



# Strengthening Climate Resilience through Disaster Risk Reduction

*Approach in Andhra Pradesh and Tamil Nadu in India - Experience and Lessons*

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# Abbreviations

AP	Andhra Pradesh	LAMG	Local Adaptation and Mitigation Guides
BMU	Federal Ministry of Environment, Nature Conservation and Nuclear Safety (in Germany)	MLC	Members of Legislative Council
CRDRR	Climate Resilience in Disaster Risk Reduction	MoEF	Ministry of Environment and Forests
CCA	Climate Change Adaptation	NAPCC	National Action Plan on Climate Change
CCFs	Community Contingency Funds	NCCF	National Calamity Contingency Fund
CCM	Climate Change Mitigation	NDMA	National Disaster Management Authority
CoP	Conference of Parties	DM Act	Disaster Management Act 2005
CRED	Center for Research on Epidemiology of Disasters	NGOs	Non-Governmental Organisations
CRF	Calamity Relief Fund	NIDM	National Institute of Disaster Management
CRZ	Coastal Regulation Zone	PRA	Participatory Rural Appraisal
DC	District Commissioner	PRI	Panchayati Raj Institutions
DDMA	District Disaster Management Authority	SAPCC	State Action Plan on Climate Change
DDMP	District Disaster Management Plans	SDMA	State Disaster Management Authority
DM	Disaster Management	SDMP	State Disaster Management Plan
DMA	Disaster Management Authorities	SHGs	Self Help Groups
DPRs	Detailed Project Reports	SLD	Shared Learning Dialogue
DRM	Disaster Risk Management	SREX	Special Report on Managing Risks of Extreme Events and Disasters to Advance Climate Change Adaptation
DRR	Disaster Risk Reduction	TN	Tamil Nadu
EPA	Environmental Protection Agency	ToTs	Training of Trainers
EU	European Union	UNDP	United Nations Development Programme
FYP	Five Year Plan	UNFCCC	United Nations Framework Convention on Climate Change
GFDRR	Global Facility for Disaster Reduction and Recovery	UNISDR	United Nations International Strategy for Disaster Reduction
GIZ	Gesellschaft für Internationale Zusammenarbeit GmbH	V&NA	Vulnerability and Needs Assessment
HFA	Hyogo Framework of Action	VDMP	Village Disaster Management Plan
IPCC	Intergovernmental Panel on Climate Change		

# Abstract

India is highly vulnerable to natural hazards particularly of hydro-meteorological origin. The country experienced 431 major natural disasters during the period 1980-2010, resulted in huge loss of human lives, property and resources (Hoyois, 2007). Increasing frequency and intensity of disasters related to the climate change impacts on weather systems, ecological dynamics and natural resources, are of serious concern for both, disaster management and climate change adaptation. As per the Working Group 1, contribution to the IPCC Assessment Report 5, the coasts of the Bay of Bengal and the Arabian Sea are likely to experience enhanced summer monsoon precipitation and increased rainfall extremes of landfall cyclones over the coming years (IPCC, 2013). Climate change is known to increase people's vulnerability by intensifying underlying factors, besides aggravating frequency and intensity of hazards. People's vulnerabilities, particularly of the marginalized communities living in coastal regions, call for immediate and well-synthesized actions.

Such actions are to be planned and implemented with the dual objectives of Climate Change Adaptation (CCA) or Disaster Risk Reduction (DRR). For both CCA and DRR, the major shared objectives include protecting developmental goals through effective planning, managing risks and uncertainties, particularly in the face of mounting evidence that disasters are hampering development and poverty alleviation (UNISDR, 2008). The purpose of engaging in DRR and CCA is to reduce the vulnerability of people and their resources which are exposed to various natural hazards, and increase their resilience to bounce back after the eventualities arising out of such disasters.

Identification of disaster risks entailing understanding of the hazards and vulnerabilities is the primary step in the process of integrating CCA and DRR actions. Once the risks and vulnerability components are identified and understood, it needs their integration into risk mitigation pathways and plans at the community and district level.

CCA and DRR practices on ground level need to be implemented through structural and non-structural measures like constructing protective infrastructure and increasing community capacity, effective planning and making specific investments, which has been carried out through pilot interventions under the AdaptCap project. The key activities included Vulnerability & Need Assessment (VNA), developing CCA-DRR integrated plans (Village Disaster Management Plans and District Disaster Management Plans) and drawing lessons for CCA-DRR integration in state level plans (State Action Plan for Climate Change, State DM Plan).



# 1. Introduction

Climate variability, climate change and extreme events pose significant risks to development and poverty alleviation (Figure 1). Over the past decades, there has been a striking increase in the number of climate related disasters, people affected and economic losses (Gupta et al., 2009). Management of climate related risks shall include the following:

- (i) Improved understanding about extreme events (hazards),
- (ii) Understanding the vulnerability and its underlying causes,
- (iii) Identifying various mitigation measures and adaptation strategies, and
- (iv) Identifying pathways for integration into plans at different levels of governance.

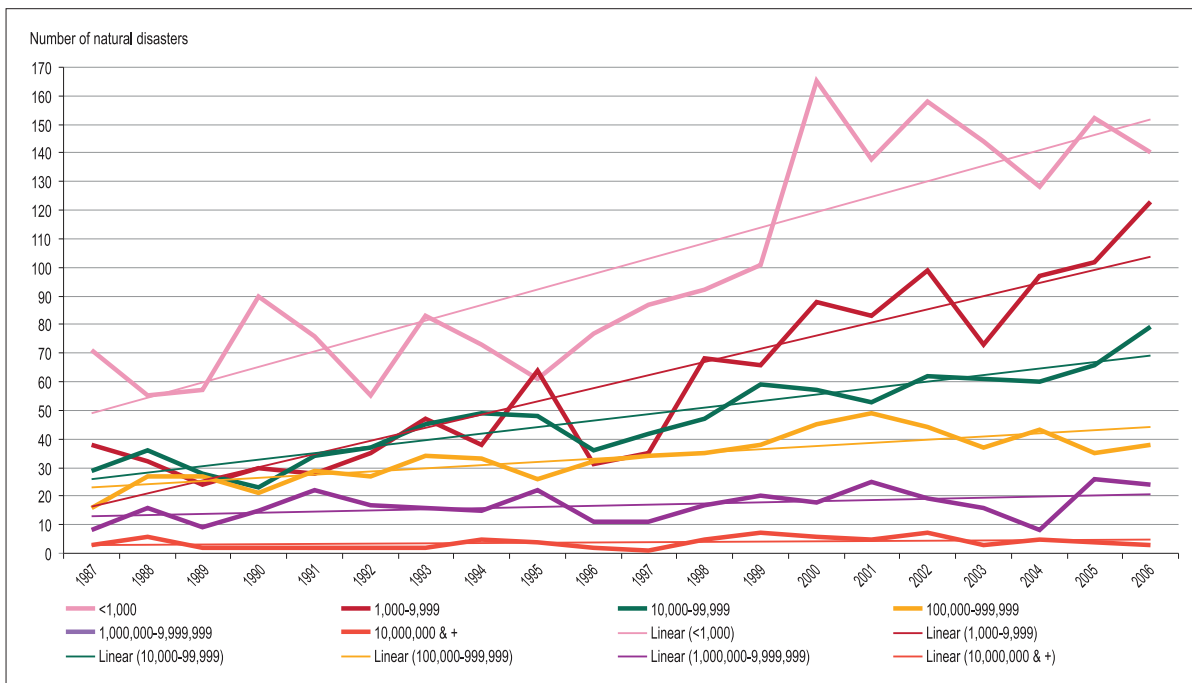


Figure 1: Natural disasters categorised by number of victims (killed and affected) - number and linear trends (Source: Hoyois et. al., 2007)

The objective of effective disaster management plan is to minimise its adverse impacts on human lives, property and environment under current and future climatic settings. Unless and until the communities and Governments at various levels are enabled to adapt their activities

according to the changing climate and related risks, effectiveness of these disaster management plans cannot be assured.

Changes in the climatic patterns not only drive extreme weather events like cyclones, droughts, and floods etc. but also cause slow, permanent and long-term damaging effects like change in precipitation patterns and timings, salinity of water and land, water and vector borne diseases, loss of biodiversity, degradation of soil quality, etc. Loss of lives, livelihood opportunities, food resources and human health, and damage to property, infrastructure, are the consequences which disrupt the process of sustainable development.

Increasing sea level due to climate change is known to worsen the impact of cyclones in low-lying coastal regions as flooding becomes more severe. Urbanisation is driving accelerated movement of population towards the coast. Deleterious effects on mangrove forests, coral reefs and large scale landscape changes are further increasing coastal vulnerability to cyclonic hazards (Figure 2). In such circumstances, loss of ecosystem services can make urban settlements more prone to disaster amplifying the risks of climate change (Mc Granahan, 2007).

## Climate Change Impacts

Climate change impacts can be roughly divided into two groups

### Environmental impacts

- physiological effects on crops, pasture, forests and livestock (quantity, quality);
- changes in land, soil and water resources (quantity, quality);
- increased weed and pest challenges;
- shifts in spatial and temporal distribution of impacts;
- sea level rise, changes to ocean salinity;
- sea temperature rise causing fish to inhabit different ranges.

### Socio-economic impacts

- decline in yields and production;
- reduced marginal GDP from agriculture;
- fluctuations in world market prices;
- changes in geographical distribution of trade regimes;
- increased number of people at risk of hunger and food insecurity;
- migration and civil unrest.

