

Adaptation to Climate Variability and Change:

Review of Policies and Programmes of Government of India

Not to be quoted

by



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1 Introduction

There is increased awareness these days about importance of disaster management systems and efforts are being made to improve pre-disaster preparedness as well as improving post-disaster response and recovery mechanisms. A well-made disaster management plan and its effective implementation save human and animal life as well as safeguard damage of property. The impact of disasters like floods, droughts and tsunami varies from region to region and across communities. This makes it pertinent to review impact of these disasters, and outline different preparedness, response, recovery, and mitigation strategies. In Indian context the relevance of these disasters can be gauged from the Tenth Five Year Plan document which states that 40 million hectare land mass is vulnerable to floods, more than two third (68%) of net sown area is vulnerable to droughts and the coastal states particularly in east coast are vulnerable to cyclones and tsunamis.

India has been suffering from economic losses and developmental setbacks year after year from disasters like Orissa cyclone, Mumbai and Gujarat floods, tsunami on western coasts apart from regular droughts in two third of the country and floods in four crore hectare of lands mostly in Indo-Brahmaputra basins apart from northwest and plateau India. In the decade 1990-2000, an average of about 4,344 people lost their lives and about 30 million people were affected by disasters every year.

Traditionally the government's perception on disaster has been limited to idea of "calamity relief", and treated essentially as a non-plan item of expenditure. However, it's being realized that just immediate relief cannot mitigate the impact of major disasters, which has been the primary focus of government efforts. The Tenth Plan document calls for making countries development process sensitive towards disaster prevention and mitigation and advocates for looking at disasters from a development perspective. Though, disaster management is not generally associated with plan financing, there are in fact a number of plan schemes in operation, such as for drought proofing, afforestation, drinking water, etc., which deal with the prevention and mitigation of the impact of natural disasters. External assistance for post-disaster reconstruction and streamlining of management structures is also a part of the Plan. A specific, centrally sponsored scheme on disaster management is also in place. The Tenth Plan thus already has a defined role to deal with the subject.

The Plan has set up monitorable targets for the country. The target of reduction of poverty ratio by 5 percentage points by 2007 and by 15 percentage points by 2012 and providing gainful high-quality employment among others In dry land areas such as the Indian semi-arid tropics, watershed projects aim to maximize the quantity of water available for crops, livestock and human consumption through on-site soil and moisture conservation, infiltration into aquifers, and safe runoff into surface ponds. (Kerr and Chung, 2001).

The Plan also aims to reduce vulnerability of the communities and tries to equip them with better coping strategies to deal with disasters. The Document calls for achieving the target of all children in school by 2003; all children to complete five years of schooling by 2007; increase in literacy rate to seven percent within the plan period; reduction of Infant mortality rate (IMR) to 45 per 1,000 live births by 2007 and to 28 by 2012; reduction of Maternal Mortality Ratio (MMR) to two per 1,000 live births by 2007 and to one by 2012; and reduction of gender gaps in literacy and wage rates by at least five percent by

2007. These target thus envisage improvement in access to education, health and mitigating gender imbalances which in turn will improve social position of the community resulting in better coping strategies. Improvements in forests and access to water is also addressed by the document as targets have been set to increase in forest and tree cover to 25 percent by 2007 and 33 per cent by 2012 and sustained access to potable drinking water in all villages within the Plan period.

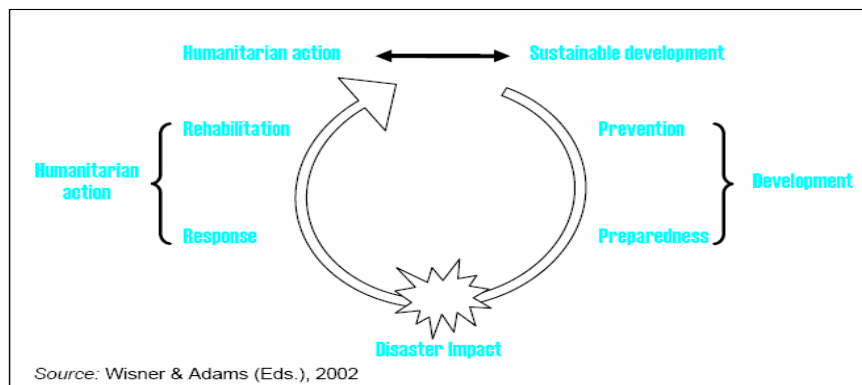
The measures to reduce disasters impact can be clubbed as **active** or **passive** measures. Active measures rely on providing incentives for disaster reduction. They are often more effective than passive measures which are based on laws and controls. For example, strict land use planning rules may provide a legal context for mitigation; but are ineffective unless rigorously enforced. Instead, measures that provide incentives such as government grants or subsidies or sound technical advice are more effective.

The pre-disaster measures can be of **mitigation** or **preparedness**. Mitigation includes any activities that prevent an emergency, reduce chances of its happening, or reduce the damaging effects. Mitigation activities take place before and after emergencies. Preparedness includes plans or preparations made to save lives and property and to help response and rescue operations. Preparedness activities take place before an emergency occurs.

An ideal system need to support the activities related to the various phases of disaster management viz., pre-disaster planning, warning and emergency relief and post-disaster recovery. (Venkatchary, Manikam and Srivastava, 2002).

This can be further clarified through disaster management cycle (See figure below)

Figure 1: The disaster management cycle



Department for International Development's (DFID) Sustainable Livelihoods (SL) Framework, though not primarily disaster oriented, has been influential in placing the household and its access to assets at the centre of such analyses. Such assets are related to vulnerabilities and influenced by social and governance conditions. The framework helps in analysis of household strategies, to sustain or improved livelihoods and outcomes are affected by hazard-vulnerability interactions. It can possibly show how the outcomes, determining access to food, water, health, shelter, education, safety fit into patterns of vulnerability, assets and governance conditions.

