floods and droughts. The State Department of Medical Health and Family Welfare, through the District Hospital (in coordination with GMC and DDMA), is responsible for public health management in case of outbreak of diseases in the aftermath of floods.

3. Department-wise workshop

As decided in the consultative workshop, a series of department-wise workshops were organised for creating an understanding of climate change issues in disaster management planning and collection of data for sectoral assessment. Departments such as Panchayati Raj, Irrigation and Flood Control, tube well, Jal Nigam, Minor Irrigation, Animal Husbandry, Forest, Public Works, Agriculture, Education, and Health were separately covered in a series of events. A detailed discussion on the roles and responsibilities of line departments during various facets of disasters were discussed.

FIGURE 8:
OPTIONS TO ADDRESS WATER LOGGING RISKS SHARMA ET AL, 2012

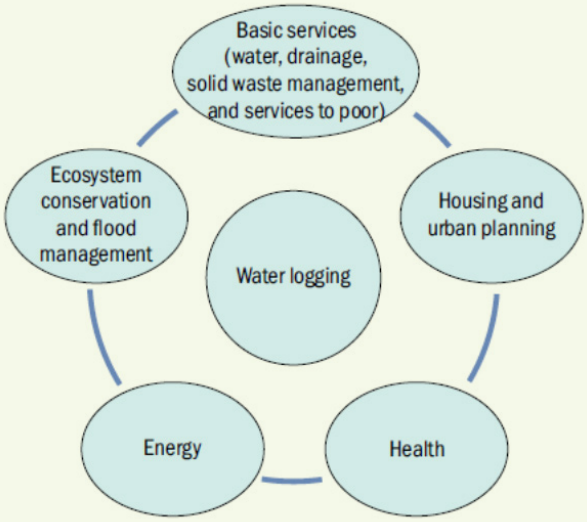
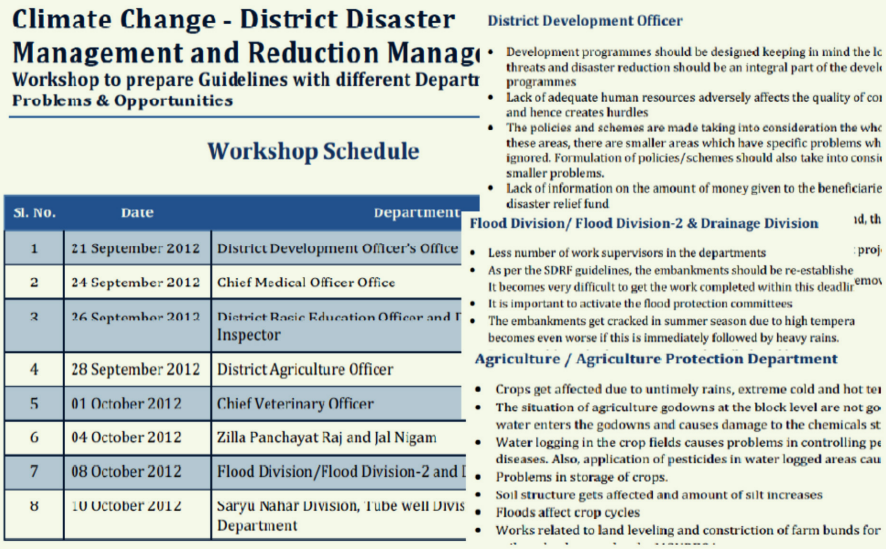


FIGURE 9:
REVIEW AND FINDINGS – SHARED LEARNING DIALOGUES



Climate Change - District Disaster Management and Reduction Manag

Workshop to prepare Guidelines with different Departr

Problems & Opportunities

Workshop Schedule

Sl. No.	Date	Department
1	21 September 2012	District Development Officer's Office
2	24 September 2012	Chief Medical Officer Office
3	26 September 2012	District Basic Education Officer and I Inspector
4	28 September 2012	District Agriculture Officer
5	01 October 2012	Chief Veterinary Officer
6	04 October 2012	Zilla Panchayat Raj and Jal Nigam
7	08 October 2012	Flood Division/Flood Division-2 and I
8	10 October 2012	Saryu Nahar Division, Tube Well Divis Department

District Development Officer

- Development programmes should be designed keeping in mind the lc threats and disaster reduction should be an integral part of the devel programmes
- Lack of adequate human resources adversely affects the quality of co and hence creates hurdles
- The policies and schemes are made taking into consideration the whc these areas, there are smaller areas which have specific problems wh ignored. Formulation of policies/schemes should also take into consi smaller problems.
- Lack of information on the amount of money given to the beneficiarie disaster relief fund

Flood Division/ Flood Division-2 & Drainage Division

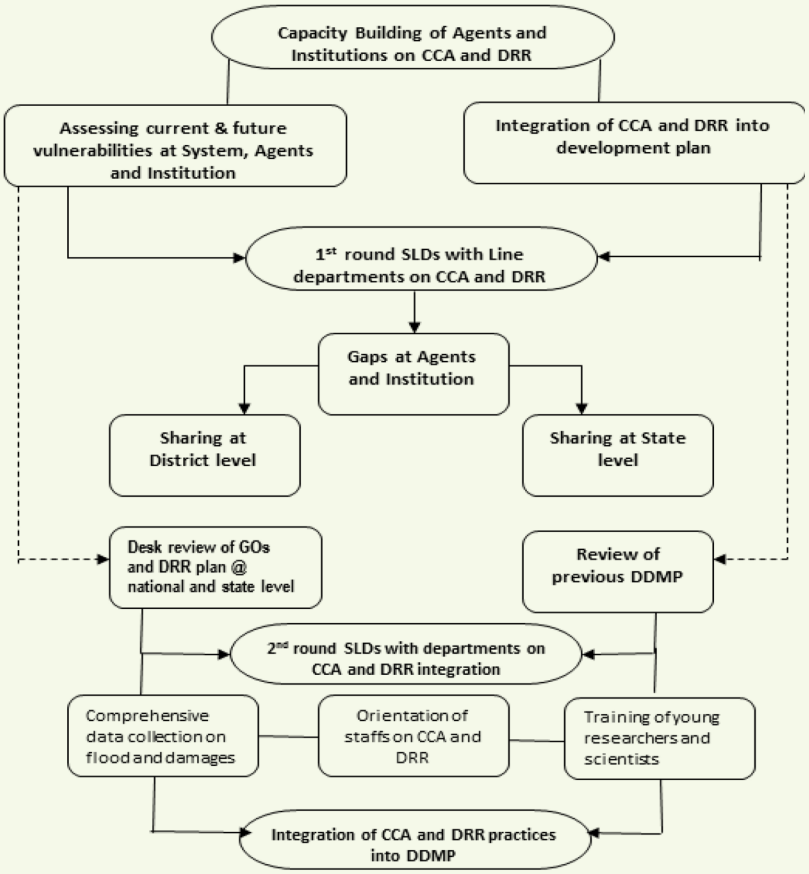
- Less number of work supervisors in the departments
- As per the SDRF guidelines, the embankments should be re-establishe It becomes very difficult to get the work completed within this deadlir
- It is important to activate the flood protection committees
- The embankments get cracked in summer season due to high tempera becomes even worse if this is immediately followed by heavy rains.

Agriculture / Agriculture Protection Department

- Crops get affected due to untimely rains, extreme cold and hot te
- The situation of agriculture godowns at the block level are not go water enters the godowns and causes damage to the chemicals st
- Water logging in the crop fields causes problems in controlling pe diseases. Also, application of pesticides in water logged areas cau
- Problems in storage of crops.
- Soil structure gets affected and amount of silt increases
- Floods affect crop cycles
- Works related to land leveling and constriction of farm bunds for

FIGURE 10:
OUTLINE OF INTEGRATION OF CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION PRACTICES IN DISTRICT DISASTER MANAGEMENT PLAN

FIGURE 11: OUTLINE OF INTEGRATION OF CLIMATE CHANGE ADAPTATION AND DISASTER RISK REDUCTION PRACTICES IN DISTRICT DISASTER MANAGEMENT PLAN



4. Department-wise Information Collection and Analysis

Various information related to occurrence of floods, response, flood damage, relief distribution, planning document and relevant governmental orders were collected for analysis of gaps at departmental level. The department-wise plans were reviewed and it was observed that departmental plans were primarily response centric. These documents were not updated nor based on updated records available at the time of developing the document. There was no document available on flood response/relief or any best practices at departmental level in the district.

Group Work

(A group exercise for identification of roles and responsibilities and presentation. This will facilitate preparation of department-wise DM plan)

FORMAT

Name of the Department xxxxxx	Group No.	
Roles & Responsibilities		
	Existing	Proposed
1. Preparedness		
2. Mitigation		
3. Response & Relief		
4. Rehabilitation		

5. Preparation of Guidelines

Based on the findings of department-wise meetings and collection of information, a guiding document for preparation of departmental plan (along with planning formats) was prepared. A consultation exercise was again organised for the fourteen departments to review the guidelines, formats and contents. Afterwards, a compiled document on department-wise planning for disaster management was introduced by the district authority, which has got overwhelmed response from line departments.

FIGURE 12: DDMP RELATED GOVERNMENT ORDERS (ISSUED BY DISTRICT DISASTER MANAGEMENT AUTHORITY, GORAKHPUR)

वर्ष 2013-14 की आपदा प्रबंधन एवं न्यूनीकरण योजना निर्माण में निम्नांकित शासनादेशों/दिशा-निर्देशों/सुझावों को दृष्टिगत रखते हुए पूर्ण की गयी है

क्र0	शासनादेश संख्या	दिनांक	विषय
1	संख्या–564/1–11–2010–22(जी)/2010	05 अगस्त, 2010	प्रदेश की नदियों में नाव से हो रही दुर्घटना की रोकथाम करने एवं समुचित संचालन कराये जाने के संबंध में।
2	संख्या–509/नौ.–7–11–27ज/04	25 अप्रैल, 2011	आगामी ग्रीष्म एवं वर्षा ऋतु को देखते हुए प्रदेश की नगर निकायों द्वारा नागरिक सुविधायें उपलब्ध कराये जाने के संबंध में
3	संख्या–एम–105/11–27–सि.–2–98 बाढ़/11	10 जून, 2011	नदियों के बहाव क्षेत्र से अतिक्रमण हटाये जाने के सम्बन्ध में।
4	सं.–2191/नौ–7–12–27ज./04	09 जुलाई, 2012	सम्भावित सूखे की स्थिति से उत्पन्न पेयजल समस्या के समाधान एवं सफाई व्यवस्था के सम्बन्ध में कार्यवाही।
5	संख्या–198/1–11–2012–22(जी)/09	13 मार्च, 2013	वर्ष 2013 में बाढ़/अतिवृष्टि प्रबंध योजना का क्रियान्वयन तथा बाढ़ से प्रभावित व्यक्तियों को तत्काल राहत प्रदान किये जाने के सम्बन्ध में।
6	संख्या–199/1–11–2013–रा0–11	13 मार्च 2013	आपदा प्रबंध व जोखिम न्यूनीकरण तत्वों को समस्त विभागों के योजनाओं/कार्यों में सम्मिलित किये जाने के सम्बन्ध में।
7	संख्या–219/1–11–2013–18(जी)/06	04 अप्रैल, 2013	वर्ष 2013 में सूखा हेतु कार्य योजना बनाये जाने के सम्बन्ध में।
8	कार्यवृत्ति	15 जून, 2013	वर्ष 2013 में बाढ़ की तैयारी के बिन्दु पर मुख्य सचिव महोदय की अध्यक्षता में दि0 15.06.2013 को अपराह्न 06:30 बजे तक आयोजित बैठक की कार्यवृत्ति।
9	मा0 राजस्व मंत्री, उ0प्र0 शासन की अध्यक्षता में आयोजित समीक्षा बैठक	19 जून, 2013	श्री अम्बिका चौधरी, मा0 मंत्री राजस्व, अनाथ, सहायता एवं पुर्नवास तथा लोक सेवा प्रबंधन विभाग, उ0प्र0 शासन की अध्यक्षता में दि0 19.06.2013 को गोरखपुर