(Gupta and Nair, 2012)

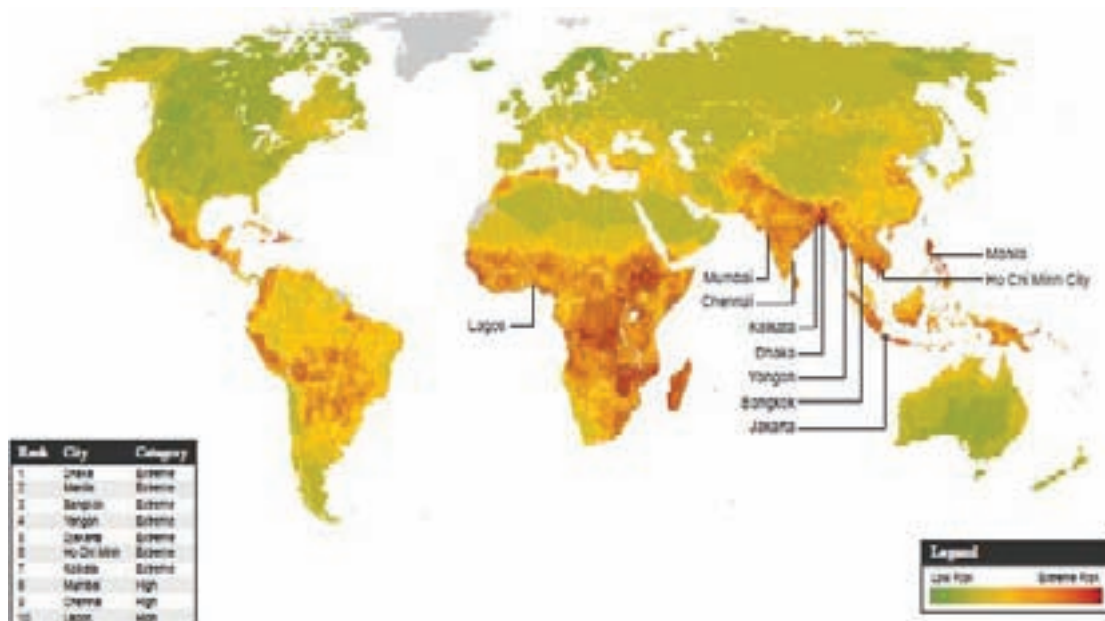


Figure 2: Climate Change Vulnerability Index 2013: Cities at maximum risk (Source: Maplecroft, 2013)

Several regions of the world are highly vulnerable to the impacts of climate change, and this calls for an integrated approach towards Climate Resilient Disaster Risk Reduction (CRDRR). At the policy level, convergence between CCA and DRR has been an agenda of strategic discussions and research since 2008 in India as well. ‘Mainstreaming adaptation’ means ‘integrating adaptation with other policy agenda rather than looking at adaptation as an additional component’ (Dutta et al., 2013). It requires improved planning for disaster management that takes into account the impact of changing patterns in climatic parameters, projected climatic scenarios, and their harmful effects on communities.

*The need for an integrated approach to improve disaster management policy and practice in response to a changing climate was the subject of the Global Facility for Disaster Reduction and Recovery (GFDRR) ‘Stockholm Policy Forum on Climate Smart Disaster Risk Management’ (Mitchell et al., 2010).*

*Holistic and integrated approach for managing and adapting to disaster and climate extremes can only be achieved through greater co-ordination and learning between sectors (GFDRR, 2009).*

Mainstreaming CCA and DRR into an integrated framework at various levels (national, state, regional and local) and its coordination with different stakeholders and agencies/institutions (international bodies, national and local NGOs, private organisations and communities) are

*Climate Change is shifting the frequency and intensity of hazards, such as heat extremes, heavy rainfall, droughts, high sea levels and possibly cyclones, with direct implications for disaster risks (IPCC, 2007).*

key facets of effective CRDRR. Besides, incorporating CCA with DRR through a common organisational setup shall help in avoiding duplication of efforts, administrative difficulties, and will enable better coordination among various groups for effective use of resources. Investing in integrated and flexible institutional

and policy frameworks is a first step towards creating a strategic environment for building resilience to climate and disaster risks (CDKN, 2012). A framework integration of CCA and DRR for sustainable development is shown in Figure 3.

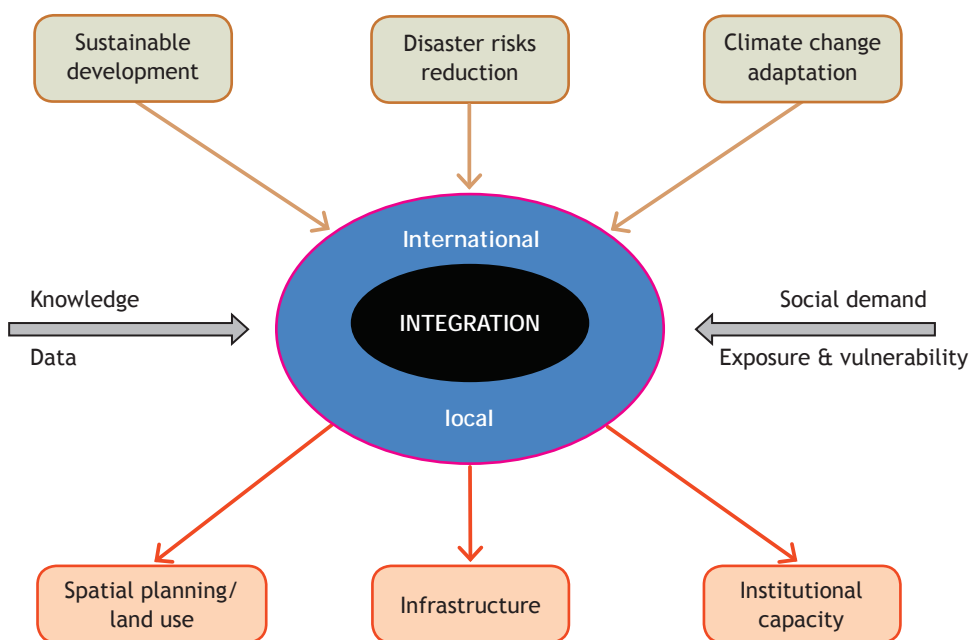


Figure 3: CCA and DRR Integration framework

## Impacts of extremes on human systems and ecosystems in Asia

*Climate extremes may result in a broad range of impacts on both human and ecosystems including economic losses, impacts on different sectors such as tourism and agriculture, on urban settlements and on small island states. The severity of these impacts will depend strongly on the level of exposure and vulnerability to climate extremes. Collectively such impacts can also have a significant adverse effect on the population and can harm national, regional and global development.*

*Extreme events have the greatest impacts on sectors that are closely linked with or dependent on the climate, for example water, agriculture and food security, forestry, health and tourism. There is high confidence that changes in the climate could seriously affect water management systems.*

*SREX Report, Chapter (IPCC, 2012)*

India is highly vulnerable to natural and anthropogenic disasters on account of geo-climatic settings. About 60% of the geographical area is susceptible to earthquakes and over 8% is prone to floods (excluding urban floods and flash floods). India has 7500 kilometres long coastline, which is prone to cyclonic hazards. India's 68% net sown area is susceptible to drought. All this entails huge economic losses and causes widespread developmental setbacks. Disasters are no longer limited to natural catastrophes. Man-made emergencies often cause larger disasters in terms of fatalities and economic losses. With urbanization and concentration of population in metropolitan cities, more and more people are becoming vulnerable to location specific disasters (Planning Commission GOI, 2006).

With climate change impacts intensifying, erratic rainfall and other stresses will increase and with lack of information on the ground, the devastation is bound to increase. The rapid expansion of climate change related efforts needs to build on the experiences and tools developed for DRR (Mitchell et al., 2010). There are many facets of adaptation as many sectors

and geographical locations are hit by changing climatic conditions. In India, these sectors (at district/local level) can be broadly grouped as following, for the purpose of effective planning, implementation and monitoring:

- (i) Infrastructure and trade/commerce
- (ii) Environment and natural resources, and
- (iii) Social welfare and poverty alleviation

Adaptation to climate-change, thus, requires a range of policies and plans to provide for adequate support - both at the level of national government but also with regard to institutional mechanisms at the state, district, block, village and community level, for reducing the vulnerability of people and their resources to the risk of natural hazards associated with climatic variability and extreme events. As proposed under the Bali Action Plan 2007<sup>1</sup>, enhanced action on adaptation, including inter alia consideration of disaster risk reduction strategies and means, is needed to prevent losses and damage associated with climate change impacts. Such actions need to be a priority particularly for the developing countries. Level of ecological degradation coupled with social insecurity and disparities make inhabiting communities relatively highly vulnerability to the impact of hydro-meteorological disasters.

<sup>1</sup> At the 13th Conference of the Parties (COP), Bali, December 2007, the "Bali Action Plan" was adopted. It provides the road map toward a new international climate change agreement to be concluded by 2009, and that will ultimately lead to a post-2012 international agreement on climate change. In paragraph 1c, the Bali Action Plan highlights the significance of disaster risk reduction, as part of enhanced action on climate change adaptation. <http://unfccc.int/resource/docs/2007/cop13/eng/06a01.pdf#page=3>.