With increased emphasis on getting a better understanding and formulation of effective disaster strategies both in pre-disaster and post-disaster scenarios this review sub-divides the past initiatives/government programmes under two heads: government's

watershed/water harvesting programmes. The treatment of watershed programme under separate head becomes pertinent, as watersheds are now recognised as a key and discrete development unit in rural development. Further, to achieve sustainable increase of productivity and management, integrated approaches have been recommended.

The Watershed Development Project (WDP), funded by India's Ministry of Rural Areas and Employment, has been implemented since 1994–95 in about 10,000 watersheds in all the major states of the country. In addition to an estimated US \$ 3.5 billion being invested for rehabilitation and development of micro-watersheds by the government, the World Bank (WB), Swedish International Development Cooperation Agency (SIDA), Switzerland's Agency for Development and Cooperation (SDC), Department for International Development (DFID) and the Indo-German Watershed Development Programme (IGWDP) are supporting WDPs through direct funding support as well. Watershed programmes are increasing being favoured by most of India's state governments. (<http://www.inwent.org/E+Z/1997-2002/de102-9.html>)

The Tenth Plan document outlines the extent that 380 major and medium irrigation projects (which includes WSD projects also) with an estimated cost of 1683.233 billion Rs is underway.

Springate-Baginski *et al.*, (2002) bring out the reasons due to which WSD has become a central focus for rural development in India:

1. Increases in agricultural production in India over the 1990s have reached a plateau, primarily due to stagnation in green revolution areas. The Government thus focused on developing rainfed areas to take up the momentum for productivity growth.
2. Land degradation has emerged a serious threat across the country. With increasing pressure of the growing human and cattle population, deforestation, soil erosion, indiscriminate use of chemical fertilizers, pesticides and also of water, has led to a severe eco-system threat. About 15 percent of India's geographical area (329 million ha) may be defined as degraded (Reddy, 2000).
3. Rising demand for water and a tendency toward over-extraction of groundwater, with little concern for improvements in water harvesting and use of precious water resources available

The terms coping capacity, adaptation and resilience has been used throughout this review due to which it becomes pertinent to make these a little clearer. Coping capacity simplistically stated means (DFID, 2004) the ability to use available resources to meet basic needs at times of adversity – affects capacity to recover thereafter, and subsequent levels of poverty and vulnerability. This capacity is determined by adequacy of assets as well as social and governance conditions. These strategies reduce exposure to disaster shocks and in turn reduce susceptibility and losses. Adaptation on the other hand is permanent change in the livelihood or economic systems more often than not a result of repeated exposure to the disaster shocks and long term adversity. The examples of these can be change in cropping pattern or land use. Repeated drought or flood-affected areas have the tendency to go for water-deficient or water intensive crops respectively. Adaptation has economic cost inherent in itself be it in terms of opportunity cost being higher than the current returns or increased social cost.

Post adaptation livelihood systems might be less resilient than the original one. Resilience in simple terms is recovery or absorption ability. The early warning systems

and/or pre disaster coping strategies have important role that can enable coping capacity and adaptation in turn boosting resilience.

2 Pre-Disaster Strategies

The pre-disaster measures can be of response or recovery. Response includes actions taken to save lives and property in a disaster situation. Response in simple terms is responding safely to an emergency putting preparedness plans into action, e.g. seeking shelter from a tsunami. Response activities take place during an emergency. On the other hand, recovery includes actions taken to return to a normal or an even safer situation following an emergency. Recovering from an emergency e.g. getting financial assistance to help pay for the repairs take place after an emergency.

In the "pre-disaster" case we look at extent to which the schemes/policies/programmes help in preparing communities for combating disasters. This preparedness can be viewed in various ways-improved access to water due to improved water availability, enhanced savings, improved skills, improved communication network, early/timely warning systems etc., due to implementation of various schemes/policies/programmes.

2.1 Rural Development Initiatives and Programmes

In the "pre-disaster" case we are looking at extent to which the schemes/ policies/ programmes help in preparing communities for combating disasters. This preparedness can be looked at in various ways-improved access to water due to improved water availability, enhanced savings, improved skills, improved communication network, early/timely warning systems etc under various national and state specific programmes and schemes. It becomes pertinent here to look at various government schemes and programmes and the type of capital it creates or strengthens under SL framework. The Ministry of Rural development runs various schemes for upliftment of rural communities:

- Sampoorna Gramin Rozgar Yojana (SGRY) run by Ministry of Swarnajayanti Gram Swarozgar Yojana (SGSY)
- Indira Awaas Yojana (IAY)
- DRDA Administration
- National Food for Work Programme
- Pradhan Mantri Gram Sadak Yojana (PMGSY)
- Accelerated Rural Water Supply Programme
- Sector Reforms Project/Swajaldhara
- Rural Sanitation Programme
- Watershed Development Programme under DPAP, DDP and IWDP (Hariyali)

The last four deal with making secure water available and/or Watershed development. Briefly these schemes have been explained below:

Desert Development Programme (DDP): This programme is being implemented in district Lahaul & Spiti and Pooch sub division of Kinnaur district as a 100% centrally sponsored programme. Under this total 80 watersheds have been identified to be developed within a period of four years. The programme is being implemented through District Rural Development Authorities and Watershed Development Committees.

Drought Prone Areas Programme (DPAP): This programme is basically an area development programme. This programme is engaged in promoting the economic development of the village community directly or indirectly dependent on the watershed. The aim of the programme is to mitigate the adverse effects of drought and to restore the ecological balance and employment generation.