FIGURE 13: STATE GOVERNMENT ORDER REGARDING MAINSTREAMING DRR IN PLANS/ ACTIVITIES OF ALL DEPARTMENTS (SCREENSHOT)

संख्या–199/1–11–2013–रा0–11

प्रेषक,

जावेद उस्मानी,
मुख्य सचिव, उ0प्र0 शासन/
मुख्य कार्यपालक अधिकारी,
उ0प्र0 राज्य आपदा प्रबंध प्राधिकरण।

सेवा में,

1. समस्त प्रमुख सचिव/सचिव,
   उ0प्र0 शासन।
2. समस्त मण्डलायुक्त
   उत्तर प्रदेश।
3. समस्त जिलाधिकारी,
   उत्तर प्रदेश।

राजस्व अनुभाग – 11 दिनांकः 13 मार्च, 2013

विषयः– आपदा प्रबंधन व जोखिम न्यूनीकरण तत्वों को समस्त विभागों के योजनाओं/कार्यों में सम्मिलित किये जाने के संबंध में।

महोदय,

उपर्युक्त विषय पर मुझे यह कहने का निदेश हुआ है कि राष्ट्रीय आपदा प्रबंध अधिनियम, 2005 के धारा 39 में किये गये प्राविधानों के अनुसार, राज्य सरकार के विभिन्न विभागों को अपने विभागीय योजनाओं एवं कार्यो मे आपदा जोखिम न्यूनीकरण के तत्वों का समावेश किया जाना आवश्यक है। इस अधिनियम की धारा 39 के प्राविधान निम्नवत हैः–

"39. It shall be the responsibility of every department of the Government of a State to—
(a) take measures necessary for prevention of disasters, mitigation, preparedness and capacity-building in accordance with the guidelines laid down by the National Authority and the State Authority;
(b) integrate into its development plans and projects, the measures for prevention of disaster and mitigation;
(c) allocate funds for prevention of disaster, mitigation, capacity-building and preparedness;
(d) respond effectively and promptly to any threatening disaster situation or disaster in accordance with the State Plan, and in accordance with the guidelines or directions of the National Executive Committee and the State Executive Committee;
(e) review the enactments administered by it, its policies, rules and regulations with a view to incorporate therein the provisions necessary for prevention of disasters, mitigation or preparedness;
(f) provide assistance, as required, by the National Executive Committee, the State Executive Committee and District Authorities, for—
(i) drawing up mitigation, preparedness and response plans, capacity building, data collection and identification and training of personnel in relation to disaster management;
(ii) assessing the damage from any disaster;
(iii) carrying out rehabilitation and reconstruction;
(g) make provision for resources in consultation with the State Authority for the implementation of the District Plan by its authorities at the district level;

6. State level sharing workshop

SDMA is the apex body at state level that controls, guide and monitor every district level disaster management of authority. The process of preparation of Disaster Management plan was shared at the state level dialogue which was attended by Hon'ble Minister of Revenue and Relief Commissioner of Uttar Pradesh at Lucknow. Officials from 24 flood prone districts of UP participated in the workshop. The prime objective of sharing the process of preparation of disaster management plans was not only to educate the district level officials but also to get the process approved at state level so that it could be implemented in other districts with the help of SDMAs. SDMA issued letters to districts to follow the process document of DDMP prepared for Gorakhpur and prepare plans similar to the Gorakhpur district.

7. Second Round Dialogues with Departments

Second round interaction was held with the all the department to facilitate the planning and documentation. Almost 15 dialogues were organised with the departments under the guidance of district magistrate. As a result of these dialogues, various points related to climate change were integrated in department level plans. Further these plans were integrated in district plan document.

8. Young Research Training Programme

In order to build capacity of the young academicians and researchers, a young research training programme was organised. The Training programme aimed to build capacity of young researchers and scholars from reputed institutions for promoting DRR and CCA by seeking contribution to development and sharing of knowledge.

Process adopted:

(i) The entire academic and research institutes in the district were listed down.

(ii) Seminars and workshops were engaged to attract young researchers in the field.

(iii) A pool of young scientists and researchers engaged in academic institutes and universities was created.

(iv) The eligible researchers were appointed as interns and were involved in regular interactive sessions organized through workshops in universities on the theme of integration of DRR and CCA in development processes.

This programme was a success in the district and was well received by young researchers.

9. Major Achievements

The project has demonstrated achievements at various levels, may be as given below:

(i) Development of District Disaster Management Plan with inclusion of component of Climate risks and adaptation strategies.

(ii) Countered horizontal gaps by engaging departments in making plans on DRR & CCA.

(iii) Understanding of process and gaps at department level and corrective actions taken in planning process and content in DDMP which will possibly contribute to state and national level planning framework in context of DRR & CCA.

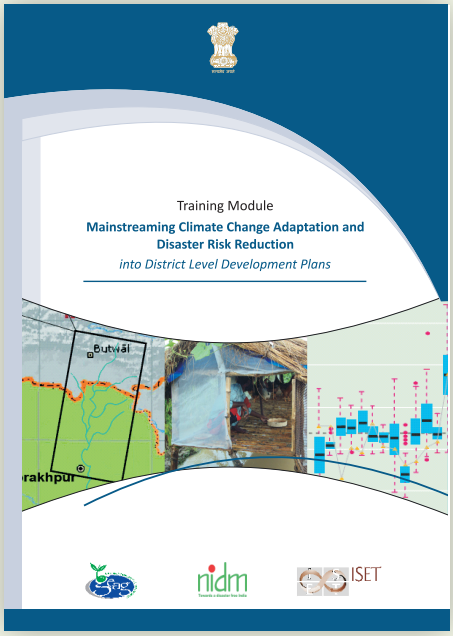
(iv) Understanding the use of Communication, Coordination and Convergence at organisational level, right from the planning to implementation level.

(v) Recognition of importance of DDMP preparation and need of considering CCA issues in the process at district as well as state level by officials and ministers.

10. Conclusion & Way Forward

This case study was one of its own kinds where capacities of district level officials were developed in understanding the concepts of CCA & DRR and preparation of department level disaster management plan. It was observed that, if suitable capacities of the officials are built, they are receptive towards bringing change in the system. In fact, involvement of young scientists in the planning process was another remarkable achievement of the project, which resulted in capacity building of young generation for mainstreaming CCA and DRR into development planning. The Government of Uttar Pradesh directed all the 75 districts in the state to follow Gorakhpur's process of disaster management planning. To aid development of climate smart plans, the experience has been shared with all the 600 plus districts of India through a training module which was developed by National Institute of Disaster Management in partnership with GEAG and the Institute for Social & Environmental Transition.

FIGURE 14: TRAINING MODULE ON MAINSTREAMING CLIMATE CHANGE ADAPTATION & DISASTER RISK REDUCTION INTO DISTRICT LEVEL DEVELOPMENT PLANS (2014).



ANNEXURE: 2

Inclusion of DRR into Development Schemes and Projects

For mitigating climatic hazards and minimizing the impacts of hydro-meteorological natural disasters and for improving livelihoods and overall well being of the people, central and state Governments have implemented a number of schemes, whose activities are facilitated further by the involvement of PRIs, NGOS and other non-profit organizations. Some of the important national level programmes are listed herein:

TABLE 12: BRIEF OF SCHEMES AND PROGRAMS

SCHEMES	DETAILS
Swachh Bharat Mission	It is a national campaign by the GoI, to clean the streets, roads and infrastructure of the country. It has two components: SBM (urban) and SBM (Rural).
Atal Mission for Rejuvenation of Urban Transformation	The mission was launched in 2015 with the aim to provide basic services to household (including water supply, sewerage, urban transport) and build amenities in cities which will improve quality of life.
Smart Cities Mission	SCM is the new initiative of the present government that aim to drive the economic growth and quality of life of city people by enabling local area development through the use of technology, information, infrastructure development and services.
Urban and Regional Development Plans Formulation and Implementation (URDPFI) Guidelines	Formulated in 2015, the guidelines take into account the emerging scenario in planned development of cities and towns and have provisions for rainwater harvesting, conservation of urban water bodies, water supply system, waste water management system, energy efficiency, strategic plan for new and renewable energy, alternate sources of energy to meet the city demand, smart grid to check electricity losses and many other sustainability issues.
National Mission on Sustainable Habitat	It is one of the Eight Missions of National Action Plan on Climate Change (NAPCC) launched in 2010, that takes into account the climate change component and vulnerabilities which is likely to affect infrastructure related to water, sanitation, energy, transport etc. It seeks to improve ability of habitats to adapt to climate change by improving resilience of infrastructure, community based disaster management and measures for improving advance warning systems for extreme weather events.
Jawaharlal Nehru National Urban Renewal Mission (JnNURM)	The JNNURM is a massive city-modernization scheme launched by the Government of India under Ministry of Urban Development.The scheme was officially inaugurated on 3 December 2005 as a programme meant to improve the quality of life and infrastructure in the cities. One of the important steps of the scheme was to improve existing levels of basic services of urban poor.
Rajiv Awas Yojana (RAY)	The scheme has been implemented by the Ministry of Housing and Urban Poverty Alleviation, envisages for slum free India with inclusive and equitable cities in which every citizen has access to basic civic infrastructure and social amenities and decent shelter.RAY is to be implemented in a mission mode and will provide financial support to States/UTs/Urban Local Bodies (ULBs)/Central Government Agencies, hereafter called implementing agencies, for providing housing and improvement of basic civic infrastructure and social amenities in each selected slums.[1]