## Mainstreaming CCA and DRR at international platform

### • UNFCCC

The UNFCCC Parties have recognized that existing knowledge and capacities for coping with extreme weather events must be harnessed to adapt to climate change. The Bali Action Plan's directions for adaptation call for the consideration of:

*“Risk management and risk reduction strategies, including risk sharing and transfer mechanisms such as insurance; Disaster reduction strategies and means to address loss and damage associated with climate change impacts in developing countries that are particularly vulnerable to the adverse effects of climate change.” (Bali Action Plan, 2007).*

In support of the Bali Action Plan, and based on consultation with ISDR system partners and UNFCCC Parties, the UNISDR has identified and promoted the following three areas of action over 2008:

- (i) Develop national coordination mechanisms to link disaster risk reduction and adaptation,
- (ii) Conduct a baseline assessment on the status of disaster risk reduction and adaptation efforts, and
- (iii) Prepare adaptation plans drawing on the Hyogo Framework.

The need to systematically integrate disaster risk reduction and adaptation into national development strategies has also emerged as a key conclusion from a number of recent international policy forums. In particular, the “Stockholm Plan of Action for Integrating Disaster Risk and Climate Change Impacts in Poverty Reduction” (UN-ISDR) and the recent Oslo Policy Forum on “Changing the Way We Develop: Dealing with Disasters and Climate Change” reiterated this view (UNISDR, 2008).

### • Hyogo Framework of Action (HFA)

The HFA explicitly integrates the need to anticipate changing risks due to global climate change. Specifically, states, regional and international organizations and other actors commit to “promote the integration of risk reduction associated with existing climate variability and future climate change into strategies for the reduction of disaster risk and adaptation to climate change, which would include the clear identification of climate-related disaster risks, the design of specific risk reduction measures and an improved and routine use of climate risk information by planners, engineers and other decision-makers.” HFA strategic goals are following:

- (i) Integration of disaster risk considerations into sustainable development policies, planning and programming at all levels, with a special emphasis on disaster prevention, mitigation and preparedness;
- (ii) Development and strengthening of institutions, mechanisms and capacities at all levels, in particular at the community level, that can systematically contribute to building resilience to hazards; and
- (iii) Incorporation of risk reduction into the design and implementation of emergency preparedness, response and recovery programmes.



The experiences and lessons from dealing with past disasters, especially during the last three decade, have made disaster managers and policy makers recognize the need of a proactive approach in disaster risk management (DRM) in India. For instance, the Gujarat earthquake in 2001, and Indian Ocean Tsunami in 2004 has triggered a thought process to move from a reactive emergency response to a pro-active risk reduction approach. This was effectively understood in the light of lessons drawn during United Nations International Decade for Natural Disaster Reduction (IDNDR, 1990-99) which led to the strategies adapted in World Summit on Sustainable Development (WSSD, 2002). Climate change impacts and environmental degradation as drivers of natural hazards and social vulnerability, has been discussed in the background of India's concern for sustainable development (Gupta and Yunus, 2004).

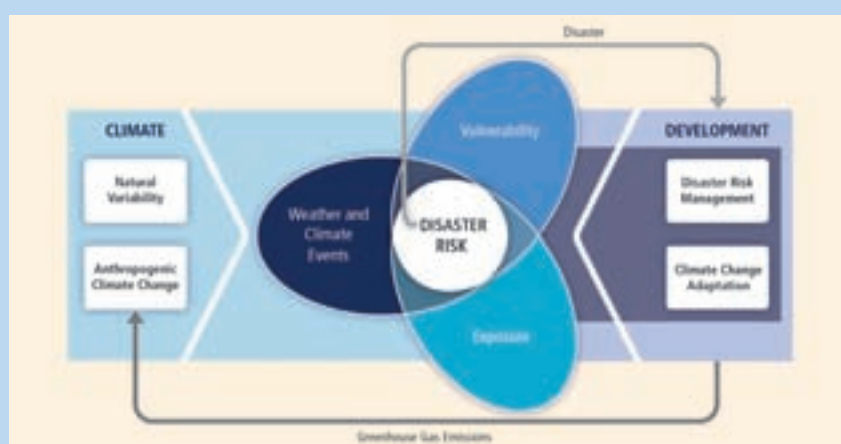
### Mainstreaming CCA and DRR at international platform

- *Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX)*

*The SREX report assesses how exposure and vulnerability to weather and climate events determine impacts and the likelihood of disasters (disaster risk). It evaluates the influence of natural climate variability and anthropogenic climate change on climate extremes and other weather and climate events that can contribute to disasters, as well as the exposure and vulnerability of human society and natural ecosystems. The report examines how disaster risk management and climate change adaptation can reduce exposure and vulnerability to weather and climate events and thus reduces disaster risk, as well as increase resilience to the risks that cannot be eliminated.*

*The Special Report on Managing the Risks of Extreme Events and Disasters to Advance Climate Change Adaptation (SREX) was commissioned by the Intergovernmental Panel on Climate Change (IPCC) in response to a recognized need to provide specific advice on climate change, extreme weather and climate events (extremes).*

*SREX considers the role of development in exposure and vulnerability, the implications for disaster risk, and the interactions between disasters and development under a broad framework of environmental systems interaction with human-system (Figure 4). It examines how human responses to extreme events and disasters could contribute to adaptation objectives, and how adaptation to climate change could become better integrated with DRM practice. The SREX report (Field 2002) represents a significant step forward for the integration and harmonization of the climate change adaptation, disaster risk management and environmental sciences.*



**Figure 4:** Interaction of natural and anthropogenic components for DRR and CCA integration  
Source: SREX Report (IPCC, 2012)

As a result, India's 11th Five Year Plan (2007 - 2012) for development made provisions for a holistic approach to DRM, transitioning the conventional focus on post-disaster response and relief centric activities<sup>2</sup>. An institutional framework for DRM was put in place at the national level, by notifying the Disaster Management Act in 2005 (DM Act, 2005). The Act prescribes a disaster risk reduction approach to be adapted at the national, state, district, village and local level. Disaster Management Policy (2009) and DM Act call for disaster management plan to be developed and implemented by each Ministry/Department and agency/organization at every level of the Government. It is envisaged that, at each level, development planning must integrate the prevention and mitigation of disasters in the respective general and sectoral development plans, and resources should be directed towards mitigation activities (NDMA, Govt. of India). Disaster management plans are required to incorporate the elements and activities concerned to prevention and mitigation, response and capacity building.

As per Indian Constitution, 'disaster management' is a state subject and, therefore, Federal or State Governments hold key responsibilities for disaster management. District being the most important administrative units, the District Disaster Management Plan (DDMP) holds key significance in organization of mitigation and response activities. These disaster management plans, for state, district, village and local levels, are supposed to be prepared with a participatory and coordinated approach.

However, the existing plan documents and prevailing DM planning primarily focussed on emergency response and coordination, with deficiencies as following:

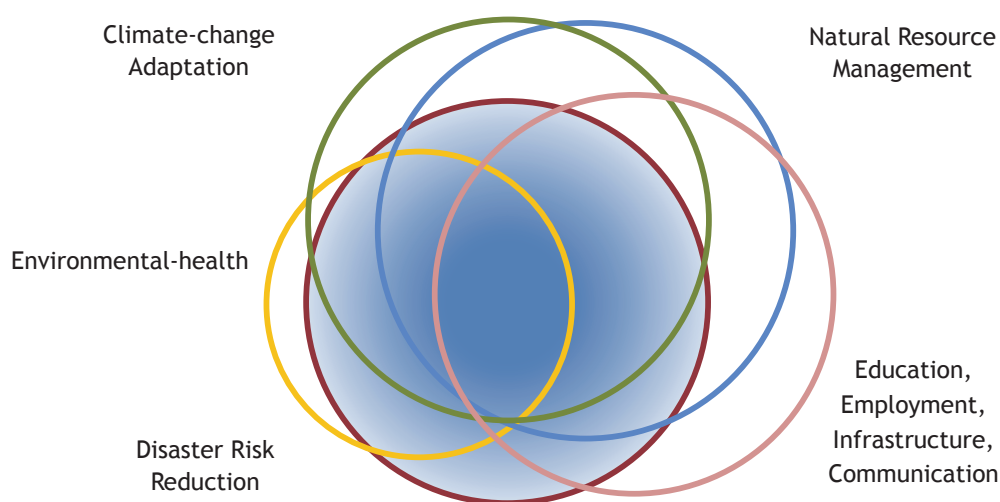
- (i) Hazard Risk Vulnerability Capacity (HRVC) Analysis is poorly addressed and done mostly in ad-hoc approach. The HRVC does not take into account building up or future hazards or projected scenarios in the context of changing environment - climate, land-use or other anthropogenic settings. Besides, detailed vulnerability analysis and particularly assessment of underlying factors of vulnerability are seldom reflected.
- (ii) Mitigation Plan is mostly reflected in form of conceptual detail of type of measures and actual identification and assessment of suitable structural and non-structural measures to prevent the disaster and its impact, to be implemented in short, medium and long-term during pre-disaster period are rarely incorporated.
- (iii) Besides, Mitigation plans are also required to incorporate issues of change management (for example, in context of climate change impacts, land-use, economic activities, migration, etc.) and framework of post-disaster sustainable recovery (with issues like livelihood, health, food security, ecosystem services, etc.).
- (iv) Components of DM Plan (all sections, viz. HRVC, mitigation, response & relief, and post-disaster recovery) need to clearly spell the approaches to be adapted, for instance, engineering solutions, ecosystem based DRR, community centric approaches, capacity building (resources and communication) and human resources (education and training) etc.
- (v) Most strategies adapted and suggested in these existing plan documents are centred on emergency preparedness and disaster response & relief (in extreme events) management and so far lack in provisions to reduce vulnerability to climate change impacts. Therefore, the 'components of resistance' against hydro-meteorological hazards, i.e., avoidance, tolerance and resilience, call for a framework approach to be woven with the disaster management system make it more effective and climate resilient.