Integrated Wastelands Development Projects (IWDP): The integrated wastelands development projects are being implemented in district Kangra, Chamba, Solan, Sirmour and Mandi. IWDP's are also being implemented on watershed development basis. The projects are being executed through DRDAs and Watershed Development Committees.

Sampoorna Grameen Rozgar Yojana (SGRY): The objectives of the Sampoorna Grameen Rozgar Yojana is to provide additional employment in the rural areas as also food security, alongside the creation of durable community, social and economic infrastructure in the rural areas. The programme is self-targeting in nature with special emphasis to provide wage employment to women, Scheduled Castes (SCs), Scheduled Tribes (STs) and parents of children withdrawn from hazardous occupations. This Programme is being implemented as two streams:-

- The first stream is being implemented at the district and intermediate level Panchayats. 50% of the funds are earmarked out of the total funds available under the SGRY and distributed between the district Panchayats and the intermediate Panchayats in the ratio of 40 to 60.
- The second stream is being implemented at the village Panchayat level. 50% of the SGRY funds are earmarked for this stream. The entire funds are released to the village Panchayats through the DRDAs/District Panchayats.

Pradhan Mantri Gram Sadak Yojana (PMGSY): This scheme seeks to provide connectivity to all unconnected habitations in the rural areas with a population of more than 500 persons through good all-weather roads by the end of the Tenth Plan. In hill states and desert areas, the objective is to connect habitations with a population of 250 persons and above.

Indira Awaas Yojana (IAY): This scheme provides assistance primarily to the Below Poverty Line (BPL) rural households belonging primarily to SCs/ STs and freed bonded labour categories. Benefits of the scheme have also been extended to families of servicemen of the armed and paramilitary forces killed in action. Three percent of the houses are also reserved for BPL physically and mentally challenged persons living in rural areas. As per the revised guidelines of Government of India (GOI), an assistance of Rs 22,000 is provided for conversion/ up-gradation of Kutcha house into semi Pucca/ Pucca house.

Pradhan Mantri Gramodaya Yojana (PMGY): This scheme envisages allocation of additional central assistance to the States/UTs for providing /improving the outlay of basic minimum services including "Rural Shelter" in the rural areas. The funds under this scheme are released by the Ministry of Finance/Ministry of Home Affairs on the basis of recommendations made by the Ministry of Rural Development.

Credit cum Subsidy Scheme: This scheme targets rural families having annual income upto Rs 32, 000. While subsidy is restricted to Rs10, 000, the maximum loan amount can be availed upto Rs 40,000 under the scheme.

Samagra Awaas Yojana: This is a comprehensive housing scheme with a view to ensuring integrated provision of shelter, sanitation and drinking water. This is being implemented in one block each of 25 districts of 24 States and one Union Territory.

Innovative Scheme for Housing and Habitat Development and Rural Building Centres: The innovative scheme for housing and habitat development has been designed for standardizing and popularizing/ replicating/propagating cost-effective, environment-friendly housing construction technologies, designs and materials and evolving ideal types of sustainable rural human settlements consistent with agro-climatic variations and natural disaster proneness. The **Rural Building Centres Scheme** is, *inter alia*, designed with the purpose of technology transfer and information dissemination, skill up gradation through training and production of cost effective and environment friendly material components.

Annapurna: The Annapurna Scheme aims at providing food security to meet the requirement of those senior citizens who though eligible have remained uncovered under the National Old Age Pension Scheme.

Accelerated Rural Water Supply Programme (ARWSP): Under ARWSP, the Central Government supplements the efforts of the State Governments efforts in providing access to safe drinking water to all rural habitations of the country.

Central Rural Sanitation Programme (CRSP): This programme aims at improving the general quality of life in rural areas; accelerating coverage in rural areas; generating demand through awareness creation and health education; and controlling incidence of water sanitation related diseases.

Swajaldhara: This programme aims at providing community-based rural drinking water supply. The key elements of this programme are namely, (i) demand-driven and community participation approach, (ii) panchayats / communities to plan, implement, operate, maintain and manage all drinking water schemes, (iii) partial capital cost sharing by the communities upfront in cash, (iv) full ownership of drinking water assets with gram panchayats and (v) full operation and maintenance by the users/ Panchayats.

Information, Education and Communication (IEC): Information, Education and Communication plays a pivotal role in creating awareness, mobilizing people and making development participatory through advocacy and by transferring knowledge, skills and techniques to the people. The IEC efforts aim at creating awareness and disseminating information on the rural development Programmes of this Ministry primarily to the target groups in rural, to the opinion makers and also to the public at large.

Swaranjayanti Gram Swarozgar Yojana (SGSY): The GOI by restructuring the self employment programmes merged Integrated Rural Development Programme, Training of Rural Health For Self Employment (TRYSEM), Development of Women and Children in Rural Areas (DWCRA), Supply of Improved Tool Kits to Rural Artisans (SITRA) and Ganga Kalyan Yojana (GKY) and Million Wells Scheme (MWS) into a new scheme namely "Swaranjayanti Gram Swarozgar Yojna".

Employment Assurance Scheme (EAS): This employment generation scheme is being implemented in all the development blocks. The centre and state are fund the scheme on 75:25 sharing basis. The main objective of this programme is to provide 100 days of assured casual manual labour employment during lean agriculture season at statutory minimum wages linked to the normal output of 8 hours of work as well as creation of economic infrastructure and community assets in the rural areas. The scheme is being implemented through DRDAs and Panchyats.

Jawahar Gram Samridhi Yojna (JGSY): Jawahar Gram Samridhi Yojna is a new programme replacing Jawahar Rozgar Yojna, which has been launched by the

Government of India. This Yojna is being financed between centre and state on 75:25 sharing basis. The central government releases funds directly to DRDAs on the prescribed criteria of poverty and population of SC / ST in the state. The aim of this Yojna is creation of durable assets / infrastructure at the village level, creation of productive assets exclusively for SC / ST for sustained employment and generation of supplementary employment to the un-employed poor living below poverty line.