National Rural Health Mission (NRHM)	The NRHM was launched by Ministry of Health and Family Welfare in 2005 with an objective to provide support to the health care systems of rural areas of 18 states through provision of physical infrastructure, human resources, equipment, emergent transport, drugs, diagnostics and other support. It provides managing, funding and institutional support to all the selected states to all the facilities starting from sub centre, public health centres, community health centres, sub-district and district hospitals.
Sarva Shiksha Abhiyan (SSA)	The SSA is Government of India's flagship programme for achievement of Universalisation of Elementary Education (UEE) in a time bound manner, as mandated by 86th amendment to the Constitution of India making free and compulsory Education to the Children of 6-14 years age group, a Fundamental Right. SSA is being implemented in partnership with State Governments to cover the entire country and address the needs of 192 million children in 1.1 million habitations.
Pradhan Mantri Gram Sadak Yojana (PMGSY):	The PMGSY was launched in 2000 as a fully funded Centrally Sponsored Scheme to provide all weather road connectivity in rural areas of the country. The programme envisages connecting all habitations with a population of 500 persons and above in the plain areas and 250 persons and above in hill States, the tribal and the desert areas. As per latest figures, this programme involves construction of about 3.71 lakh kms. of roads for new connectivity and 3.68 lakh km. under upgradation.
Indira Awas Yojana (IAY):	The IAY was launched in May 1985 as a sub-scheme of Jawahar Rozgar Yojana by Ministry of Rural Development. It is being implemented as an independent scheme since 1 January 1996. The scheme aims at helping rural people below the poverty-line (BPL) belonging to SCs/STs, freed bonded labourers and non-SC/ST categories in construction of dwelling units and upgradation of existing unserviceable kutcha houses by providing assistance in the form of full grant.
National Rural Livelihood Project (NRLP):	The Government of India has availed a credit from the International Development Association (IDA) for implementing the NRLP. The NRLP is implemented in 13 high poverty states accounting for about 90 percent of the rural poor in the country. Intensive livelihood investments would be made by the NRLP in 107 districts and 422 blocks of 13 states (Assam, Bihar, Chhattisgarh, Jharkhand, Gujarat, Maharashtra, Madhya Pradesh, Orissa, Rajasthan, Uttar Pradesh, West Bengal, Karnataka and Tamil Nadu).
Urban Infrastructure Development Scheme for Small & Medium Towns (UIDSSMT)	The UIDSSMT is one of the components of JnNURM scheme launched by GoI in 2005 for promoting planned development of the towns and cities. The objectives of the scheme are: • Improve infrastructural facilities and help create durable public assets and quality oriented services in cities & towns, • Enhance public-private-partnership in infrastructural development and • Promote planned integrated development of towns and cities.
Special Package for Drought Mitigation Strategies	Government of India in 2009 approved a special package for implementing drought mitigation strategies in Bundelkhand region at a cost of Rs.7266 crore comprising Rs.3506 crores for Uttar Pradesh and Rs.3760 crores for Madhya Pradesh, to be implemented over a period of 3 years starting 2009-10. It is envisaged to provide an additional central assistance (ACA) to the tune of Rs.3450 crore for implementation of the package. In continuation of the special Package during the 12th Plan period (2012-2017) a financial outlay of Rs. 4400 crore was approved under the Backward Regions Grant Fund (BRGF). The project objectives are to restore ecological balance by harnessing, conserving and developing natural resource like soil, water and forest and improve the ecosystem by checking soil erosion and deforestation. One of the objectives of the project is to empower the local community to manage natural resources using traditional knowledge.

Other Projects & Schemes

There are several other schemes and programmes being implemented by the state government with the support of the central ministries on the issues related to water & sanitation, wasteland, droughts, backward region etc. A brief of such schemes are as given below:

TABLE 13: BRIEF OF OTHER SCHEMES AND PROGRAMMES

Sl. No	NAME OF THE SCHEMES	BRIEF
1	Swajal	In 1996, when the World Bank supported SWAJAL was started in the Bundelkhand and the hill districts of the then undivided UP, a paradigm shift in both approach and institutional structure was initiated to facilitate integrated service delivery that included drinking water, sanitation and hygiene promotion, effective community participation and long term sustainability of facilities, services and the overall sector in terms of effective policies and institutions. SWAJAL also envisaged setting into motion the decentralised process as envisaged in the 73rd Constitutional Amendment. Under SWAJAL at the community level the Village Water and Sanitation Committees were the key institutions. Initially delinked from the constitutionally mandated Gram Panchayats (GPs), subsequently, they were brought within the scope of GPs through a government order, although still outside the constitutional framework.
2	Swajaldhara	Swajaldhara was launched on 25.12.2002 in rural drinking water supply sector. The scheme provides a choice for any village to participate in the reform programme directly and scope for an entire district to participate in the reform programme if more than 50% of the villages in the district are ready to participate in the reform programme. This project was implemented in 356 villages.
3	Total Sanitation Campaign (TSC)	TSC also called as Nirmal Bharat Abhiyan is a community-led and demand-driven programme stated in 1999 with a goal to eradicate the practice of open defecation by 2017. As a part of scheme, GoI gives cash incentives to poor rural households for construction of toilets and baby-friendly toilets in anganwadis. It also gives a 60% grant for construction of community toilets and toilets in schools; the rest of the money has to come from the state government and village communities.
4	National Watershed Development Project for Rainfed Areas (NWDPRA)	The scheme NWDPRA was launched in 1990-91 in 25 States and 2 Union Territories based on twin concepts of integrated watershed management and sustainable farming systems. During IX Plan, the scheme was extended to 3 newly formed States of Uttaranchal, Jharkahand and Chhattisgarh. Under the scheme, Agricultural Department, Ministry of Agriculture, GoI has accorded high priority to the sustainable integrated farming systems of rainfed areas on watershed basis. The project aims at in-situ moisture conservation primarily through vegetative measures to conserve rainwater, control soil erosion and generate the green cover both on arable and nonarable lands. The scheme is implemented at the field level by an inter-disciplinary team of members from line departments of state government and the beneficiaries of the watersheds.
5	Integrated Wasteland Development Programme (IWDP)	The IWDP of the GoI was started in 1989-90 and seeks to develop government-owned wastelands and common property resources (CPRs), on the basis of village-level or micro-watershed plans.
6	Drought Prone Areas Programme (DPAP) (1995-2006)	The basic objective of the DPAP is to minimise the adverse effects of drought on production of crops and livestock and productivity of land, water and human resources ultimately leading to drought proofing of the affected areas. The programme aims to promote overall economic development and improving the socio-economic conditions of the resource poor and disadvantaged sections inhabiting the programme areas. DPAP was in operation in 627 blocks of 96 districts in 13 States.

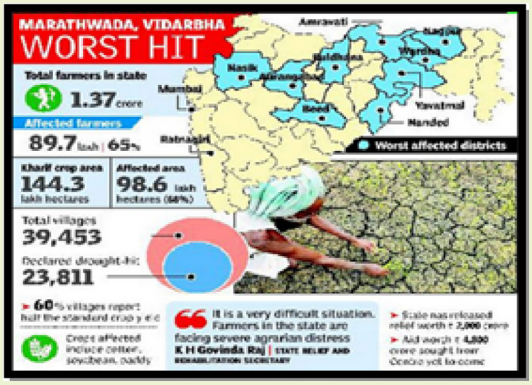
7	Backward Region Grant Fund (BRGF)	The BRGF is designed to redress regional imbalances in development. The fund will provide financial resources for supplementing and converging existing developmental inflows into 250 identified districts, so as to (i) bridge critical gaps in local infrastructure and other development requirements that are not being adequately met through existing inflows (ii) strengthen, to this end Panchayat and Municipality level governance with more appropriate capacity building, to facilitate participatory planning, decision making, implementation and monitoring, to reflect local felt needs, (iii) provide professional support to local bodies for planning, implementation and monitoring their plans. BRGF, set up in 2006 under the Union Ministry of Panchayati Raj, provides a good opportunity to identify challenges and opportunities in backward districts and make realistic plans with involvement of people and elected representatives up to the district level.
8	Rashtriya Krishi Vikas Yojana (RKVY)	RKVY, launched in 2007, provides 'additional central assistance' to Central government and state schemes related to agriculture. Among the projects funded by RKVY is region-specific agriculture research and preparation of district agriculture plans, taking into account local needs and conditions.
9	Integrated Child Development Services (ICDS)	ICDS seeks to provide supplementary nutrition, health care and pre-school education to children below the age of six. Under a Supreme Court order of December 13, 2006 in the Right to Food case, all settlements that have at least 40 children under the age of six have to set up anganwadis within three months of the rural communities and slum dwellers making such a demand.
10	Mid-day Meal Scheme	The Mid-day Meal scheme is the result of a November 28, 2001 order of the Supreme Court in the Right to Food case, directing state governments to provide cooked mid-day meals in all government and government-assisted primary schools.
11	Integrated District Approach (IDA)	The IDA was launched in late 2004 and early 2005 in seventeen districts across 14 States in the country, and is the culmination of key strategies outlined by UNICEF India since the mid-eighties. These strategies focused on promoting community action and the integrated delivery of services by establishing horizontal linkages between line agencies on the one hand and establishing an interface between the communities and the line agencies on the other to ensure responsive, relevant and convergent delivery of services. Development of village plans for health, nutrition, education, water and sanitation resulting in the ownership of the process and activities at the community level is central to almost all national programmes.

ANNEXURE: 3

Case Study on Drought in 2015

In India, drought occurs due to failure of south-west monsoon (June-September). The affects become more severe because the drought prone areas have to wait till the next monsoon, as 75% of annual rainfall in India is received during south-west (SW) monsoon season. India has faced two consecutive years of week monsoon in 2014 & 2015. The SW Monsoon which irrigates over half of India's crop area recorded a 12% deficit in 2014 followed by a 14% deficit in 2015 due to El Nino weather phenomenon in the Pacific Ocean. Overall, the impacts were felt in 266 Districts of 11 Indian states which were declared as drought-hit states in 2015. Around 330 Million People i.e. almost a quarter of India's population in 2, 55,923 villages were affected by drought.

Karnataka was the first state to notify a drought status in August 2015. The other states of Maharashtra, Odisha, Madhya Pradesh, Chhattisgarh, Andhra Pradesh, Uttar Pradesh, Telangana and Uttar Pradesh declared a drought between October & December. Along with reduced drinking water supply, the most devastating effect of 2015 drought was seen on crop yield in these states. The relief operations were delayed because they had to wait for the yield data from crop cutting experiments.

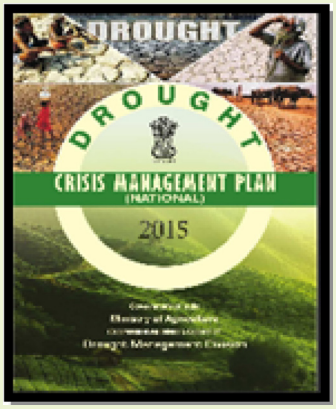


ARTICLE: TIMES OF INDIA, FEBRUARY 3, 2015

Around 90 lakh farmers were affected by drought in Maharashtra which ruined the Kharif crop. Farm crisis in Maharashtra due to drought are already known and the state has the highest number of farmer's suicides in the country. Crop distress was further exacerbated by hailstorms adding to the difficulties of cultivators. Agriculture Department data shows that out of 1.37crore farmers in the state, two-thirds were affected by drought mainly in the Marathwada & Vidarbha regions.

Ministry of Agriculture took several immediate steps to relief the farmers. Number of working days in the MGNREGA scheme were increased from 100 to 150 days in drought-hit regions. Diesel subsidies were provided to do irrigation through diesel pumps. A Crisis Management Plan (CMP) for drought was made in 2015 and updated in the wake of two consecutive droughts to expedite the process of State Level Management Plans on Drought. State Governments are doing efforts to mitigate the acute water crisis, for e.g. Maharashtra Government is trying to bring in a law which makes it mandatory to use recycled water in industries. Water trains are being provided in severe drought-hit regions like Marathwada.

A risk management approach emphasising on preparedness and improved Early Warning System (EWS) will help to mitigate the impacts of future drought events in developing countries like India. Preventive measures like building dams, reservoirs, wetlands to store water, land & water management in a sustainable manner, cattle management and reducing deforestation in affected areas can help to mitigate drought. Pre-disaster activities like improvement in agriculture through modifying cropping patterns, introducing drought-resistant varieties of crops & development of water resource system with improved irrigation will be the most beneficial ones.