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2 Planning Commission, Eleventh Five Year Plan (2007 - 2012), <http://planningcommission.nic.in/plans/planrel/fiveyr/welcome.html>

- (vi) Even though the DM Act, 2005, prescribes every district to prepare a District Disaster Management Plan (DDMP) and allocate a specific budget for it, most line departments are yet to come up with a plan which includes a disaster management component. Limited understanding and access to technological advances and lack of appropriate data about the threats posed by the changing climate render the conventional DDMPs incomplete in actual sense of 'DRR'. It is also attributed to the lack of scientific staff to assist the district office.

Even though climate change adaptation and mitigation as part of overall national responsibility lies with the Union Ministry of Environment and Forests (MoEF), issues related to managing disasters faced by local regions and originating from erratic weather patterns are dealt primarily by the Union Ministry of Home Affairs in India. At State level, the Department of Revenue/Relief and Disaster Management looks after the issues related to disaster management. All the states in India have been asked by MoEF to expeditiously prepare their State Action Plans on Climate Change (SAPCC). However, these too identify strategic interventions to address climate change alone, focus primarily on GHG reduction (for CC mitigation) and usually lack any provisions to alleviate environmental vulnerabilities resulting from climate change impacts. Adaptation and DRR has seldom been addressed within primary concern in a SAPCC document, despite great overlap among these and also with the issues of natural resources management, environmental health along other developmental facets (Figure 5, Gupta et al., 2011).



*Figure 5: Environment-development interface for CCA and DRR linkages (Gupta et al. 2011).*

The integration of CCA and DRR has recently been much talked starting 2007-08 but has been less realised at ground implementation levels. Therefore, developing and testing the approaches and models for their effectiveness and acceptability at different level of governance and by the communities is important. As a part of the study undertaken by GIZ (Indo-German Environment Partnership Programme, IGEP) jointly with National Institute of Disaster Management (NIDM), the entry points for integration have been identified, explored and up-scaled at the national level for cross county replication of the CRDRR approach. Identifying barriers in the implementation and overcoming obstacles in terms of mainstreaming CCA and DRR was also an objective of this research.

## 2. Climate Resilience in Disaster Risk Reduction (CRDRR)

Climate Resilient in Disaster Risk Reduction is an area where CCA and DRR converge within the practices of sustainable development. The conceptual and practical similarities and differences of DRR and CCA have been the subject of several studies (Anderson, 2012; Gupta et al., 2009, 2011; Mercer, 2010). They have found that whilst there are some political and physical distinctions between the scopes of each field, there is a key area of similarity - a

*Holistic management of disaster risk requires action to reduce impacts of extreme events before, during and after they occur, including technical preventive measures and aspects of socio-economic development designed to reduce human vulnerability to hazards. Approaches toward the management of climate change impacts also have to consider the reduction of human vulnerability under changing levels of risk. A key challenge and opportunity therefore lies in building a bridge between current disaster risk management efforts aimed at reducing vulnerabilities to extreme events and efforts to promote climate change adaptation (Few et al. 2006).*

focus on vulnerability reduction and the enhancement of resilience (Venton and Troube, 2008). Both, DRR and CCA focus on reducing people's vulnerability to hazards by improving methods to anticipate, resist, cope with and recover from their impact. The effectiveness of both CCA and DRR are limited if they are not viewed within the broader context of sustainable development.

According to the Hyogo Framework for Action (HFA) 2005, DRR is a cross-cutting issue in the context of sustainable development and, therefore, an important element for the achievement of internationally agreed development goals, including the Millennium Development Goals. At the World Conference on Disaster Reduction governments agreed to adopt a mainstreamed approach to DRR (Hyogo Framework) to which India was a party. At the 13th session of the UNFCCC

Conference of Parties (COP 13) held in Bali in 2007, governments formally recognised the importance of DRR for adaptation in the Bali Action Plan, agreeing that 'enhanced action on adaptation' should include consideration of 'disaster reduction strategies'.

From a planning perspective, mainstreaming DRR and CCA is a multi-level process as outlined in the Figure 6.



Figure 6: Bottom-up approach for mainstreaming CCA and DRR

Avenues for mainstreaming CCA and DRR into developmental planning start with existing policies and practices rather than creating new ones. This renders implementation easier and more effective. It will help in making efficient use of resources and systems, instead of creating separate and new institutions and processes to support CCA and DRR. Mainstreaming of CCA and DRR requires fine tuning of the relevant policies and plans in a coordinated way to avoid their overlapping and conflicting nature. It has been recognised that those policies aimed at reducing the risk of climate-related disasters can provide an entry point for adaptation, too (Lebel et al., 2012). Thus, it is increasingly realised that adaptation and risk reduction must be integral components of development planning and implementation process in order to ensure sustainability of human well-being, their environment and economies.

According to the IPCC report 2012, the “risks arising from future extreme events can be avoided primarily at the regional and local level” and hence making a plan at village level is a step towards it (IPCC, 2012). Adaptation to Climate change and Disaster risk management of extreme events can, therefore, be approached complementarily in dealing with Climate change. These approaches can supplement each other in order to reduce exposure and sensitivity and increase the adaptive capacity of humans and the environment to the changing climate and associated disasters risks. This can be accomplished by introducing the climate change concerns and related adaptation component into the local planning process such as Village Disaster Management Plans (VDMPs) and District Disaster Management Plans (DDMPs). This is expected to ensure appropriate and expeditious communication both to and from the communities, in response to climate related hazards, which culminates into efficient administration, mobility of funds, human and material resources and coordination of emergency response in case of a disaster event.

## 2.1 Potential for integration between current schemes related to CCA and DRR in India

Disaster Management, including prevention-mitigation and capacity development, has evolved a lot in India with a tiered approach of institutional setup at the national, state, district and village or local level. It can, thus, provide the Climate change sector a ready mechanism. On the other hand, Climate change action including adaptation has only recently seen much action, mostly since the launch of the National Action Plan on Climate Change (NAPCC). The major challenge towards mainstreaming DRR and CCA is at the national and state level where there

is a lack of substantive interface between the concerned Ministries and departments/agencies. However, at the village or local level, it is the long existence of disaster preparedness that drives the activities and planning process. Table 1 provides an analytical comparison of DRR and CCA at state level and points out ways to integrate it.

**Table 1** Comparative analysis of State Disaster Management Plans (SDMP) and State Action Plans on Climate Change (SAPCC) at State level in India

	SDMP / DDMP	SAPCC
Authority	Multi tier institutional framework NDMA, SDMA, DDMA, local DM authority	Advisory council on Climate change
Chaired by	Chief Minister, District Collector/ Magistrate, Local authority	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 hazards and human-induced disasters	Identifies measures that promote sustainable development objectives while also yielding co-benefits for addressing climate change impacts. It outlines a number of steps to simultaneously advance India's development and climate change-related objectives of mitigation and adaptation.
Departments	Disaster Management and Revenue/Relief department	Environment & Forests department.
Planning Approach	In line with the development plans of the State Five Year Plans	In line with the eight missions of the NAPCC
Financial arrangement	NCCF, CRF, Mitigation fund, 13th finance commission allocations, grants from NDMA & NIDM	No such dedicated funds for CCA but other ministries have fund under different missions
Point of integration	Emerging concerns of urban, environment, land-use, population, etc. are included in the proposed guidelines	Disaster management has been included as a key area in SAPCC

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 and Forests (MoEF) 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, envisage for DRR instead of the conventional response and relief centric approach previously followed by State Departments for years. 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 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 2006 (NEP) clearly relates with other policies related to natural resources, viz. water, agriculture, urban sanitation, forests, etc. and offers a framework for mainstreaming DRR and CCA together into various actions of development, welfare and infrastructure development (Gupta et al., 2012b).

## 2.2 Setting Context for the CRDRR approach in DM plans

Climate change, climate variability and extreme events pose significant risks to development and poverty alleviation in the present time - with compelling scientific evidence that these threats will further accelerate. Over the past decades, there has already been a striking increase in the number of climate related disasters, the number of people affected and the economic losses caused by these disasters. Management of climate related risks, including improved understanding and alleviation of the vulnerabilities to extreme events, is imperative to minimise the adverse impacts on human health, society and the environment under current and future climates. Both DRR and CCA aim to reduce vulnerabilities to the changing climate and create climate resilient societies, even though there exist some political and physical distinction between them (Figure 7).

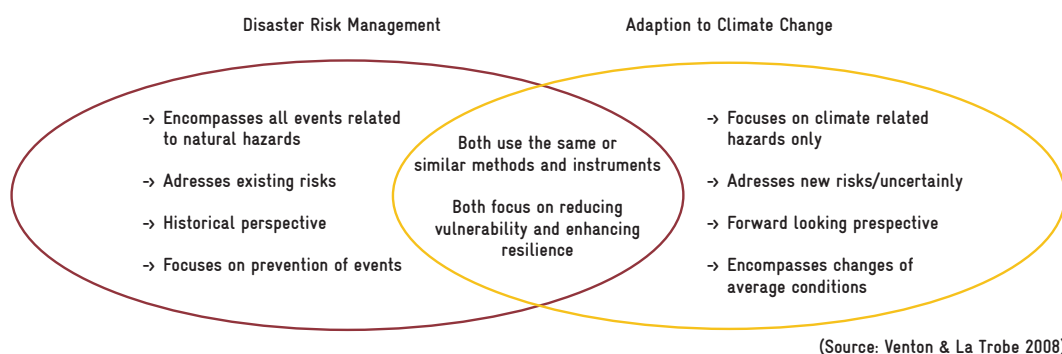


Figure 7: Overlap between disaster risk management and adaptation to climate change

# 3. Achieving Climate Resilience in Disaster Risk Reduction (CRDRR)

As of now, tools in DRR and CCA strategies in the developing countries, the multi-hazard vulnerability analysis, risk mapping, planning and evaluation of mitigation strategies, etc. are at nascent stage and under diverse experimentations. Besides this, the concepts and case studies are at varying levels and scales. Our approach and pilot level planning process suggests tools and measures that could be effectively implemented for multi-level integration of hazards and vulnerability at the community and district level.