Kisan Credit Card Scheme: This scheme was initiated by GOI in 1999 was formulated under which Kisan Credit Cards(KCC) were issued to farmers, on the basis of their land holdings, for uniform adoption by banks, so that the farmers may use them to readily purchase agricultural inputs such as seeds, fertilisers, pesticides, etc. and also draw cash for their production needs. The objectives of KCC were: to provide insurance coverage and financial support to the farmers in the event of failure of crops as a result of natural calamities, pests and diseases; to encourage farmers to adopt progressive farming practices, high value inputs and higher technology in agriculture; to help stabilize farm incomes, particularly in disaster years; and to support and stimulate primarily production of food crops and oilseeds.

National Social Assistance Programme (NSAP): Old age pension at Rs 100 per month per destitute person above 65 years of age belonging to target group families is being provided. Financial assistance of Rs 10,000 is provided to the family in case of death of a bread earner in the family living below the poverty line. A lump-sum financial assistance of Rs 500 is being given to pregnant women above the age of 19 years belonging to BPL family upto two live births.

The most comprehensive of these development programmes is the **National Rural Employment Guarantee Act**¹ which aims to provide for the enhancement of livelihood security of the poor households in rural areas of the country by providing at least one hundred days of guaranteed wage employment in every financial year to every household whose adult members volunteer to do unskilled manual work.

The Act has laid down a timeframe according to which every State Government shall, within six months from the date of commencement of this Act, by notification, make a Scheme, providing not less than one hundred days of guaranteed employment in a financial year to every household in the rural areas covered under the Scheme and whose adult members, by application, volunteer to do unskilled manual work subject to the conditions laid down by or under this Act. By the time such Scheme is notified by the State Government, the annual action plan or perspective plan for the *Sampoorna Grameen Rozgar Yojana* (SGRY) or the National Food for Work Programme (NFFWP) whichever is in force in the concerned area immediately before notification shall be deemed, to be the action plan for the purposes of this Act.

Under the section statement of objects and reasons of the Act, it has been accepted that productive absorption of under-employed and surplus labour force in the rural sector has been a major focus of planning for rural development of Government. Though the SGRY is providing some relief to the rural poor, its reach has been inadequate in view of the dimension of the unemployment in rural areas. It has been observed that the scale of employment generation under SGRY in 2002-03 and 2003-04 was barely adequate to provide on an average 20 days of employment to each BPL household in the rural areas. Secondly, there is no guarantee that employment will be available to the rural households on demand as SGRY is an allocation-based programme. The situation of unemployment has been compounded by the absence of any social security mechanism.

¹ Now an Act after being passed by both houses of parliament and signed by President.

There is, therefore, an urgent need to ensure at least some minimum days of employment in the shape of manual labour to every household in the rural areas, which has been given shape through this act.

The role of Panchayati Raj Institutions (PRIs) is being emphasized more and more these days. A number of funds, functions and functionaries have been transferred to Panchayats in 30 states and UTs. The exception being Delhi where Panchayati Raj system is yet to be revived.

While assessing the rural development programmes in terms of SL framework it is noteworthy that all these schemes /programmes focus on employment and poverty alleviation in managing and mitigating disaster risk. The creation of assets and reduction of vulnerability through direct or indirect measures is also envisaged through these rural development programmes.

Some of the rural programmes directly emphasize creation and improving access of community to a particular capital, while others such as JGSY take a holistic view and try to build linkages and relationship between capitals. Here it is noteworthy that a particular programme/scheme might prioritize development of a particular capital, say physical capital through creation of road, but it does not mean that other capitals are not positively affected. The effect might be indirect but the improvement in assets base certainly takes place. The development of roads might lead to better access to markets resulting in higher income resulting in reduced vulnerability and improved financial capital. For the purpose of analytical simplicity countries rural development initiatives can be looked through the lens of it focusing on a particular capital.

Physical Capital: This capital is directly targeted by programmes of the likes of Pradhan Mantri Gram Sadak Yojna, Samagra Awaas Yojna, Indira Awaas Yojna (IAY), Accelerated rural water supply programmes (ARWSP),Jawahar Gram Samridhi Yojna (JGSY), Central Rural Sanitation Programme (CRSP), Innovative scheme for housing and habitat development and rural housing centres, Swajaldhara. Creation of all weather roads, housing and shelter, provision and access to safe drinking water, sanitation are the priority areas of these programmes. The Watershed Development (WSD) programmes like IWDP, DDP, DPAP also provide for creation of physical structures. Here creation of individual assets such as housing along with community assets like roads, sanitation both is focused on. This capital has traditionally been given more emphasis than others as infrastructure development and amelioration of poverty through structural measures have largely been the focus of government.

Financial Capital: The programmes, which improve the income of the households, can generally be taken as improving the financial capital base. The self-employment programmes, wage employment programmes, food for work programmes and those improving credit holding of the households can be thought of as influencing this capital base to a large extent. The employment programmes are directly correlated to creation of other assets mostly physical assets. But, these programmes certainly reduce the vulnerability by acting as the household income source in lean seasons as well as in the aftermath of the calamities. These have been dealt below for simplicity purposes and links and influences of these programmes on other assets are not intended.