CMP, MINISTRY OF AGRICULTURE, GOI

ANNEXURE: 4

Case Study on Cyclone Hudhud

On October 12, 2014, a Very Severe Cyclonic Storm (VSCS), HUDHUD, brought heavy to extremely heavy rainfall, strong gale winds of more than 180 kmph and storm surge of 1.4 meters above astronomical tide to the eastern Indian states of Andhra Pradesh (A.P.) & Odisha. Tropical cyclones like Hudhud are formed over warm ocean basins where some of them intensify into severe storms. The eye of cyclone laid exactly over Vishakhapatnam (Vizag) in A. P. causing tremendous loss to life, property, agriculture & natural resources. Large numbers of trees were uprooted, buildings were severely damaged and power and telecommunication infrastructure was disrupted in affected districts. Many places of A. P. were flooded due to maximum 24 hour cumulative rainfall of 38 cm. Around 9.2 million people in 7, 285 villages in 4 districts were affected by Hudhud causing 61 human causalities. More than 2, 22,000 people were evacuated from low lying and vulnerable areas to 310 relief camps. In Odisha, 16 districts were put on high alert. No casualties were reported from Odisha.

Vizag was hit hard by Hudhud. The roof of city's airport was blown away due to the speed of cyclone & flood water entered the runway. Radar & navigational aids were destroyed. Airport authority suspended all the operations and all flights to Visakhapatnam were cancelled. The airport used to get inundated in the past due to heavy rains. It remained shut for more than 10 days in due to flooding in 2005. The blowing away of airport's roof clearly indicated that airport building was not designed to sustain the wind velocity of high magnitude. No lessons were learnt from past cyclonic events of high magnitude in other coastal areas & proactive steps were not taken to strengthen the airport building keeping past disasters in mind. To prevent infrastructure damage due to future cyclones, mitigation measures may be taken in terms of better design of roof and material used at the airport, with wind resilient material or windproof design to resist high ranges of wind speed(300 km/hour of speed). Not only airports but all other buildings in vulnerable areas must be prepared to withstand multi-hazards.

Due to effective & timely response of Central & State Government(s) in the early warning stage and sustained preparedness & mitigation measures undertaken in the past, human causalities were reduced to minimum. For future cyclonic disasters also, risk preparedness needs to take into account the involvement right from the community to various stakeholders like Govt., NGOs and the Private Sector.

Early warning issued by Indian Meteorological Department (IMD) in advance helped in evacuation of most of the vulnerable population including fisher men resulting in minimal loss of life. It is recommended that IMD should enhance its capabilities further, to predict the actual wind velocity and gusting speed, in advance to actual landfall. EWS can be made more effective by developing a web based early warning dissemination system based on satellite, radio, internet and mobile technologies so that warnings by IMD can be directly communicated to the last mile i.e. communities.

"Cyclone Hudhud"

Strategies and Lessons for
Preparing Better & Strengthening Risk Resilience in
Coastal Regions of India

NATIONAL DISASTER MANAGEMENT AUTHORITY
AUGUST 2015

REPORT OF NATIONAL DISASTER MANAGEMENT AUTHORITY, 2015, GOI, AVAILABLE AT: HTTP://WWW.NDMA.GOV.IN/IMAGES/PDF/HUDHUD-LESSONS.PDF

ANNEXURE: 5

Case Study on Uttarakhand Forest Fire

In 2016, India witnessed the most devastating forest fire of the decade in numerous places across the Indian state of Uttarakhand. Forest fire which began in February 2016 destroyed nearly 4,048 hectares of land in Uttarakhand in 1857 incidents till May 2016. Mainly the pine forests in the Sub-Himalayan region were on fire producing clouds of smoke in the region. The reasons for this forest fire as claimed by many environmental experts & social media range from anthropogenic to climatic factors: a) Poor rainfall b) Extreme dryness c) Climate change d) Chir pine trees that are prone to catching fire and that make up 16% of Uttarakhand forests e) Pine needles that cover the forest floor are highly combustible f) Man induced fire by Timber Mafia.

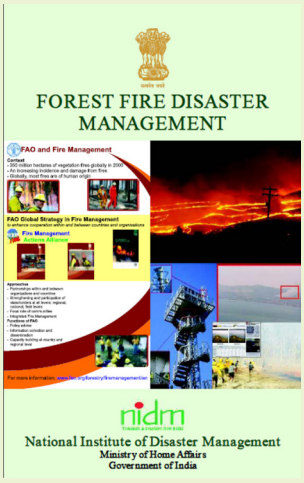
There are more evidences in favour of climatic causes of fire as the strongest on record El-Nino year 2015-2016 caused high temperature & less rainfall. In the forest ecosystems, reduced precipitation before and during the dry season can reduce fuel moisture and lower humidity near the surface allows fires to more easily escape from human control, and spread more rapidly over the landscape. The interactions between El Nino & climate warming can create extreme wild fires in future due to rainfall deficits & extreme temperature.

INDIANEXPRESS, MAY 18, 2016

Apart from severe land and green cover destruction, this wildfire contributed to global warming. The black carbon from the smog & ash were covering the glaciers. It will have a lasting impact on the Himalayan glaciers and may hasten their melting. Low altitude glaciers which are most likely to be affected by this are Gangotri, Milam, Sundardunga, Newla and Cheepa. So far, seven casualties are reported due to this fire. Tourism & wildlife at Corbett National Park & Rajaji Tiger Reserve regions were affected. Various tourist places in Himachal Pradesh & Uttarakhand faced heavy air pollution declining the number of tourists. Real biodiversity loss was to the birds which lay eggs on shrubs and their young ones who could not escape the fire. Students from a boarding school in Kasauli (H.P.) were evacuated as the forest fire reached their compound wall and filled the entire area with smog.

The forest department estimated a monetary loss of US$43, 000. A lot of vegetation which holds rainfall was also destroyed during fire & it may cause floods in rainy season. National Disaster Response Force, personnel from the Forest Department & Indian Air Force was deployed for rescue operations in affected areas. Ultimately, a good spell of rain on May 3, 2016 helped to reduce the impacts of fires.

To prevent such major fire outbreaks in future, the Forest Department along with locals at grassroots levels should clear the forest floors of the fallen, highly combustible pine needles & leaf litter. A paradigm shift in forest handling approach involving local people in conservation endeavours & fire prevention and control will be a more realistic solution to mitigate forest fire. For effective forest fire management a preventive program of zoning, danger rating, early warning and real time monitoring has to be designed and installed. Prevention and Management programmes should be integrated in the Joint Forest Management framework by State Governments. There is a further need to conduct research studies on the impact of repeated pine/oak forest fires in the Himalayan belt of India so that preparedness & mitigation measures can be undertaken.



NIDM PUBLICATION, 2014

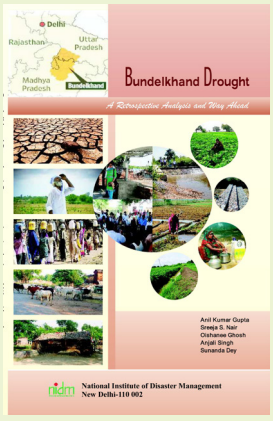
ANNEXURE: 6

Case Study on Bundelkhand Drought

Bundelkhand region lies at the heart of India below the Indo-Gangetic plain. The region spans across 13 districts, 7 in Uttar Pradesh (U.P.) & 6 in Madhya Pradesh (M.P.). Home to 18.3 million people, the region has a long standing history of drought & famine. The most recent and continued period of poor rainfall recorded in Bundelkhand was during 2004-10, when below average and erratic rain was reported in most part of the region in all the years. In the U.P. part of Bundelkhand, drought became evident in 2004-05 with a 25% short fall in monsoon rains. The rainfall deficit increased further to 43% in 2006-07 and 56% in 2007-08, leading to severe (metrological) drought conditions in Mahoba, Jhansi and Chitrakut districts. Except Tikamgarh and Datia districts, drought in the Bundelkhand region of M.P. commenced from 2006-07.

The effects of recurring droughts are more devastating as 90 % of rural income is based on crop production, livestock rearing & seasonal out-migration. Monsoon failure has led to declined water availability in rivers systems & other surface water sources in both rural & urban areas. Around 70 % of the tanks, ponds and dug-wells dried up in the region as a result of the steep fall in surface and ground water table during 2005-2007 ultimately declining availability of drinking water for people & domestic animals. It has also impacted natural vegetation & growing grasses which are crucial as fodder. Tribal population living near rivers are exploiting forests for survival leading to overexploitation of resources. The conditions deteriorated rapidly in 2015 when the villagers were hit by a triple whammy: untimely & heavy rainfall followed by hailstorms from February to early April destroyed the ripening winter wheat and gram crops, then a drought destroyed the summer Kharif paddy and pulse crops & finally due to prolonged drought Rabi crop could not be sown in a major part of the farmland over the November-December period. Repetitive crop failure & depletion of natural resources have led to drinking water crisis, farmer suicides, starvation deaths, mortgaging of women & migration to urban areas.

The Union Government launched Bundelkhand Special Package in 2009 with various mitigation measures that are being integrated in developmental schemes. The government has already spent a lot of money & resources earlier in drought relief but now a long term strategy is required to mitigate drought in Bundelkhand region. There is a need to prioritise the mitigation measures according to needs of people in different districts. Appropriate institutional mechanisms involving communities and local government need to be instituted at grassroots levels for management of water to have long lasting solutions. Medium term solutions could include renovation, repairs, desilting, raising embankments and crest height to increase storage capacity. To improve biomass productivity, trench digging, gully plugging, check dam and gabion construction in non-arable land is the primary step. Long term strategies include implementing methods to improve water use efficiency, pressure irrigation system, participation irrigation management, bridging yielding gap, crop rotation, seed production and seed banks, intensification and diversification and bringing up of agricultural markets. Adaptation to climate-change impacts and challenges of uncertainty relating to water and weather conditions/events, need to be a central component in disaster risk reduction and natural resource management for sustainable livelihood in the region. Traditional and local knowledge of dealing with climatic uncertainties and drought challenges need to be documented across the places in Bundelkhand.



BUNDELKHAND DROUGHT, NIDM, 2014

ANNEXURE: 7

Case Study on Uttarakhand Disaster

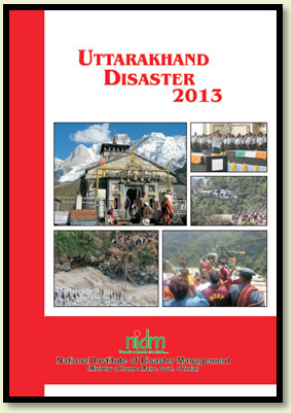
The Himalayan State of Uttarakhand experienced a mammoth disaster due to heavy (64.5-124.4mm) to very heavy (124.5-244.4mm) rainfall between 15 to 17 June 2013. Heavy rainfall & glacier melting resulted into flash floods & landslides causing irreparable losses in terms of human lives, damage to public & private properties & infrastructure, damage to livelihoods, landscapes and ecosystem. The unusually high rainfall possibly due to collision of western disturbances with monsoon easterlies resulted in heavy runoff with loads of debris, moraine & boulders causing massive devastation in the area. The most affected districts were Bageshwar, Chamoli, Pithoragarh, Rudraprayag and Uttarkashi. Human settlements were severely impacted in Kedarnath Shrine area & Mandakini Valley.