The tools required for an incorporation of CCA and DRR into local planning regard four areas:

- (i) Risk (including hazard and vulnerability) assessment,
- (ii) Integrating risk concerns within management strategies and fiscal plans,
- (iii) Pilot Measures (experimenting the approach, drawing lessons and case examples) and
- (iv) Capacity Development and knowledge dissemination.

## 3.1 Participatory Vulnerability and Risk Assessment

Participatory Vulnerability and Risk Assessment includes characterising a hazard, its level of risk exposure and vulnerability of the local communities to it. The vulnerability and risk assessment generates the information on which measures for DRR and CCA can be developed as part of local planning processes. Traditionally, most risk assessments are carried out by experts using hard scientific criteria to a particular hazard (i.e., with physical environment approach). However, the involvement of communities in these processes is imperative since there are factors that cannot be measured and determined by outside experts due to variable characteristics and conditions of the community.



*Pic 2: Community identifying climate related risks through PRA tools*

Different communities have their own perceptions regarding vulnerability and capacity depending on the conditions of their locality and experiences acquired by them through each disaster. Based on their perceptions, they could make their own choices from the available options and alternatives. People survive disasters and crises through their own means, which are important starting points for any risk assessment. It has been shown that many indigenous coping mechanisms exist and the role of an external and local organisation is to recognise and support them. For example, in the AdaptCap<sup>3</sup> project, during the Vulnerability and Needs Assessment (V&NA) and the Participatory Rural Appraisals (PRA) the community members came to share a common understanding of the issues faced (Figure 8). The process allowed community members to examine their experiences with climate change and disaster risks, and discuss the triggers and possible solutions to the difficulties at hand.

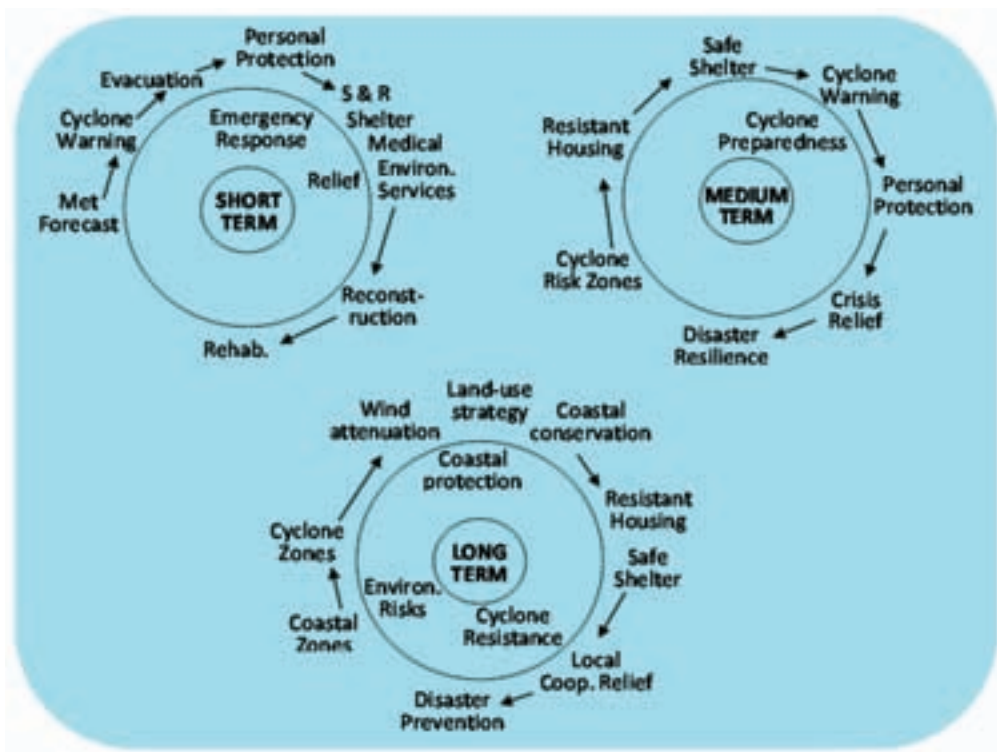


Figure 8: Coastal management framework for short-term and long-term mitigation for cyclone disaster (Gupta and Nair, 2012).

Based on the vulnerability and risk assessment, effective measures for reducing the communities' vulnerability can be designed. The changing climate patterns, and especially the increased frequency and/or severity of extreme events, will increase the vulnerability in natural disasters, both slower-onset ones such as droughts and rapid-onset disasters such as floods and cyclones (Figure 9). Key entry points for vulnerability reduction are based on the livelihood activities of poor and vulnerable communities. This places the goal of poverty reduction at the core of adaptation, as the capabilities and assets that comprise people's livelihoods often shape poverty as well as the ability to move out of poverty. Equally important are the resource support system, i.e., infrastructure to support and sustain ecosystem services, and aspects of social well-being including public health, food security, social cohesiveness and organizations, etc. which are also important for enabling preparedness to impacts of climate-change and disaster risks.

3 Project aimed at Strengthening Adaptation Capacities and Minimizing Risks of Vulnerable Coastal Communities (AdaptCap) GIZ- EU project on Climate change adaptation in Andhra Pradesh (AP) and Tamil Nadu (TN) [www.adaptcap.in](http://www.adaptcap.in)

This approach, therefore, requires an understanding of how livelihoods are selected and sustained over time. The greater and more varied the asset base, the more sustainable and secure is the livelihood. There are generally five forms of livelihood assets: natural capital, social-political capital, human capital, physical capital and financial capital. Taken together, these assets largely determine how people will respond to the impacts of climate change, and should therefore form the basis of adaptation strategies.

### 3.2 Integrate Risks within Strategies, Plans and Regulations

Environmental knowledge and awareness is crucial in all stages of the disaster management cycle including pre-disaster prevention and mitigation, and post-disaster response, relief, reconstruction and recovery (Gupta and Nair, 2011). Environment and its natural resources, if sustainably utilised, are built to provide protection to societies from any naturally occurring hazard through natural buffer and by enabling resources to enhance and maintain local capacities to prepare and withstand. Experiences over past disasters indicate that, especially in case of water and climate related disasters, environmental services like shelter, water, food safety, sanitation and waste management form crucial components in emergency relief and early recovery of communities. However, on the other hand, with changes in climate patterns, we see a compromise and degradation of the environment and ecosystem services which in turn increases the economic and environmental vulnerabilities to these hazards (Figure 9). The concern for disaster risk and its mitigation is thus equally important in all stages of environment management from prevention of hazards and environmental degradation, control, impact minimization, remediation, rehabilitation overall sustainability in environmental systems.