Wage employment programmes like SGRY provide employment opportunities during lean agricultural seasons but also in times of floods, droughts and other natural calamities. They create rural infrastructure, which supports further economic activity. The efficacy of these programmes can be gauged from the excerpt in the Tenth Five

Year Plan Document “*wage employment schemes have proved beneficial in some respects. They created much-needed rural infrastructure. The programmes are self-targeting in nature since only the poor come to work at minimum wage rates. The programmes have played a major role in protecting consumption patterns of the rural poor during natural calamities. A study conducted in four drought-affected districts of Rajasthan found that the consumption of food grains was higher in the drought years compared to normal years due to the wage employment programmes.*”

The Employment assurance schemes (EAS) are aimed to provide employment in the form of manual work in the lean agricultural season. The works under the programme were expected to lead to the creation of durable economic and social infrastructure and address the felt-needs of the people. The Food for Work programme was started in 2000-01 as a component of the EAS in eight notified drought-affected states of Chattisgarh, Gujarat, Himachal Pradesh, Madhya Pradesh, Orissa, Rajasthan, Maharashtra and Uttaranchal. The programme aims at augmenting food security through wage employment. While the self-employment programmes like IRDP, TRYSEM, DWCRA, SITA, MWS, and GKY all were merged to give holistic package of SGSY.

The credit-cum-subsidy scheme aiming to provide loans as well as subsidy to poor families, Kishan Credit Card Scheme that provides financial support to farmers for purchasing inputs as well as s insurance coverage to the crops, National Social Assistance programme (NSAP) provides for financial assistance to the needy ones all strengthens the financial capital base.

Natural Capital: Programmes like IWDP, DDP, DPAP aim for soil and moisture conservation measures in turn improving ecology. Water percolation tanks, soil and moisture conservation measures, afforestation schemes, irrigation structures, activities combating desertification all improve the natural capital base of the community in turn leading to improved crop productivity and amelioration of environmental conditions.

Human Capital: Programmes like Information, Education and Awareness, and other skill and micro-enterprise development schemes lead to improvement in human capital. Social schemes of improving health, promoting education, training etc. all improve the inherent skills and make the beneficiary more resilient to cope with disasters.

Social Capital: The community based activity and resource creation results in creation of social hegemony and trust building within the community. The Self Help Group Model has an in built mechanism for societal ownership over resource and provides for improvement in social capital base. The self-help groups move through various stages: social mobilization and formation of groups (initial phase); savings and internal lending among the members of the group on their own, augmented by revolving fund grants from the government and linkages with banks and other credit agencies (second phase); obtaining micro finance (third phase) and setting up of micro enterprises (fourth phase). This is a long process and groups require time to mature as cohesive units.

Some Programme such as **Jawahar Gram Samridhi Yojna (JGSY)** act as a holistic package covering all aspect of self-employment such as organization of poor into self-help groups, training, credit, technology, infrastructure and marketing. Apart from natural capital, the Programme provides for creation and strengthening of all the other capitals. The financial assets are created and vulnerability of poor through the objective of SGSY which is to bring the assisted poor families above the poverty line by providing them income generating assets through a mix of bank credit and government subsidy. The human capital of the families of below poverty line (BPL) including artisans, are identified

and assisted. While selecting the new activities the priority is generally given to those having inherent skill, which is primarily constituted by the rural artisans. This emphasizes social capital through self help group approach and enables the poor to interact with other social groups from a position of strength.

2.2 Watershed Development (WSD) Initiatives and Programmes

Kerr *et al.* (2000) in an evaluation study in Andhra Pradesh and Maharashtra list various WSD projects undertaken by various institutions/agencies. This listing can be conveniently extrapolated to other parts of the country also. They include the following:

Ministry of Agriculture (MOA): projects focusing primarily on technical aspects of developing rainfed agriculture. These include the National Watershed Development Project for Rainfed Areas (NWDPRRA), the Indian Council of Agricultural Research's model WSD projects, and the World Bank-assisted pilot project for WSD development in rainfed Areas.

Ministry of Rural Development (MORD): projects focusing on water harvesting through construction of percolation tanks, contour bunds, and other structures. These fall under department of soil and water conservation projects (Jal Sandharan) and the Drought Prone Area Project (DPAP).

Non-government organizations (NGOs): projects typically placing greater emphasis on social organization and less on technology relative to the government programmes.

NGO-Government collaboration: projects operated jointly by government and Non-government organizations (Indo-German Watershed Development Programme (IGWDP), Adarsh Gaon Yojana (AGY)) that seeks to combine technical approach of government projects with the NGOs' social organization orientation.

The role of WSD approaches well established it becomes pertinent to look at its development. Springate-Braginski *et al.*, (2002) have outlined milestones in the development of this approach in India:

- Ministry of Rural Development framed guidelines at national level for implementation of the Drought Prone Area Programme through WSD approaches in 1978. This approach was also favoured by the Task Force on Integrated Agriculture Development in implementing the DPAP during the Fifth Five Year Plan (1974-79).
- The Desert Development Programme (1977-78) adopted the WSD approach, and concentrated on reforestation activities to prevent the expansion of hot and cold deserts.
- The National Wasteland Development Board (NWDB) created in 1984 also advocated the adoption of WSD approach in the implementation of the Integrated Watershed Development Project (1987), which focuses on development of non-forest wastelands through silvi-pasture and soil and water conservation measures.
- National Watershed Development Programme in Rainfed Areas (NWDPRRA) implemented by GoI since 1990, with the aim of improving production potential in

rainfed areas, issued Central Ministry of Agriculture watershed development (WARASA) guidelines in the light of the suggestions made by the committee of secretaries constituted to review the Programme.

- The revised Programme after the review gave importance to planning for the watershed, and included the preparation of a complete plan under primary activities. The Programme was made pro-people and showed a shift towards economic benefits from the technical orientation it had before. Further, the coverage of the Programme was increased and an inherent monitoring and evaluation component put in place.