The impacts of disaster became more serious as it coincided with peak tourist & pilgrimage season. It increased the number of causalities & stranded around 60,000 people at various places. People in different affected areas were cut off from supplies of essential commodities for days & weeks. Roads breached out, highways & bridges at several locations were washed away. Disruption of traffic along all national highways & link roads severely impacted the relief & rescue operations. In terms of human causalities, a total of 169 people died and over 4,000 people were reported missing (presumed to be dead). Impact & damage assessment shows that total 4,200 villages were affected, 11,091 livestock were lost & around 2, 513 houses were completely damaged.

INDO TIBETAN BORDER POLICE RESCUE OPERATION, INDIA TODAY, 1 JULY, 2013

Anthropogenic aspects of Uttarakhand Disaster are also there. Large influx of tourists & pilgrims during summer & rainy seasons puts pressure on fragile mountain ecosystem. Land use change caused by unabated expansion of hydro-power projects, roads & transport is a major destabilising factor for mountains. Road cutting activities, heavy machinery used in dam construction have led to more frequent landslides in Uttarakhand.

Keeping the fragility of mountain ecosystem in mind, a legal framework is required to avoid construction on unstable slope & land use planning should be done on the basis of Hazard, Risk, Vulnerability & Capacity (HRVC) studies. A detailed scientific study of existing, under construction & proposed hydro power projects is required. Solar, wind & bio-energy should be promoted in the Himalayan region. For landslide management, there is an urgent need for landslide risk zonation mapping & enforcement of such zonation with appropriate guidelines. Unsustainable mining of riverbeds must not be allowed & illegal mining must be stopped. State Disaster Management Plans must be revised & updated. The HRVC analysis, mitigation and preparedness planning must also consider the impacts of climate change, ecological & natural resources, livelihood and local developmental issues. An effective tourist & pilgrim management system will enable control of movement & effective rescue and relief operations in adverse situations.



UTTARAKHAND DISASTER, NIDM PUBLICATION, 2015

ANNEXURE: 8

Case Study on Heat Wave in India, 2015-16

Heat-wave is a condition when atmospheric temperature increases to such an extent that it causes physiological stress and sometimes can claim human & animal life. The maximum temperature during heat-wave is 3°C or more than the normal temperature, consecutively for 3 or more days. Temperature of entire Asian region is increasing due to changing weather patterns, global warming and El Nino effects. It causes disruptions in community infrastructure such as power supply, public transport and other essential services.

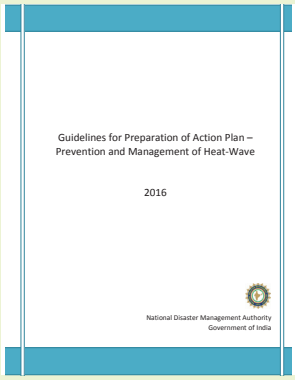
India has experienced two consecutive years of severe heat wave due to El Nino effects & global warming in 2015 & 2016. In 2015, annual mean temperature was 0.67°C above the 1961-1990 average which made it the third warmest year on record. Most severely impacted heat wave regions include: Churu (Rajasthan) 48.0°C, Nagpur (Vidarbha region in Maharashtra) 47.1°C, Khammam 48 °C, Jharsuguda (Odisha) & Hyderabad (Andhra Pradesh) 46 °C. More than 2400 people died in the heat wave of 2015 due to dehydration, heat & sun stroke. Majority of human causalities include the most vulnerable people like vegetable vendors, repair mechanics, construction workers, road side kiosk operators and homeless persons. It also caused cattle & wildlife death and affected animals in various zoos in India.

INDIAN EXPRESS, 23 MAY 2016

In 2016, double whammy of heat wave & severe drought in various parts of India, destroyed crops, killed livestock and left 330 million people without adequate water supplies for various purposes. In May 2016, India recorded the highest ever temperature at 51°C in Phalodi, western Rajasthan, while Churu in the same state recorded 50°C on the same day. India Meteorological Department issued red-level heat wave alert for Rajasthan, Madhya Pradesh & Gujarat in May 2016 where temperature were higher than the average. According to state government estimates more than 370 people have died so far. The heat waves of 2016 were so intense that many states witnessed melting of roads.

National Disaster Management Authority of India has prepared heat wave guidelines. These guidelines must be followed to prepare a heat wave management plan by various stakeholders so that necessary mitigative & response measures may be adopted. The impacts of heat waves are preventable if people follow some preventive measures and this can be done by educating the public about preventive actions following some Do's & Don'ts. Proper health facilities & timely diagnosis and treatment can save many lives. Ahmedabad prepared the first Heat Wave Action Plan in 2015. Other Indian cities must learn from Ahmedabad and protect their citizens from heat waves by preparing their own action plans.

The Key Lessons are: Heat wave should be recognised as a major health risk and proper health care facilities should be there to handle the cases, high-risk communities should be identified and aided, public cooling places should be made, public outreach of early heat wave alerts through various media like bulk messages on mobile phones, information on electronic screens at busy traffic intersections and market places should be increased so that people can plan their activities accordingly and be better prepared for heat waves.

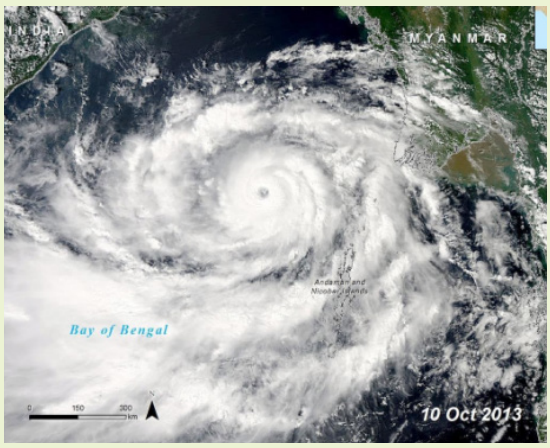


NDMA GUIDELINES ON HEAT WAVE, 2016

ANNEXURE: 9

Case Study on Cyclone Phailin

On October 12, 2013, a Very Severe Cyclonic Storm (VSCS), Phailin, brought torrential downpours, damaging winds of more than 220 kilometres per hour and storm surges of up to 3.5 metres to the eastern Indian states of Odisha and Andhra Pradesh (AP). It originated from a remnant cyclonic circulation from the South China Sea and formed as a low pressure area over Tenasserim coast on 6th October 2013. It made landfall near Gopalpur in Odisha on October 12, 2013. This VSCS caused heavy to extremely heavy rainfall over Andaman & Nicobar Islands, and Odisha and heavy to very heavy rainfall over isolated parts of North Coastal Andhra Pradesh, West Bengal, Jharkhand, Chhattisgarh and Sikkim. Major impacts of extreme rainfall and storm surge were seen in Odisha where low lying areas were inundated in the coastal districts of Ganjam, Puri, Khorda and around Chilika lagoon.



NASA MODIS AQUA IMAGE OF TROPICAL CYCLONE PHAILIN CIRCLING OVER THE BAY OF BENGAL, MOVING WEST TOWARDS INDIA, ON OCTOBER 10, 2013. (CREDIT: NASA MODIS RAPID RESPONSE TEAM IN GUTRO, 2013; VISUALISATION BY UNEP/GRID

The cyclone caused massive devastation such as a large number of trees were uprooted, roads, schools and buildings got damaged & telecommunication, water supply & power lines were disrupted. Railway infrastructure was badly impacted & 165 trains were cancelled. In total, 18 districts in Odisha & 3 districts in AP were affected by Phailin. Significant flooding was observed in Jharkhand, Bihar & Chhattisgarh. 21 deaths were reported due to cyclone in Odisha while the subsequent floods claimed 23 more lives.

Cyclone Phailin is considered as a success story of disaster management in India due to largest evacuation before disaster in Indian history. Lessons were learnt from past cyclonic disaster especially a comparable cyclone, 05B largely known as super cyclone in 1999. Dissemination of early warning given by India Meteorological Department (IMD), effective disaster preparedness and planning led to greatest evacuation in Indian history with over 13 lakh people evacuated before disaster & reducing the death toll to greater extent. Government cooperation (MHA, IMD, NDRF, NDMA, Odisha State Government, and OSDMA) and involvement of various civil society organisations played an important role in managing this disaster. Early warning also allowed for the relocation of more than 30,000 animals. Damaged communication connectivity was also restored within short period of time due to early preparedness. Similar type of disaster management approach may be replicated in future disasters also & better plans can be made by incorporating the lessons learnt from this disaster.

There is a need to improve on models used by IMD for forecasting and considering different components like rainfall, oceanic component etc. Mitigation of cyclone risk through bio-shield arrangement may be helpful in reducing the risk from cyclone. To prevent infrastructure damage, towers & buildings should be properly designed, tested and erected so that it can withstand high wind speed. We should try to find out the current gaps in our understanding of the hazards of cyclone in the coastal region of the country and identify and try to reduce those gaps.

NATIONAL WORKSHOP ON CYCLONE PHAILIN 2013: LESSONS LEARNT, NIDM PUBLICATION, 20114

ANNEXURE: 10

Case Study on Chennai Flood

India's fourth largest and most populous city Chennai faced devastating floods due to heavy rainfall during November-December 2015. In the month of November, 1,049 mm of rainfall was recorded in Chennai which is the highest recorded rainfall since 1918. Extremely high rainfall over Chennai was an outcome of a depression generated over a warm Bay of Bengal (BoB) which brought huge moisture from BoB and resulted in heavy precipitation over the South-East coast of India. The warming of BoB is also attributed to global warming & climate change. It is also hypothesised that El Nino in the year 2015 intensified the rainfall as it caused strong easterly winds during November-December 2015 which may have brought down moisture to the east coast of India over Chennai.

SUBMERGED BRIDGE DUE TO FLOOD. SOURCE: INDIAN AIR FORCE, RETRIEVED FROM: HTTPS://WWW.IJSR.NET/ARCHIVE/V4I12/NOV152333.PDF

Torrential rainfall during this period inundated the coastal districts of Chennai, Kancheepuram and Tiruvallur, and affected more than 4 million people with economic damages that cost around US$3 billion. The upper catchment area of Chembarambakkam received much higher rainfall than the city itself and resulted into major floods in the city. Due to massive flooding, schools and colleges remained closed for days & fishermen were also warned against sailing due to high waters & rough seas. In December beginning, 60% of the city was left without power supplies and several city hospitals stopped functioning.

Many major trains were cancelled by Southern Railways & Chennai International Airport remained closed until 6 December 2015. Huge shortage of food & safe drinking water prevailed for days. It is estimated that around 57, 000 houses in the city suffered structural damage. By December 2, 2016 more than 188 people were reported dead in Chennai. Unregulated urbanisation is also considered an important factor that intensified the extreme precipitation in Chennai either by generation of convection due to urban heat island effect or by uneven urban terrain resulting in wake diffusion & turbulence. Loss of natural drainage has occurred due to uncontrolled urban sprawl. Drainage channels have been blocked and urban lakes are filled and encroached, canals are degraded, polluted, heavily silted and narrowed. The storm water drainage systems are inadequate and lack maintenance. The city has only 855 km of storm drains against 2847 km of urban roads. Plastic and polythene constituents to the storm-water stream along with poor or no maintenance aggravates flood.