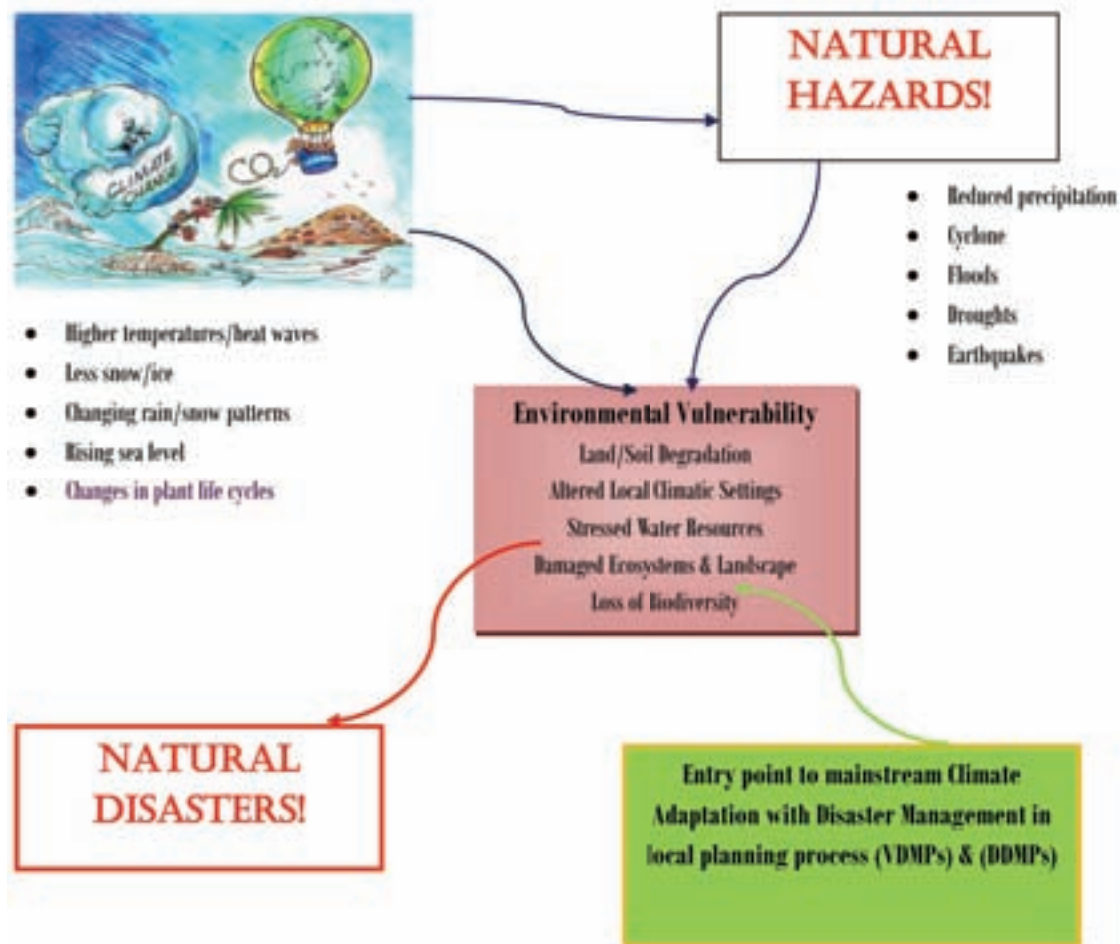


Figure 9: Linkages between environmental vulnerability and climate change

VDMPs and DDMPs are operational modules of the village and district administrations developed in line with DM Act, 2005. They act to decentralise the power to local level authority in order to efficiently manage the villages with the resources that are available locally and channelize the funds from centre as well as state for their development. They aim to mitigate and reduce risks of different types of disasters with locally available resources and personnel and to provide distressed people with immediate relief. Prepared in consultation with various stakeholders and approved by the local community, this document details the disasters faced by a particular region and the preparedness and coping mechanisms for them. Earlier, disaster management was considered as crisis management, beginning at the moment the disaster occurred and closing soon after the relief and rehabilitation. It is now realized that the process of risk mitigation should incorporate long term preventive and protective measures through appropriate strategies for disaster prone areas. Mainstreaming of DRR and CCA into development planning of sectoral departments is one of the key areas of VDMPs and DDMPs.

VDMPs agglomerate along several components of prevention, preparedness and capacity development. The capacity analysis component includes actions and instruments aimed at reducing the disaster risk in endangered regions, like better approach to governance, programmes to make society and economy of the region resilient to the hazards, for better resource management, land use management and structural design, spreading of risk awareness and mechanisms for warnings, emergency response, and disaster recovery and developing people's Knowledge, Skills and Attitude (KSA) towards a systematic approach of performance.

Mitigation plans of VDMPs include both short and long term mitigation measures (based on timeline), and also structural and non-structural measures (based on type of intervention) that are allocated for individual sectors. Short term plans are those implemented within one year and long term plans are those which extend up to five years. Structural mitigation plans are physical interventions whose impact can be visualised within a short period of time, for example, setting up of a water purification treatment system, building roads etc. whereas, non-structural plans generate awareness, build capacity and whose impact can be noticed in the long term, for example, health camps, supporting fish marketing etc.

Preparedness and response mechanisms of VDMPs detail activities and measures that need to be taken in advance to ensure effective response to the impact of hazards, including the issuance of timely and effective early warnings and temporary evacuation of people and property from threatened locations. It specifies the allocation of roles and responsibilities of different village committees and its members, the timeline of their activities and the support they would require at each step of the preparedness and response to the disaster.

Village disaster management plans also enumerate some **financial mechanisms** on setting up Community Contingency Funds (CCFs) or community disaster resilience funds which are devised by village committees at the time of crisis. These funds can be implemented with the help of self-help groups (SHGs) and other independent organisations. As regions continue to face changes in the environment and risks faced, there is a need for VDMPs to be revised and updated periodically. This calls for maintenance procedures like monitoring and evaluating the plan, updating the plan, incorporating the plan into other planning mechanisms and continuing public involvement which have been incorporated in VDMPs.

**Table 2:** Details of Village DMPs facilitated under AdaptCAP

Village Name	District/Mandal/Block	Particulars	Components of VDMP
<b>Andhra Pradesh state</b>			
1. Govupeta	Bheemunipatanam mandal Visakhapatnam district	The total population of the village is 428 in which 207 are male and 221 female. The village is dominated by fisher folk community. 98 Households all BPL. Literacy as low as 42%.  Frequent cyclones and salinity is a major problem.	1. Village Profile and baseline data  2. Hazard, Risk, Vulnerability and Capacity (HRVC) Analysis
2. Chepala Dibadda Palem	Bheemunipatanam mandal Vishakhapatnam district	Total population is 627, 172 households all BPL.  Literacy rate is 45%  The village is dominated by Fisher folk. Frequent cyclones, lack of drinking water and salinity is a major problem.	3. Mitigation Plan- Integrating Climate Change Adaptation into Disaster Risk Reduction framework
3. Chukkavani Palem	Bheemunipatanam mandal Vishakhapatnam district	Total Population 324. Dominated by fisher folk. Cyclone, coastal flooding and water pollution are the main problems.	4. Preparedness and Response Mechanism
<b>Tamil Nadu state</b>			
4. Kadapakkam	Thiruvallur district	Total population of the village is 442 in which 234 are male and 208 female. Dominated by farming community. 134/139 households are BPL. Most of them small, marginal or landless farmers. Frequent cyclones, salinity affecting soil fertility and lack of irrigation water is a major problem.	5. Financial Mechanism
5. Thirumalai Nagar	Thiruvallur district	The total population of the village is 1093 in which 564 are male and 529 female. Literacy rate is 56%. Entire population is Fisher folk.  Cyclone, coastal flooding and saline water intrusion are key problems. This village was also worst hit by the tsunami.	6. Plan review and updating mechanisms
6. Thangal-Perupulam	Thiruvallur district	The total population of the village is 286 in which 153 are male and 133 female. The village is mainly dominated by agriculture community. 81/83 households are BPL. Literacy rate is 31%. Cyclone, Coastal flooding, Saline water intrusion, Sea erosion are the major problems.	

### 3.3 Pilots Measures: Paradigms of Adaptation Strategies

*GIZ and its partners launched the EU-AdaptCap project in Nagapattinam, Cuddalore and Thiruvallur in Tamil Nadu (TN) and Nellore, Prakasam and Vishakhapatnam districts in Andhra Pradesh (AP) wherein 18 rural communities or villages and 6 cities adopted an integrated approach to CCA, CCM and DRR was implemented.*

The integration of CCA and DRR into development plans, based on through vulnerability and risk assessments, paves the way for implementing concrete measures for adaptation in the village or district. In designing such pilot measures some considerations need to be kept in mind.

If adaptation strategies are supposed to reflect the dynamics of peoples' livelihoods, then adaptation must be seen as a process that is itself adaptive and

**flexible** to address locally-specific and changing circumstances. For the poor and vulnerable, the actions that they take will be constrained by their limited assets and capabilities, but they will also be the most appropriate given the specific local manifestations of climate change impacts.

Acknowledging the fact that assessing a change in climate risks is difficult and the actual effectiveness of any related measure is therefore uncertain, following only mitigation or only adaptation (or both in isolation from each other, and from disaster prevention and /or sustainable development objectives) seems to be an inappropriate approach (Kane and Shogren, 2000). In fact, an "optimal combination" of CCA and CCM can be implemented while selecting a pilot project for CRDRR. Likewise, any measure implemented within the project has a higher probability to be effective in any way, despite of the uncertainties. For instance a potential example for the implementation in coastal communities could be a photovoltaic-powered reverse-osmosis plant. This measure directly combines adaptation efforts (scarcity of drinking water) with mitigation (energy is supplied by a renewable source) and also addresses disaster risk reduction (the plant may provide drinking water even during and/or after a disaster).

*Under AdaptCap project GIZ-IGEP is working with National Institute for Disaster Management (NIDM), Govt. of India, for integration and mainstreaming of CCA and DRR. Key activities include developing "Climate Resilient Disaster Mitigation Plans" at District and Local levels. The pilot infrastructure interventions and plans developed under the Adaptcap project at the local level through consultative process with major stakeholders can be up-scaled in the village and also in other coastal areas.*

Moreover, besides implementing single pilot measures, adaptation should be mainstreamed into wider development processes. Institutional capacity must be strengthened in order to reduce the gaps between local and national processes, and between formal and informal patterns of economic activity and resource management. Addressing these disconnections will help to ensure the effective participation and empowerment of poor communities in key adaptation decisions, allowing for the inclusion of non-structural approaches rooted in community-based patterns of resource management in these decisions.

## Coastal and river bund strengthening and installation of a shutter, Kumarakudi, TN

Storms, flooding and salinization threaten the livelihoods of Kumarakudi, a Bay of Bengal coastal village - inhabited by around 2000 people. Recently, there have been major crop losses in the village due to salt water intrusion from the Sunder river inlet in the rainy season and from the sea during the cyclone season. Also, storms have hit the coastline with increasing intensity, lifting the ocean over the dunes that used to protect village fields. The December 2011 cyclone "Thane" pushed the storm surge into paddy crops and caused total crop loss in over 50 acres. With projected impacts from climate change such as more extreme weather events, storm surges and flooding, protecting the village and the fields becomes even more pressing.

To address this problem, GIZ with the support of partner organisations helped in mitigating this issue. A coastal and river bund was erected encompassing all agricultural fields of the village. A bund was constructed, on existing dunes, from stiff clay, hard red earth and gravel, and undergrowth was planted on the slopes to prevent erosion. Additionally, a shutter was placed on the north-western confluence of the fields' irrigation canal and the Manjal River to control inflows - and outflows of water.

Operation & maintenance (O&M) of the bund and shutters is taken care of by the farmers' community, the village development committee and the Panchayat. The average annual costs for O&M are Rs.2800 which is being mobilised from the beneficiaries. This measure protects the agricultural land and harvest of 343 families, resulting in an expected increase in harvest worth Rs.20 lakhs in food products.