According to an estimate by Farrington *et al.*, (1999) over \$500 million per year is being invested in micro-watershed rehabilitation through number of WSD programmes. Water resource development, management, harvesting and equity in distribution, forms the nucleus of watershed development (GoAP, 2001).

The, GoAP (2001) document outlines WSD as the sole solution to ensure drought proofing and to mitigate drought distress.

WSD approach from SL framework

Sustainable Livelihoods (SL) approach suggests that improvement of assets through Watershed Development (WSD) is not an end in itself, but it is a means to an end (Turton, 2000). The SL approach provides a framework through which correlation between WSD activities, rural livelihoods and poverty reduction can be found out. Table 1 below indicates some questions raised by the SL approach.

Table1. Sustainable Livelihoods and WSD

Livelihood component	Key issues
Capital assets	Which assets are more important to the poor? Are there particular combinations of capital assets – or sequences in their development – which increase the likelihood that WSD will succeed? Has access to poor to common property improved as a result of WSD?
Livelihood strategies	Does WSD support the livelihood strategies of the poor? How does WSD interface with other livelihood strategies: NR-based, non NR-based and migration? How do people' livelihood strategies affect their participation in and benefit from WSD?
Sustainable livelihood outcomes	What contributions has WSD made to sustainable livelihoods? What are the relevant outcome indicators? Are people's own livelihood priorities being addressed? How can activities be adapted in order to enhance livelihood impacts on target groups, while remaining consistent with the overall objectives?

Source: Turton, 2000

According to Srigiri *et al* (2003) there have been a number of evaluations of Watershed projects favouring these types of projects, but there is dearth of available literature to prove that benefits from these projects have been distributed equitably. In dry land areas such as the Indian semi-arid tropics, watershed projects aim to maximize the quantity of water available for crops, livestock and human consumption through on-site soil and

moisture conservation, infiltration into aquifers, and safe runoff into surface ponds. (Kerr and Chung 2001).

Ministry of Rural development and Ministry of Agriculture's projects emphasize on technical aspects of WSD –developing rainfed agriculture and creation of physical structures like tanks, contour bunds, check dams, percolation tanks etc. The physical assets creation and enrichment takes place through these WSD structures. Soil and moisture conservation efforts certainly improve natural asset base of the community in terms of productivity of the land but the other assets like financial, human and social assets were largely ignored.

Ignoring the orientation of social organization in WSD projects has been one of the oft-mentioned lacunae of these projects. These projects were large-scale projects and followed technocratic, top-down approach, in turn largely ignoring local technical and managerial knowledge. This impacted the performance of these projects adversely in turn for a gradual movement towards greater local participation and acceptance of local technologies, and better performance in terms of conservation and productivity (Farrington *et al.*, 1999; Hinchcliffe, Thompson, Pretty, Guijt, and Shah, 1999).

Many of the likes of (Crispino Lobo and Abraham Samuel, 2001) argue that better soil moisture regime and greater availability of water resulting from the WSD measures, provide the opportunity to change and diversify the cropping pattern, increases the household income. This in turn increases resilience of the community to cope with market fluctuations and unexpected rainfall variability.

The early WSD projects also resulted in many successes. WOTR (1999) outlines experience of the IGWDP, which succeeded at least in a village, convincing wealthier people to grant to the landless the exclusive fishing rights in a runoff pond established under the project.

Some NGOs followed a formalized approach and asked people to develop written agreements to share products from common lands with landless (Kerr, 2002). These steps certainly contribute towards poverty alleviation, but fail to grant complete and equal rights to landless and marginalised.

Srigiri, *et al* (2003) have traced the way WSD approaches in the country have moved towards a more holistic vision, which sees WSD as a mean to tackle rural poverty. These depict the growing concern in the past few years about ensuring that poor, landless people benefit from WSD. There is specific attention given to sharing the net benefits evident from the 2000 common guidelines between the Ministries of Agriculture and Rural Development. In fact, the ideas first introduced in the Sukhomajri experiment and Pani Panchayat projects calling for poor people to gain usufruct rights to natural resources made more plentiful or more productive through watershed development have been revisited (GOI, 2000). The common guidelines move closer to the ideas of some of the civil society institutions and funding agencies in this regard.

Participatory WSD projects have been seen as a solution for the problem of rural resource degradation and poverty alleviation in the past decade. Studies conducted on a large number of projects claim substantial improvements, mostly based on the positive biophysical indicators as well as the new institutions built during the project. However, there is still no convincing evidence if there has been equity in the distribution of benefits and if they have been successful in alleviating poverty of the most vulnerable sections. (Kerr, 2000)

Linkages between Equity and Disaster Risk Reduction in WSD

The increase in income and creation of livelihood opportunities reduces risk and builds in resilience within the community to face extreme events. According to SL framework creation of assets along with improved access to resources results in better coping strategies for the communities in light of disasters. Thus, it becomes relevant to assess the WSD programmes and policies and gauging their effectiveness in reducing the vulnerability of the people in general –and poor in particular. The equity in benefit sharing arrangements, creation of sustained employment opportunities and improved social and institutional capital can act as suitable indicators of disaster risk reduction.

According to Kerr *et al.*, (2000) there have been many studies (based on watersheds treated prior to 1995) showing that water table has risen, but the benefits have not been reaped by poor and landless. Further the studies fail to clearly point whether increased employment opportunities, is due to the temporary project related works, or significant long-term rise in labour.

Many studies have been carried out to explore the ecological and economic impact of WSD programmes across the country. Most of these studies have favoured the programme in terms of benefits and costs (Reddy, 2000) with some focusing on also the less quantifiable ecological benefits (Deshpande and Reddy, 1991; Chopra, Kadekodi and Murthy, 1989; Deshpande and Rajasekhar, 1995).