National Centre for Medium range Weather Forecasts (NCMRWF), forecasted the extreme event over Chennai well in advance. For proper usage of these forecasts there should be a good coordination among various meteorological and hydrologic communities. For future purposes these probabilistic forecasts should consider large scale forcings from Global Forecast System. Chennai disaster is a lesson for better urban planning & city governance. Indiscriminate dumping of solid waste into storm water drains should be stopped immediately.

To make the entire drainage system of the city very efficient a participatory approach in management of drainage system is required where the local government along with citizens work together. Storm water drainage system designs must be re-assessed keeping in mind the challenges posed by climate change. Reservoir operation guidelines must be revisited and more rational rule for operation should be formulated. Policies for sustainable and water sensitive development in the Peri-urban areas & retrofitting in developed urban areas as far as possible should be introduced.

INDIAN EXPRESS, DECEMBER 19, 2015

ANNEXURE: 11

Training Games

Objective: To create an environment of effective listening, learning and sharing

1) Chinese Whispers (Ice Breaking, during pre-training assessment)

Step 1	Ask for 6-10 volunteers from the participants. It is better to involve more people because the message being passed around is likely to be more distorted when number of people is more.
Step 2	Write down a message on a paper (containing at least 10 words). The message can be about a case study of any disastrous event or any other serious note.
Step 3	Ask the participants to sit in a circle
Step 4	Now give the written message to the first person and ask him to whisper the message in the ear of next person. The message paper should come back to the organiser and must not be passed on. The participants will pass on the message in the same way in a quick manner
Step 5	The game will continue to the last person in the circle. The last participant will say whatever he has heard loudly and the first person will reveal the real message. Compare them and laugh.
Note:	*Error accumulates while retelling and the statement announced by the last person will be significantly different and amusing from the one stated by the first person. The final result of the game will be experiential learning about how we all listen selectively and establish the need to work on learning so as to engage in active and maximum listening.*

2) Arms Crossed (Ice Breaking, during pre-training assessment)

Objective

To bring about a change in our habits that is leading to climate change. Our continuous efforts to combat climate change will be not be useful if we do not change our habits that are actually leading to it. This exercise makes us aware to some of the consequences of trying to change our habits.

Requirements:

No materials are required as such but there should be enough space in the room so that everyone can see the instructor and participate actively. It is a mass game which can be played by all individuals in the training room.

Step 1	All the participants in the training hall should play this short game. Participants should not hold anything like pen, pencil, paper etc. while playing this game. Initially the arms should be in dropped position.
Step 2	The instructor will ask everyone to fold their arms by folding his own arms to illustrate.
Step 3	The instructor will ask the participants to look down and note which wrist is on top, and remember whether it is right or left?
Step 4	Ask the participants to drop their arms
Step 5	Now ask them to cross their hands again and look down and remember which wrist is on top now. Ask them to drop their arms again.
Step 6	Now a little survey should be conducted by the instructor where he will ask everyone who had the same wrist on the top both the times to raise their hands. Instructor should deliberately put same wrist on top both the times so that he can also raise his hand. You will observe that almost everyone had the same wrist up both the times. This should be followed by a discussion with instructor about our habits.
Step 7	Now ask the participants to raise hand who had the left wrist up both times and then everyone who had the right wrist up both times. Finally ask them to do it the other way. Wait for 30 seconds to look at the efforts and reaction of the participants and have a discussion later.
End Note	The trainer should discuss what the participants have learnt from this activity. Is it possible for us to change our habits or behave in a different way? What could be the best possible solutions to change the habits of society?

Source: Compiled from Booth Sweeney, L. Meadows & G. Martin Mehers (2011) , The Systems Thinking Playbook for Climate Change, A toolkit for interactive learning, Deutche Gesellschaft für Internationale Zussamenarbeit, Reinheim

3) Quiz Game (Module 1, LU-B)

Requirements:

Box, Markers, Paper Chits

Step 1	This will be a question answer session in the form of a quiz where the trainer will ask questions to assess perceived competency of participants on climate change and disaster risks.
Step 2	The trainer should ask questions from a box which contains chits of prepared questions which includes the basic concepts of climate hazards, extreme events, disasters, vulnerability, sustainable development, climate change adaptation, disaster risk reduction, El Nino & La Nina etc.
Step 3	The participants can play this game individually or in a group of two. Every time the trainer picks up a chit from the box and asks a question; the participants will have to write the key word of the question on a chit with a marker and raise his hand while showing the chit to the trainer. For example: If the question is saying: What is El Nino? The participant should write El Nino on the chit and raise his hand. This is done to make the quiz like a buzzer round where buzzer is not available.
Step 4	The rules for answering the question include: The participant who shows the chit first to the trainer by raising hand will be given first chance to answer the question. The participant should explain in brief the basic concept of the term asked. He should also give an example to enhance the understanding.

Step 5	The trainer will give a chance to other teams willing to add to the concepts explained by current team and will finally move on to the next question when fully satisfied with the explanation.
Step 6	*Marks will be awarded to teams for answering and adding to the explanations each time. Trainer should make a note of the marks. Similar type of quiz sessions should be conducted during different learning units. The team with the highest marks can be awarded at the end of training.*

4) Avalanche – Module 2, LU – A

Objective

To bring changes in a system it is first necessary to understand the rules of the system. This game is to realise the difficulties faced by various stakeholders when there are certain rules to be followed. It is also intended to gain practical experience of the need for good communications and negotiations among stakeholders.

Requirement

Hula-Hoop of large diameter (It can be made by re-cycled paper also).

Step 1	Ask for at least 10 volunteers from participants to play the game. If there are more hoops it can be played as a competition among the groups. One person should be able to kneel down on the floor. The goal of the game is to lower the hoop down on floor.
Step 2	The participant who is willing to kneel down (Leader) should stand inside the hoop and the hold the hoop initially. The other participants will stand around him in a circle.
Step 3	Each team member should now support the hoop with the upper part of their index finger. The instructor could illustrate that by doing so.
Step 4	The participants should not let go the hoop and they cannot touch the hoop to support it. Now, the leader will say 'GO' and remove his support from the hoop and asks the team to lower down the hoop to ground.
Step 5	If any team member loses contact with the hoop, the game has to start again for that team.
Step 6	The hoop will actually rise up instead of going down as everyone will struggle to have a closer control over the loop. Compare what happened between different groups.
End Note	*A debriefing session where the trainer will ask questions about what went wrong in the game? What kind of changes in our rules are necessary to get the desired outcomes? Finally what should be the ideal modality to change the rules? A lot more discussion can be done on challenges faced in CCA & DRR mainstreaming & good coordination requirement among stakeholders to achieve a target.*

Source: Compiled from Booth Sweeney, L. Meadows & G. Martin Mehers (2011) The Systems Thinking Playbook for Climate Change, A toolkit for interactive learning, Deutche Gesellschaft für Internationale Zussamenarbeit, Reinheim

5) Paper Tear – Module 2, LU-C

Objective

To enhance proactive dealing with climate change, to enhance the communication skills and to show that how efforts to communicate even small things can fail easily. This game will remind the participants that communication requires constant care and the involvement of everyone.

Requirements:

One sheet of same size paper for each person (Use Recycled paper if possible).

Step 1	Minimum 5 participants can play this game. The maximum number is unlimited.
Step 2	Ask everyone to pick up the paper and see and listen to your instructions carefully. "This piece of paper is a metaphor for our policy options vis-à-vis climate change. I have an extremely important message to give you about a new climate policy that we all need to follow. It is a critical message and I ask you to listen carefully and please do not interrupt me or talk while I share with you my important message. Do not ask questions. Just do precisely as I ask you to do. Tearing the paper is a metaphor for the policy steps. Our goal is for everyone to produce identical patterns with their pieces of paper."
Step 3	The instructor should hold the paper so that everyone can see it and give the following instructions while doing the same with his paper: Fold the paper in half and tear off the bottom right corner of the paper. Fold the paper in half again tear off the upper right hand corner and then finally fold the paper in half again and tear off the lower left hand corner.
Step 4	Now ask the participants to unfold their paper and hold it up so that everyone can see it.
Step 5	Ask the participants about their patterns and what actually happened during the game.
End Note	*In the debriefing session ask the participants what actually went wrong? Why all of them were getting different patterns? Give the key reason for failure i. e. one way communication and ambiguous vocabulary. Relate the discussions to policy options. How can we communicate more effectively and where do failures exist in discussions?*

Source: Compiled from Booth Sweeney, L. Meadows & G. Martin Mehers (2011) , The Systems Thinking Playbook for Climate Change, A toolkit for interactive learning, Deutche Gesellschaft für Internationale Zussamenarbeit, Reinheim

6) 1-2-3- Go- Module 5- Wrap Up Game

Objective

The game is intended to make a point that when we are talking about deep changes, leading by examples will provide more power to our words and messages. It supports the saying "Action Speak Louder than Words".

Step 1	This is a mass game. Everyone in the training hall should play this game. There should be enough space in the hall so that everyone can see the instructor.
Step 2	The instructor should tell the class that he is going to count to three and then he will say "Go". When he will say "Go", everyone should clap their hand together. Repeat the instructions so that everyone can understand it properly. Tell them that the goal is to clap together at the same time. We will be doing the same thing and doing it together will amplify the impact. Finally say that: I am going to count to three and say "Go".

Step 3	Slowly count “1-2-3”, and clap your hands together loudly, take a break for a second and say “Go”. When the instructor will clap his hands together almost everyone in the class will clap their hands together without waiting for you to say “Go”. Pause, let everyone realise what actually happened.
Step 4	The exercise can be repeated once again.
End Note	*Call for a discussion about this game. Tell the importance of nonverbal communication in determining what happens when you are trying to make impact or catalyse change.*

(Source: Compiled from Booth Sweeney, L. Meadows & G. Martin Mehers (2011), The Systems Thinking Playbook for Climate Change, A toolkit for interactive learning, Deutche Gesellschaft für Internationale Zussamenarbeit, Reinheim)

7) The Domino Game – Module 4 , LU- C

Objective

To understand how proactive planning and investments for climate change adaptations can increase the infrastructure resilience.

Requirements:

Thermal boards, Ice cream sticks, all pins, small glass balls.

Step 1	This is a group activity. The whole class can be divided into groups of 5 persons each group.
Step 2	Each group will be given a thermal board, all pins and a glass ball. Make sure that equal amount of material is provided to each group.
Step 3	With the help of these materials each group is required to make a zigzag road like path for the ball to pass on a slanting thermal board. The path for ball can be made on the board with the help of ice-cream sticks and all pins together to support the sticks.
Step 4	The rule of game is that once the path is complete, the board should be held in slanting position and the ball needs to be passed through the path developed by sticks. The path should be planned in such a manner that the ball takes 15 seconds to travel from the beginning of path to the end of path.
Step 5	The team which completes the task early is the winning team. At the end of the activity there will be a debriefing session where the importance of pro-active planning, infrastructural requirements and team efforts will be discussed to achieve the required targets.

8) Stop Disaster Game, Module 3

An online learning game can be played by all participants if proper computer facilities will be there in the training hall. The “Stop Disaster” game by UNISDR will enable the participants to practically learn the importance of adequate spatial planning for risk reduction. If all the participants could not play the game online then the instructor can give a demonstration of the game for future reference.

The game is available at: (http://www.stopdisastersgame.org/en/playgame.html)

ANNEXURE: 12

Guidelines on Group Exercises

Group Exercise 1

Knowing Each Other – Ice Breaker

At the beginning of the training it is very important to loosen up participants physically & mentally so that a comfort level can be achieved. The following exercise is intended to create an environment that is comfortable for everyone, to put the participants at ease and to let them know each other.