*Pic 3: Bund Strengthening and Shutter Construction at Kumarakudi, Nagapattinam District, Tamil Nadu*

## Renovation of irrigation tank, channelization of flood water to irrigation tank, Motumala, AP

Of 4243 people in Motumala, 325 families or households are employed in agriculture or agriculture labour. During the last few years, the output from agriculture was reduced due to drought, shorter, unseasonable, and more intense rainfall causing flash floods connected to climate change. Climate projections for the area assume that rainfall patterns are going to change even further and heavy precipitation events are going to become more frequent and intense. While water for the local agriculture already is scarce, the irrigation demand will grow as temperatures rise, drought periods become longer and intense short rains with strong water runoff become more frequent.

To address this problem, GIZ worked with its partners to install a water harvesting system in the village. The scheme harvests rain water and flood water normally going to waste in the sea and pumps it into a minor irrigation tank where water can be stored and utilized for critical irrigation purposes. The pilot assures water directly to 200 acres of tail-end lands and also benefits another 400 acres by providing water during critical times of paddy cultivation. The scheme also supports standing crops during the time of droughts and erratic monsoons. It recharges the ground water in the nearby villages and prevents flooding and submergence of standing crops during heavy rains. Flood water as well as all the excess water is pumped into the tank. The pilot increases water reuse and efficiency as it utilizes the excess drainage water released into the canal by the side farmers.

The scheme is maintained by the farmers using the system. The average monthly costs for O&M are Rs.6500. The user group will cover these costs by collecting user charges from the farmers who benefit from increased yield. The measure benefits 200 families in 3 villages (Motumala, Padarthi and Kothapatnam) who have access to approximately 151,200 m<sup>3</sup> of additional water for irrigation purposes per year, allowing an increase in yield of around 140 tons annually.



*Pic 4: Renovation of irrigation tank, channelization of flood water to irrigation tank, Motumala, AP*

Under the AdaptCap project numerous pilot measures for CCA were implemented in the coastal areas of Andhra Pradesh and Tamil Nadu. The solutions implemented in Dasarajupalli (AP) and Kumarkudi (TN) which are presented in the boxes above. These pilot measures can be considered models for CCA: the employ community-based, integrated and innovative solutions which simultaneously address livelihood improvements and environmental sustainability. Proactive measures focusing on preparedness for climate variability and climate change related disasters will contribute to climate-proofing coastal communities, thus securing livelihoods and alleviating poverty.

### 3.4. Capacity Development

The coastal Andhra Pradesh (AP) and Tamil Nadu (TN) region is generally categorised as holding moderate to high disaster risk. Many of the coastal communities were already exposed or had been involved in other planning activities, e.g., on disaster risks reduction after the tsunami in 2004. In the backdrop of paradigm shift in disaster management, approaches and measures for DRR are to be put in place by including proactive disaster preparedness and response, information systems and disaster-resistant construction amongst others. Building on the existing work done in this respect, aims at re-activating local disaster risk management units, at strengthening existing DRR networks and at linking DRR and adaptation where possible. Not only does this allow employing methods for participatory planning that the communities are familiar with already; in some cases it was also possible to use data as well as maps that were established for other plans, but are equally useful in this context.

However, the most important integration of planning is forward-looking: with the objective to point to the usefulness of linking plans on adaptation with existing plans on disaster risks reduction as well as, in the long-run, link the Local Adaptation and Mitigation Guides (LAMGs) with adaptation strategies that is being developed for state and district levels. As major decisions as well as budget allocation for local development projects is taken at district level, the further integration of the local adaptation and mitigation guides into the planning process at the Block level (under jurisdiction of Block Development Officer) and District level (district Collector) can be undertaken. Especially funds like the National Rural Employment Guarantee Scheme (NREGS) can be significantly tapped for adaptation activities by creating the necessary awareness at the district level while demanding support on the Panchayat level.



*Pic 5: Planning meeting on CRDRR convened by the District Collector, Thiruvallur and organized by GIZ, AVVAI and NIDM*

A shared learning process is key for developing an integrated strategy based on proper hazard and vulnerability assessments and past experiences of communities. It involves multi-stakeholder and participative approaches. It is useful for inculcating understanding of risk and promoting convergence of DRR and CCA in various environmental, developmental and welfare programmes. Multi-tier capacity development at village (local), district (or regional) and state level, where strategic decisions and plan clearances are issued, is essential.

Capacity development measures and approaches are crucial in a shared learning process. They must focus on building capabilities, resilience and strengthening people, organizations, networks and the policy field for an effective mainstreaming. Capacity building needs can be initially assessed as part of the vulnerability and needs assessment during the first stage revealing the following key issues like:

- Awareness programme on CCA, CCM and DRR
- Assessment of knowledge on CCA and CCM
- Planning and implementation of climate change measures
- Integration of CCA in local planning

In addition, clarifying the difference and complementarity between CCA and DRR should be addressed.

Overall, the target groups for capacity building are local partners and partner NGOs, local task forces, rural and urban local authorities, rural and urban local constituents and regional authorities.

*Shared learning is an approach to participatory planning and problem solving in complex situations for which mutual learning is a defining feature in determining a positive outcome of the engagement. The concept of shared learning is straight forward: by fostering iterative deliberation, sharing of sector or group specific knowledge.*

At the local level, partners and partnering implementing agencies such as local departments or NGOs must be equipped with the required capacities to then pass on their knowledge in the field. Training of Trainers (ToTs) are important capacity building approach for further transfer of knowledge and skills. Topics covered during ToTs might range from general awareness on CCA, CCM and DRR to specific technical and managerial trainings preparing for the implementation of pilot projects. The pedagogy for the training downward need to be design in such a way that transfer of knowledge is facilitated smoothly. At the meso level, the

local task forces and authorities in the target locations should be trained by the partners and partnering NGOs. Also the existing documents like rural development plans, disaster management plans, city vision documents and Detailed Project Reports (DPRs) must be reviewed to assess the entry points for CCA and DRR.

Also at the macro level, awareness and stage wise learning workshops maybe conducted with the elected representatives of the Panchayats, Jan Panchayat, Members of Legislative Council (MLC), Disaster Management Authorities (DMA) and Members of Parliament for increased understanding on the climate change vulnerabilities and identifying opportunities for increased resilience.



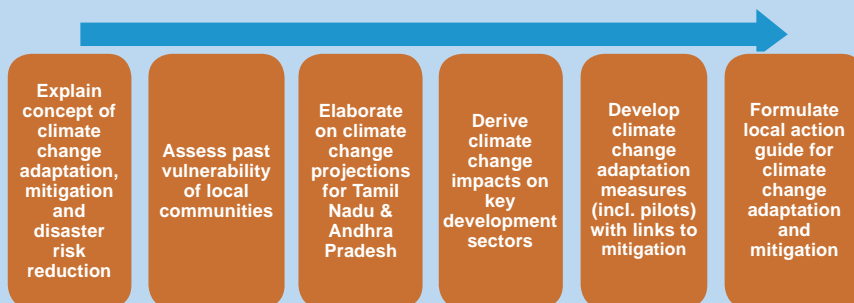
*Pic 6: Community level meeting to discuss planning and integration of pilot measures*

In the framework of the AdaptCap two models for capacity building have been developed, tested and proven their effectiveness: modularised training programmes for different stakeholder groups and Local Adaptation and Mitigations Guides (LAMGs).

### AdaptCap Training Toolbox

*During the AdaptCap project, Training of Trainers (ToTs) workshops were conducted according to the “Climate Navigator” methodology (BMU “Klimalotse” 2010) in order to provide the trainers with knowledge about climate change and adaptation strategies, and improve the skills on transferring the acquired know-how to the communities.*

*The project is based on existing methods and tools, local knowledge and scientific evidence. The “AdaptCap training toolbox” that has been developed as part of the activities of the project links existing methods with innovative approaches and on a modular basis for building capacity among local stakeholders. It consists of five parts beginning with an introduction about climate change and its diverse impacts and then in a distinct manner moves towards the development of a local adaptation and mitigation guide and its integration into local planning (Figure 10). The interim steps include the identification of climate induced or exacerbated risks as well as the development of measures to overcome them. The training toolbox aims to raise awareness of the impacts of climate change, provides material for local self- assessment on a basic level and guides adaptation and mitigation decisions. To inform the process, an overview of the relevant climate data as well as areas for potential measures have been specified with the focus on coastal communities in India*



*Figure 10: Flow of the capacity building approach*

Planning tools like LAMGs are significant to enhance capacities and inform the users about the effects of climate change and historic events. It also provides scope for future work on CCA and CCM. It is necessary to involve the affected communities in the development planning process and communicate their needs and priorities to decision makers while also working with local governments. The LAMG points out initial ideas for adaptation and mitigation options which where elaborated on the basis of an analysis of vulnerability and needs in each community (Figure 11). It also encompasses information about the planning and integration in order to improve adaptive capacities and decision making skills of local bodies (urban and rural) and communities on CCA, CCM and DRR.