These studies not only endorse the programme economically but also emphasize this as a viable alternative for the development of rainfed agriculture in the country. Some of the studies bring out that WSD programmes are better than Centrally Sponsored Schemes, like the Integrated Rural Development Project (IRDP), Jawahar Rojgar Yojana (JRY) and National Rural Employment Programme (NREP) in terms of employment generation and natural capital regeneration in moderately degraded regions (Chopra and Kadekodi, 1993). Bhatnagar (1996) suggested that Jawahar Rojgar Yojana should adopt the WSD programmes instead of just focusing on purely employment generating programmes

The temporal characteristic of the benefit whether short term, medium term or long term from WSD and watershed structure evokes much interest. Whilst rapid and high benefits may be true in the case of the well-managed watersheds, such findings cannot be generalized.

With WSD programmes having long gestation any guess on the economic impact will be too early and might throw inconclusive results. The implementation process rather than technical know how and technology defines the sustainability of the programme. The placement of watershed structures and its maintenance on a long term basis depends on the strength and sustainability of the social and institutional capital built during the process of implementation which in turn impacts livelihood much more than technological inputs. Technically, the key to success is ensuring the physical works are appropriate to the hydrological regime. (Springate-Braginski *et al.*, 2002)

Socially, community planning is the key to success, which can ensure prevalence of a longer-term vision of local watershed development. Related to this is the term watershed Plus which emerged in 1998 to describe watershed projects stepping beyond their usual remit in order to address the needs of marginalised groups of people, such as those with no land, women and the poorest of the community. Watershed-plus' covered activities that would not normally be included in the watershed programme but, in the interests of

equity, would be included in the new livelihoods projects. These activities might include better water management, minor irrigation, drinking water, sanitation, forestry and interventions to address the specific needs of the poor – including credit, collection and processing of Non-Timber Forest Products (NTFPs), aquaculture, vegetable/fruit garden activities and local crafts.²

In the evaluation of IGWDP in Maharashtra there have been studies to assess impacts on marginal farmers and the landless poor. Following components of SL Framework, methodological issues and indicators to support them for the investigation of WSD concept have been identified. Based on these identifications, the impact of different measures on selected households of marginal farmers and the landless in the project has been analysed by comparing empirical data before and after the project.

It came out that the overall impact of the project on the livelihood of the people of the project area has been laudatory, there have been significant differences in the benefits accrued between marginal farmers and the landless. The marginal farmers benefited directly by increased productivity and adoption of economically favourable cropping patterns, the landless failed to derive their full share of benefits from the project due to lack of access to land. Other institutional building efforts did less to strengthen their voice and bargaining power to articulate their interests. Hence, equity and poverty issues could not be addressed effectively as other institution building efforts didn't do much to strengthen their voice and bargaining power.

The IGWDP evaluation study recommends concerted further research directed towards the implications of promotion of WSD activities under different property regimes and social groups to identify the underlying economic, cultural, social and institutional factors influencing the said equity and poverty issues.

2.3 Other Programmes

Joint Forest Management

The National Forest Policy, 1988 document envisages that the forest communities should be motivated to identify themselves with the development and protection of forests from which they derive benefits'. Government brought out a National Joint Forest Management (JFM) resolution in June 1990, supporting the rights and responsibilities of forest communities in the management of public forests. Over the next years, virtually all of India's states passed similar guidelines adopting principles of collaborative forest management. JFM proposes the governments as custodian of forests to collaborate and work together with communities in managing forestland.

The joint or collaborative element varies across states, with communities having more or less decision-making authority relative to government and other interests. The village community is represented through an institution specifically formed for the purpose. This institution is known by different names in different states (e.g. Vana Samaraksha Samitis in Andhra Pradesh and Hill Resource Management Societies in Haryana) but most commonly referred to as Forest Protection Committee or FPC. In some states, Panchayats can also enter into JFM agreement with the Forest Department.

Under JFM, the village community gets a greater access to a number of Non-Timber Forest Products (NTFPs) and a share in timber revenue in return for increased responsibility for its protection from fire, grazing and illicit harvesting. The details vary

² <http://www.livelihoods.org/info/docs/APRLP1.rtf>

from state to state as each state has issued its own JFM resolution/rules. The essential difference between "social forestry" and JFM is that while the former sought to keep people out of forests, the latter seeks to involve them in the management of forestlands.

The JFM adopts a three-point strategy in providing benefits: Villagers are paid wages for forestry activities to stop migration and involve people more closely with the regeneration activities. While wage earning becomes the immediate benefit and checks migration, the regenerating forest provides the mid-term benefits like a constant supply of fodder and fuel. The third and long-term benefit is the rise in the water table due to the watershed activities. (Springate-Baginsky *et al*, 2002)

While undertaking assets creation and development activities under JFM, water conservation has been accorded status of key activity. Forest conservation coupled with watershed activities have been carried as opposed to the usual practice of protecting a demarcated patch of forest. Thus, wherever the JFM Committee is protecting the forest, water harvesting structures are being built and WSD activities are also being taken up. The guiding principle is: 'once you catch water, the forest will grow automatically'. The JFM is channeling funds from the EAS and other Union government sponsored schemes like the integrated watershed development programmes. Spending money from development programmes on forestry has the approval of the Planning Commission, which has now issued guidelines to all states to earmark funds for forestry projects under the EAS and *Jawahar Rojgar Yojana*. The Ninth and Tenth Plan also stresses this point.

Agriculture

The agriculture sector along with the allied sectors like horticulture, animal husbandry, has an important role in improving the overall economic conditions and health and nutrition of the rural masses. To maintain food security and ecological balance, there is need for sustainable and balanced development of agriculture and allied sectors. In India, the situation started improving gradually after the mid 1960s with the introduction of high yielding varieties (HYVs) of crops, and the development of agriculture infrastructure for irrigation, input supply, storage and marketing.