Requirements: Paper cards, Marker Pens, Wall Board

Before starting the exercise, the facilitator should prepare number cards to be distributed to each and every participant. The cards should be prepared according to the number of participants in the training hall. Numbers starting from 1 should be written on cards and each number should be written in pair i. e. two cards must have the same number. Ask everyone in the training hall to be seated and listen to you carefully. Once the participants are completely silent and fully with you then on the basis of your own judgement divide the participants in two groups' i. e. 1 and 2 randomly. Give each participant the previously prepared number cards. The card distribution should be in the following manner: If you give card having number 1 to any participant in group 1 then another card of same number i. e. number 1 should be given to participant in group 2. This will help to make pairs of participants randomly so that they can know each other. Once you have distributed the cards ask the participants to shuffle completely and find their partner by showing number cards to each other. Two participants with same number cards will be paired together. This will be a mental & physical exercise that will loosen up participants and make them actively participate in another group exercises also. When all the participants will find their partners by showing number cards ask them to be seated with their partner now. Give everyone a flash card and ask them to write the following information about their partner on that flash card:

1. Name & Area of Expertise
2. Current Assignment
3. Educational Background
4. Work Experience
5. Expectations from this training

Now ask the participants to stick their partner's flash card on the board earmarked for this exercise. Give few more minutes to the participants to have discussions with their respective partners. Invite the participants one by one to introduce their partner to the entire group by taking help of the written flashcard.

Group Exercise 2

Understanding the vulnerability to disasters and climate change

Divide the participants into 4-5 working groups according to class strength. Assign each group a type of urban area like highly urbanised planned area, highly urbanised unplanned area, slum area, wetland site, coastal area & mountainous area etc. Ask them to discuss within themselves for 10-15 minutes and come up with some examplesthat how developmental activities in these areas have increased the vulnerability of people against disasters and climate change. The participants will get a platform to share their own personal experiences from their departments, districts and states etc. They can prepare a vulnerability matrix of each identified area which may contain the following columns:

1. Type of urban area
2. Type of developmental activity
3. Hazards
4. Induced vulnerability due to developmental activity
5. Possible solutions to reduce vulnerability and increase resilience against disasters & climate change.

The discussion can also include the scopes of CCA & DRR sensitive development in social, economic & environmental spheres. Participants can show their matrix on a chart paper or they can also share their views with the help of a power-point presentations (10 minutes each group).

Group Exercise 3

Group Work on Case Study

Give case studies hand-outs preferably from Asia presenting disaster risks in Sub-national context. The participants will be asked to discuss the case study in groups and examine the issues related to disaster risks and their implications in developmental planning at Sub-national level. Ask the participants to come up with the group's analysis of key learning from the given case study. Planning and financial framework required at Sub-national level should be highlighted while discussing the case study. It is advised to take a case study where the efficacy of CCA-DRR integration into policies, plans and programmes of government are highlighted. This will make the participants familiar with the present approaches and efforts of disaster resilient development. The whole exercise can be wrapped in an hour with 30 minutes dedicated to group analysis of case study and another 30 minutes for presenting the critical analysis of study. On the basis of case study given, the presentation should clearly mention the challenges of managing disasters and climate risks in urban areas. The facilitator can also allow one group to present the challenges, one group to present the future strategies and another group to summarise the key learning from the present case study.

Group Exercise 4

Group Work- Film Screening (Understanding infrastructure vulnerability to climate change and Planning disaster safe and climate smart infrastructure)

Divide the class in groups of four so that different work can be assigned to each group. The activity could start with an animated video of a disaster focusing on damage to critical infrastructure for example highway, hydro-power project, a major irrigation project or an airport. The video clip may also be derived from any real life example of a disaster showing immense damage to infrastructure. Do not discuss anything while showing the video and let the participants observe carefully. The issue of infrastructure vulnerability to climate change and the need of pro-active planning and investments for climate change adaptation by increasing infrastructure resilience should be reiterated through a power-point aided lecture following this video. Now each group may be assigned a task based on the video shown:

1. Based on the video describe various components of infrastructural vulnerability to climatic and natural disasters.
2. Describe how a particular critical infrastructure in the video affects the other vital infrastructure in an urban area (i. e. describe critical infrastructure interdependencies from the given example).
3. Develop a small framework for critical infrastructure protection (CIP) based on the understanding developed from the lectures and this video.
4. Discuss various policy initiatives for pro-active planning of disaster safe and climate resilient infrastructure (information based policies, regulation based policies and direct investments to upgrade the existing infrastructure etc).

Each group will be given 30 minutes to answer the above questions on a sheet of paper in brief after discussion. Marks may be given to each group and can be added to previous marks from other activities.

Group Exercise 5

Sector Cluster Strategies

This group work is intended toconsider sectoral strategies and policy context in which it is possible to mainstream CCA with DRR. Divide the class into two groups and assign two sectors for example: infrastructure & social welfare sector to the groups. Ask the groups to specify the following for the sector assigned to them:

1. CCA-DRR sectoral interventions/activities
2. Time Frame
3. Stakeholders
4. Cross-cutting issues
5. How communities can be involved?
6. How to ensure accountability, transparency and equity?

The groups can make presentations followed by discussion and debate.

Group Exercise 6

Eco-DRR

Divide the participants into groups and ask them to choose an urban system that is vital for human existence like urban drinking water cycle. Provide chart papers to the group and ask them to draw the water cycle from source to consumption and then back to source. Ask the group members to indicate natural and climatic disaster risk to every component of that cycle. The participants need to propose ecosystem based options to reduce the disaster risks. For example: Integrated Water Resource Management to properly maintain the urban ecosystem, reduce the disaster risk and make the entire cycle climate resilient.

Similarly another urban ecosystem based examples can be taken. The participants can also make a list of the following by learning from this activity:

1. Principles of managing urban eco-systems for disaster risk reduction
2. The institutions and actors involved in urban Eco-DRR
3. Role of communities in Eco-DRR

Groups are expected to make short presentations on their findings. The outcomes of the above exercise can be taken to another level if participants could draw research proposals for urban Eco-DRR and submit it to the trainer.

Group Exercise 7

Group Work

Creating synergies in Sendai Framework, Sustainable Development Goals and Paris Climate Agreement.

The pre-requisite for this group work is that the trainer should develop an understanding of international agreements on Disaster Risk Reduction, Climate Change & Sustainable Development. This can be done through various power-point presentations prior to this activity. This activity is developed to gather the innovative ideas of various professionals attending this training workshop on synergising the three international conventions: Sendai Framework for Disaster Risk Reduction, Sustainable Development Goals and the Paris Climate Agreement. Hand-outs of these conventions describing the framework in brief should be given to the participants in each group.

Now, each group is expected to develop a consolidated framework to implement the three international agreements showing synergies between them. This should be represented diagrammatically and can be presented through a power point presentation. The group members should give their on innovative ideas to give a framework to achieve the goal of climate smart and risk informed development. The trainer should add his comments while presentations. The group which will come up with the most feasible and innovative framework may be rewarded with bonus points which may be carried forward to other group activities. This session should be followed by a detailed discussion between trainer and participants about synergising and implementing the three international agreements in a Journey to Sustainability and Safety Together agenda of this training programme

Group Exercise 8

Guided Group Exercise

Implementation of Sub-national/State level CCA-DRR strategy

A guided group work may be performed by placing the participants in 2 groups with 10-12 participants in each group (tentatively). This group work shall be moderated by the course faculty.

1. Provide the groups with State Disaster Management Plans (SDMP) along with all other necessary information about the state like state profile, institutional setup, and data-base on line departments, agencies and NGOs, types of disasters and state map etc.
2. Each group has to prepare a state level CCA-DRR implementation strategy. Groups will be given the same states to evolve innovative ideas.
3. The groups shall identify the nodal in-charge; stakeholders viz. line departments, local technical agencies, NGOs and academic institutes which could be involved into the planning process.
4. The groups are supposed to propose an institutional structure for implementation of the project including monitoring committee, project cell and approving committee etc. They need to identify the schemes/ projects running within the departments and propose measures for mainstreaming DRR & CCA concerns.
5. They also need to identify visible gaps and needs in the given SDMP considering various options on systems, institutions and agents.

A representative or spokesperson should be identified from each group who can present the findings of the group. Observers can also be identified from groups to give feedback on presentations.

This is a long and comprehensive group activity, so it is advised to give last slot to this activity in the trainingsession. Participants can also prepare brief reports on this group activity and submit it to the trainer for review and evaluation.

Group Exercise 9

Group Exercise

Institutional set-up for CCA-DRR mainstreaming- Scaling down to City and District level

Reconvene the two groups formed in the previous guided group exercise to continue with their implementation strategy. Now based on additional information provided the groups will design:

The most appropriate institutional set-up for CCA-DRR mainstreaming in the City and District scenario on the basis of following parameters:

a) Expertise & Experience Available
b) Time it will take to set-up
c) Availability of Human Resource
d) Financial Requirements
e) Policy requirements
f) Organisational structure of the institutional mechanism
g) Ownership of institutional mechanism
h) Governance mechanism
i) Further steps to strengthen the mechanism

The proposed institutional mechanism should be drawn on a flip chart paper or on the computer screens if available. The groups should be given a chance to present their work. The trainer should encourage discussions and debates on it. Sharing of actual experiences will add up to the discussions. Link the similar points from each group's effort and identify the common models evolved and missing links also.

Group Exercise 10

What's your opinion?

Feedback from participants

Feedback is a way to improvise and to learn about different sessions of a training workshop from participant's perspective. A dedicated feedback session is intended to take place at the Post-Training Assessment of this training exercise. It is important to mention at the beginning of training that Feedback of participants is very important for us and is highly valued as a tool for improvisation for the present and future workshops. All the feedbacks received should be thoroughly reviewed and responded. Two ways are suggested to gather the feedback of participants: End of Learning Unit Feedback& End of Training Feedback.

End of Learning Unit Feedback

This is the real time feedback capturing strategy where after completion of each Learning Unit (LU) participants are expected to give their feedback. This will ensure that the immediate concerns of participants are shared with everyone in the training hall and a daily basis review is taking place. Participants should be provided with sticky notes on their tables which can be used for writing the feedback. There should be a place in the training hall where the participants can stick their feedbacks after completion of each LU. After each LU there should be a10 minutes break where the training facilitator can go through the feedbacks received and discuss them with the participants in a casual manner. The posted feedback should be typed by the training facilitator on a daily basis and try to review it thoroughly so that the suggestions can be incorporated in the upcoming LUs. To make the session more interesting, the participants can make groups to discuss a random feedback from the board and give suggestions to the facilitator in a more structured manner.

End of Training Feedback

This session will be relatively more formal and structured when compared to End of LU Feedback. This session is intended to take place after completion of last LU of this training programme. The pre-requisite for this session is that the training facilitator should prepare a detailed feedback form to be distributed to all the participants. All the suggestions/feedbacks from previous LU's should be tried to be incorporated in this form. It should also draw the feedback of participants in the form of their responses to specific questions asked. The relevance, effectiveness and usefulness of the training workshop should be checked by this feedback form. The participants can drop their feedback forms in a box from which randomly picked forms can also be discussed in a quick session.