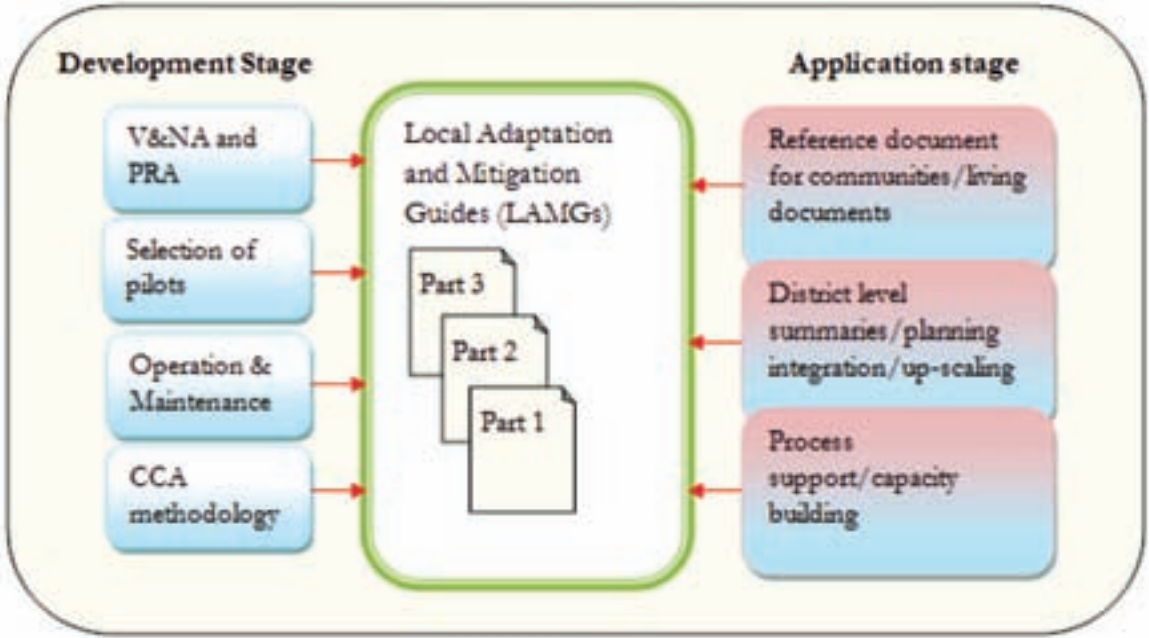


Figure 11: Steps of V&NA and LAMG from development to application stage

# 4. Conclusions: Operationalization of Climate Resilience in Disaster Risk Reduction (CRDRR)

Integrating the issues of climate change into national and local development policies and plans requires a multilevel approach which combines activities at the local (village), state and national levels and uses top-down as well as bottom-up dynamics. The top-down aspect describes a process where national policies trickle down into state level policies and local planning, thus creating the framework conditions for implementation on the ground. The bottom-up aspects focuses on bringing in knowledge, needs and implementation experience from the ground into policy, planning and programme development at district, state and national levels.

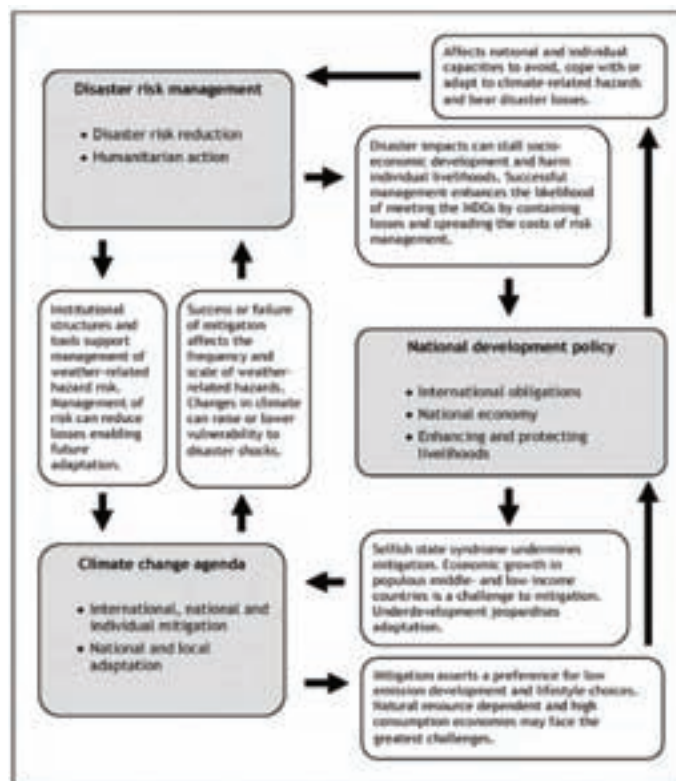


Figure 12: Relationship between disaster risk management, climate change adaptation, and national development policy (Schipper and Pelling, 2006)

## 4.1 Policy Level

An integrated approach towards DRR and CCA at the policy level means that CCA issues are integrated into DRR policies and vice versa, and that synergies and integration potential between institutional structures are utilized to the greatest extent possible (Figure 12, Schipper & Pelling, 2006). CCA and CCM needs to be embedded into each level of the policy framework of the government. The framework should be such that the stakeholders are engaged and well

informed. It should identify climate change impacts either through measures that enhance society's resilience or actions that expand the range of coping strategies. This may be directed at certain aspects of the national development strategy, at specific geographic areas, or at important sectors of the national economy (e.g., agriculture, forestry, water resources, transportation etc.). There should exist a process of integrated assessment between sectors, including a consultation process in which links can be identified and assessed. Mainstreaming CCA and DRR into the government's fiscal policy and budget planning will ensure that the funds are utilized effectively and by communities in need. The policy framework should take into account the shifting of severity and climate extremes and consider that disasters are primarily caused by processes that lead vulnerable people and assets to be in locations exposed to hazards. This would involve enhancing policies on urban and rural settlements, migration, employment etc.



*Pic 7: Meetings with the Community members on VDMPs*

## 4.2 Planning Level

The development planning at state and local (village) levels is the crucial next step for putting policies into practice. Coherent strategies are needed which map interventions for climate-resilient development in the short, medium and long-term. This involves on one hand to factor in climate change and disaster risk into on-going initiatives, e.g., planned infrastructural measures; on the other hand it involves developing additional measures which reduce the society's and economy's vulnerability.

At the local planning level two key entry points exist for integrating CCA and DRR:

- Integration of CCA into DDMPs
- Integration of CCA into decentralized planning processes on DRR by PRI bodies and elected community representatives, including VDMPs.

The effective integration into planning documents at district and village community levels requires targeted capacity building and integration support for local authorities. This kind of support should include:

- Implementation of dialogue workshops and training programmes with local and district authorities on climate change and participatory planning for DRR and CCA. The awareness of District as well as Panchayat and village level representatives in India on the connections between climate change vulnerability, disaster risk and measures for CCA, CCM and DRR is still rather low. Workshops at village level as well as Shared Learning Dialogues (SLDs) at city level have proven effective for raising awareness of these key stakeholders on CCA, CCM and DRR, identifying action needs and defining measures for climate-resilient development.
- Development of LAMGs specifying climate change vulnerabilities, adaptation needs and measures, and options for planning integration for specific communities. These guides can serve as an important source of reference for planning processes at community, district and even state level. In the AdaptCap project such guides were developed based on a vulnerability and needs assessment regarding CCA, DRR and CCM at village and city levels and the ensuing development of adaptation measures.

- Integration support through individual meetings, provided by for instance by the teams from NIDM, GIZ and local adaptation specialists leading to improved planning. In the AdaptCap project it has proven crucial that capacity building and guidance through LAMGs was complemented by direct support for integrating measures for CCA and DRR into district and village level development plans.

### 4.3 Implementation Level

The implementation level is both the final point for measures derived from national and state-level policies in a top-down process and the starting point for planning and policy development from the bottom-up approach. Such a bottom-up approach is crucial for effective CCA and DRR because climate change impacts and disaster risks strongly depend on the exact local context. The approach also ensures effective implementation and sustainable maintenance of CCA and DRR projects, as these have been developed together with communities, building on their needs and interests.

The AdaptCap project has shown that the local level serves two key functions for mainstreaming CCA and DRR in policy development and planning:

- **Identifying locally specific vulnerability to climate change and disaster risks as well as locally specific needs for CCA and DRR:** V&NAs as implemented in Tamil Nadu and Andhra Pradesh by the AdaptCap project provide an overview on climate change impacts in certain regions within a state and district. They give an idea of which impacts are most common and which measures are most often identified to address these. Local V&NAs can therefore help district level officers and higher levels to prioritize on future actions and to identify most relevant offices that should mainstream climate change into their existing activities. In the AdaptCap project information for the V&NAs was collected using participatory rural appraisal methods such as social mapping, timeline and transect walk. This ensured a locally grounded assessment and local ownership for adaptation measures developed in response.
- **Testing and showcasing pilot measures which contribute both to CCA and DRR:** Pilot measures like the ones implemented by the AdaptCap project can serve as a point of reference to roll out integrated CCA and DRR activities at a larger scale. Through pilot initiatives locally adapted solutions can be developed and their benefits for reducing climate and disaster vulnerability can be proven. Systems for monitoring and evaluating these pilot projects allow for demonstrating and communicating the benefits of such measures in terms of reducing climate and disaster risk and advancing sustainable development. Once tried, tested and proven effective, similar measures as well as lessons learned on implementation can be included in funding schemes, plans and policies at district, state and central level.

Translating concepts and “buzz words” to ground implementation is not easy and, therefore, demonstrable approaches are essential. Robust approaches that address vulnerabilities tend to be developed and monitored regularly by integrating local adaptation measures. DRR approaches from specific event related needs to be upgraded and cautiously planned for addressing the future climatic risks. Community based adaptation measures, worldwide have been successful in demonstrating the resilience building at local levels. It is essential to enable national and local actors - policy makers and planners - to better understand how to support communities which are increasingly at risk of disasters. This should be facilitated by the growing recognition among the different communities of the added value of DRM, DRR and CAA, in particular in a context of tight financial resources. The DRR and humanitarian communities have agreed that, in order to be successful, activities should, to the extent possible, be climate-proof and, when possible and relevant, take into account the potential risks induced by a changing climate.

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