The two methods suggested above to gather the feedback are very useful to get a comprehensive feedback from the participants. These exercises will help to improve the delivery strategy of subsequent training programmes and make them more effective. The trainer can make the feedback more interesting by modifying the above two activities in his own ways.

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Author's Profile

Dr. Anil Kumar Gupta

National Institute of Disaster Management, New Delhi, India

Dr Anil Kumar Gupta is a leading expert of disaster management and resilience, currently Head of Division of Policy Planning at India's National Institute of Disaster Management, at New Delhi. He steered international cooperation, research & capacity building programmes on mainstreaming DRR, climatic resilience, ecosystem approach, disaster forensics, jurisprudence, policy planning and tools. His contributions include - preparation of national disaster management plan including mitigation, response and recovery framework, national human resource plan for DRR, institutional development, besides guiding states in drawing DRR Roadmap on line of Sendai Framework, State/District level DM/DRR and developmental planning integrating CCA-DRR, village level plans, damage-loss and needs analysis, training strategies, national drought management manual, national action plan for chemical disasters, heat wave etc. Formerly he was Director, Institute of Environment and Development at Bundelkhand University. Dr. Gupta has supervised 5 Doctoral and several Masters' research, has credit of more than 130 publications including 20 books and 47 journal papers. He has 22 years of professional/ administrative and academic experience.

Email: anil.nidm@nic.in, envirosafe2007@gmail.com

Ms. Swati Singh

TERI University, New Delhi, India

Ms. Swati Singh has more than six years of professional experience in the area of water resource management, climate change adaptation and disaster management. She has worked with National Institute of Disaster Management as a Junior Consultant (Environment) where she was involved in the preparation of training modules, conducting training and organizing various workshops related to environment and disaster. She also worked with GIZ as Project Associate in mainstreaming Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR) in Coastal regions (Tamil Nadu and Andhra Pradesh) of India. She worked with Development Alternatives in a Climate Change project "Community led Assessment, Awareness, Advocacy and Action Programme (CLAP) for the Protection of Environment and Carbon Neutrality for the State of Himachal Pradesh" supported by Department of Environment, Science and Technology, HP Govt. She was also involved with Collectives for Integrated Livelihood Initiatives, a leading NGO supported by Sir Ratan Tata Trust that works for the enhancement of tribal livelihoods in the central India region through Natural Resource Management. Her key qualification includes M.Phil in Natural Resources Management from Indian Institute of Forest Management, Bhopal, Masters in Environmental Sciences from Banaras Hindu University, P.G. Diploma in Environmental Law from Indian Law Institute and Bachelor's from Ramjas College, University of Delhi. She has eight published research papers in various journals, one technical paper, newspaper articles and two training modules to her credit. Presently she is perusing her PhD from TERI University.

Email: swatiraghuvanshi05@gmail.com

Ms. Sakshi Katyal

Gorakhpur Environmental Action Group, New Delhi, India

Ms. Sakshi Katyal is a Post-Graduate in Environmental Studies & Resource Management from TERI University, New Delhi. Her areas of interest are Climate Change Adaptation (CCA) and Disaster Risk Reduction (DRR), Environmental Impact Assessment, Environmental Monitoring & Evaluation, Industrial Ecology and Water Resources Management. She has done Bachelor's in Chemistry from Ramjas College, University of Delhi. During her post-graduation she has gained exposure to real time projects on CCA-DRR, water quality management and impacts of climate change on water resources. She was a Research Intern at Tohoku University, Japan-Agra Project: UASB-DHS Integrated System-A Sustainable Sewage Treatment Technology. She was associated with National Institute of Disaster Management (NIDM) as a Researcher. During the research period she worked on Climate Resilience in Drinking Water Resources & Related Infrastructure in South Asia. She has worked as a Research Consultant with NIDM & Gorakhpur Environmental Action Group (GEAG) in the project-Scaling up Sub-National Climate and Disaster Smart Development in India. Presently, she is a Project Officer at GEAG which is a not-for-profit organisation working on the issues of sustainable agriculture, livelihoods and CCA-DRR.

Email: - sakshi.geag@gmail.com, sakshi.6teen@gmail.com

Mr. Shashikant Chopde

Institute for Social and Environmental Transition-International

Mr. Shashikant Chopde is a Post-Graduate in Civil Engineering with specialisation in Water Resources Management and a LEAD Fellow (Leadership in Environment and Development). Mr. Chopde is having more than two decades of experience in development sector on water and natural resources management issues. In the past decade he has been part of several multi-country large-scale collaborative projects in the region on Disaster Risk Reduction (DRR), Climate Change Adaptation (CCA) and Urban Resilience. He is Senior Research Associate with Institute for Social and Environmental Transition-International (ISET-I),a not-for-profit US based organization providing technical inputs on research and policy related to DRR, CCA and Urban Resilience. He has provided trainings to government and civil society organisations on the above issues. In addition, he is involved in Asian Cities Climate Change Resilience Network (ACCCRN) and CCA-DRR mainstreaming programmes supported by various agencies such as Rockefeller Foundation (RF) and CDKN. During his career he was associated with organizations such as Winrock International India as Coordinator, Adaptation Division and Programme Coordinator, Vikram Sarabhai Centre for Development Interaction (VIKSAT) where he worked on projects involving implementation, research and policy advocacy on the key focus areas.

Email: - shashikant.chopde@gmail.com

Dr. Shiraz A Wajih

Gorakhpur Environmental Action Group, Gorakhpur, Uttar Pradesh, India

Dr. Shiraz Wajih is a development professional, working as researcher, directing projects, trainer and facilitator since last 35 years. He is associated with Gorakhpur Environmental Action Group (www.geagindia.org) since its inception and is currently President of the organization. He is also Associate Professor in University College of Gorakhpur University. Dr. Wajih completed his MSc and then Ph.D. in Ecology. He has directed several projects related to issues like Sustainable Livelihoods, Natural Resource Management, Disaster Risk Reduction, Climate Change Adaptation and livelihood resilience etc supported by agencies like UNICEF, Oxfam, Govt of India/UP, IDRC, DFID, CDKN, The Rockefeller Foundation etc. His specific interest areas are Participatory Planning, Vulnerability Analysis and Resilience Strategies, Policy influencing, Micro-planning, Training and Capacity Building, Action Research and Documentation. Dr. Wajih has worked as Consultant, providing services on issues like Planning, Capacity Building, Resilience Building processes, Monitoring and evaluation etc and has worked for agencies like Christian Aid, Canadian Power Consultant, Oxfam, GIZ (NIDM), Govt of India/UP etc. He has been part of National Team on evaluation of DRR programme in states of Uttarakhand and Uttar Pradesh. He has been a member of governing board of various organizations like Oxfam India, IYF, Sahyog, Voluntary Health Association of India etc. and he is currently an active board member of organizations like Society for Promotion of wasteland Development, Institute of Social and Environment Transition (ISET), USA, Gorakhpur Environmental Action Group, Member-Wildlife Board, Govt of UP etc.

Email: - geag@vsnl.com

Mr. Amit Kumar

Gorakhpur Environmental Action Group, Gorakhpur, Uttar Pradesh, India

Mr. Amit Kumar is a Post-Graduate in Rural Development from Xavier Institute of Social Service (XISS) Ranchi. He holds specialization in Project Management. He is having more than 12 years of professional work experience in development sector on issues like CCA-DRR, Health & Nutrition and HIV/AIDS. He has worked with various national and international agencies in different capacities. He has previously worked with FHI 360, CARE India, TCI Foundation and SSK. He is currently associated with GEAG, leading the project on CCA & DRR integration in Odisha & Uttarakhand. Mr Kumar has contributed significantly in various documents & research reports related to CCA/DRR, livelihood, participatory methodologies & health. Besides his project management and research skill, he has undertaken various monitoring & evaluation assignments independently and jointly. Mr. Kumar is empanelled consultant in various leading agencies. He has provided his expert consultancy services to CARE India, UPSACS, MSACS, HLFPPT, GIDS & various others organizations.

Email: - amit.xissranchi@gmail.com, amitxiss@rediffmail.com

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About Organizations

Gorakhpur Environmental Action Group

Gorakhpur Environmental Action Group (GEAG) is a voluntary organization working in the field of environment and sustainable development since 1975. Ever since its inception, GEAG has been actively engaged in implementing several development projects addressing livelihood issues of small and marginal farmers, particularly women, based on ecological principles and gender sensitive participatory approach. Besides, GEAG has accomplished several appraisals, studies, researches at the micro and macro levels as well as successfully conducted a number of capacity building programmes for various stakeholders including women farmers, civil societies groups and government officials etc.

Today, GEAG has established its identity in North India as a leading resource institution on sustainable agriculture, participatory approaches, methodologies and gender. Acknowledging its achievements, efforts and expertise, United Nation's Economic and Social Council (ECOSOC) accorded GEAG Special Consultative Status in the year 2000. GEAG was recently awarded with the Lighthouse Activity Award by UNFCCC in 2013.

Institute for Social and Environmental Transition- International

Institute for Social and Environmental Transition- International (ISET-I) is a non-profit research, training and technical support organization with offices in the USA, Vietnam, and India. The organisation serves as a hub for sister organizations (ISET-Nepal and ISET-Pakistan) and a diverse network of partners across South and Southeast Asia. Each office functions as an integral part of the overall organization and also has strong country and regional programs. ISET-International's work bridges the science-policy-implementation divide across regions and cultures. The core activity areas are: Knowledge and Innovation Research, Methodology Development, Incubation Support and Evidence-Based Advocacy.

The organisation is engaged in both basic research and applied implementation activities, with a particular focus on the translation of global natural and social scientific insights into local contexts in a manner that improves understanding and enables action. It also analyzes the implications of local physical, cultural, economic and other system dynamics for global and high level policy and strategy. ISET-International's activities combine knowledge generation, learning and the incubation of innovative strategies through pilot scale implementation.

National Institute of Disaster Management

The National Institute of Disaster Management constituted under the Disaster Management Act 2005, has been entrusted with the nodal national responsibility for human resource development, capacity building, research, documentation and policy advocacy in the field of disaster management. The Institute provides training in face-to-face, on-line and self-learning mode as well as satellites based training. NIDM provides technical support to the state governments through the Disaster Management Centres (DMCs) in the Administrative Training Institutes (ATIs) of the States and Union Territories. Presently NIDM is supporting thirty such centres.

Upgraded from National Centre for Disaster Management of the Indian Institute of Public Administration on 16th October 2003, NIDM is steadily marching forward to fulfil its mission to make disaster resilient India by developing and promoting a culture of prevention and preparedness at all levels.

Climate and Development Knowledge Network

The Climate and Development Knowledge Network (CDKN) aims to help decision-makers in developing countries design and deliver climate compatible development. This is done by providing demand-led research and technical assistance, and channelling the best available knowledge on climate change and development to support policy processes at country and international levels. The work is done in partnership with decision-makers in the public, private and non-governmental sectors nationally, regionally and globally.

CDKN is managed by an alliance of five organisations that brings together a wide range of expertise and experience: PricewaterhouseCoopers LLP, Fundación Futuro Latinoamericano, LEAD Pakistan, the Development Institute and SouthSouthNorth. Within the broad scope of climate compatible development, work is done across four strategic themes: Climate compatible development strategies and plans, Improving developing countries' access to climate finance, Strengthening resilience through climate-related disaster risk management and Supporting climate negotiators from the least developed and most vulnerable countries.

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