The high production potential input responsive HYVs motivated farmers to adopt improved production technologies with the use of water, fertilizers and agrochemicals. India was a full participant in the Green Revolution of the 1960s and 1970s that brought hybrid seeds to subsistence farmers as a way to consistently feed a growing population. The 1980s saw the farmers coping with the extreme events as well as crop varieties. The crop seeds which could be grown in water logged areas along with saline and alkaline areas picked up. These types of crop varieties reduced the vulnerability of the farmers to a large extent. Recently genetically modified crop cultivation has been allowed in India since 2002. This has opened the avenues for genetically modified drought, flood or pest resistant varieties of crops in turn leading to increased productivity and reduced vulnerabilities.

Land Degradation

Land degradation has a direct bearing on the productivity of soil, its vulnerability to rainfall variations, scarcity of drinking water, fodder and fuel wood. Given the inter-linkages of crop production, livestock economy and environment, land degradation has a major impact on the livelihoods of the people, especially in rural areas.

Box-2 Some of the strategies for developing degraded lands

- Land development including in situ soil and moisture conservation measures like contour and graded bunds fortified by plantation, bench terracing in hilly terrain; and nurseries for fodder, timber, fuel wood, horticulture and non-timber - forest produce.
- Afforestation including block plantations, agro-forestry and horticultural development. Shelter-belt plantations, sand dune stabilisation, etc.
- Drainage line treatment with a combination of vegetative and engineering structures.
- Development of small water harvesting structures such as low-cost farm ponds, nalla bunds, checkdams and percolation tanks and ground water recharge measures.
- Renovation and augmentation of water resources, desiltation of tanks for drinking water and irrigation.
- Pasture development either by itself or in conjunction with plantations.
- Repair, restoration and upgrading of existing common property assets and structures in the watershed to obtain optimum and sustained benefits from previous public investments.
- Crop demonstrations for popularising new crops and crop varieties or innovative crop management practices.
- Promotion and propagation of non-conventional energy saving devices and energy conservation measures.

Source: *Guidelines for Watershed Development (Revised 2001) Department of Land Resources, Ministry of Rural Development*

Information and Communication Technology

The information and communication technology (ICT) mitigates disaster risk through forecasting, early warning system to notify the disaster along with assessment of damages.

For many types of natural disasters—forest fires, tsunamis, cyclones, flash floods, storms, volcanoes- disaster forecasting and early warning information and communication systems are very much called for. These systems continuously collect, collate and disseminate information on disaster, and determine the potential damage and extent to which populations will be affected and the measures need to be taken to protect lives and facilities from impact of disasters.

In disasters which are sudden, a preliminary “disaster early notification” be issued as soon as possible after the disaster occurrence. This early notification alerts Government machinery about occurrence of a disaster and its approximate magnitude and extent and immediate priorities, such as immediate search and rescue.

The ICT has integral role in post disaster cases also like undertaking the need and damage assessment as well as coordinated planning for disaster response. This assessment will provide information like: the extent of damage in terms of lives and property, urgent needs and priorities, as well as actual response measures being taken. These assessments need to be continuously updated as more information becomes available.

Natural disasters can't be avoided, but the losses can be minimized by proper awareness and its impact mitigated through application of ICT tools. These tools are discussed below:-

GIS and Remote Sensing

GIS application can be utilized for risk assessment through:- hazard zoning and mapping to show earthquake, landslides, floods or fire hazards prone areas. These maps can be created for cities, for districts, states or even for the entire country. This technology is used in India to prepare Tropical Cyclone Threat Maps which is used by meteorological department to improve quality of the tropical storm warning services and also for quick dissemination of the risk to people likely to be impacted.

GIS and Remote Sensing can be used in management of drought relief. The satellite data may be used to target potential ground water sites for taking up well-digging programmes and evaluation of areas subject to desertification. The satellite data can also be effectively used for mapping and monitoring the flood inundated areas, flood damage assessment, flood hazard zoning and post-flood surveys.

Internet

In the present era of electronic communication, the Internet provides a useful platform for disaster mitigation communications. It provides a new and potentially revolutionary option for the rapid, automatic, and global dissemination of disaster information.

Box-3 India's warning and forecasting systems**Indian Meteorological Department (IMD)**

IMD provides cyclone warnings from the Area Cyclone Warning Centres (ACWCs) It has developed the necessary infrastructure to originate and disseminate the cyclone warnings at appropriate levels. It has made operational a satellite based communication system called Cyclone Warning Dissemination System for direct dissemination of cyclone warnings to the cyclone prone coastal areas.

National Remote Sensing Agency (NRSA)

Long-term drought proofing programmes on the natural resources of the district have been greatly helped by the use of satellite data obtained by NRSA. Satellite data can be used very effectively for mapping and monitoring the flood-inundated areas, flood damage assessment, flood hazard zoning and past flood survey of river configuration and protection works.

Seismological Observations

Seismological observations in the country are made through national network of 36 seismic stations operated by the IMD, which is the nodal agency. These stations have collected data over long periods of time.

Warning System for Drought

The National Agricultural Drought Assessment and Management System (NADAMS) has been developed by the Department of Space for the Department of Agriculture and Cooperation, and is primarily based on monitoring of vegetation status through National Oceanic and Atmospheric Administration (NOAA) Advanced Very High Resolution (AVHR) data. The drought assessment is based on a comparative evaluation of satellite observed green vegetation cover (both area and greenness) of a district in any specific time period, with that of any similar period in previous years.

Flood Forecasting

Flood forecasts and warnings are issued by the Central Water Commission (CWC) , Ministry of Water Resources. These are used for alerting the public and for taking appropriate measures by concerned administrative and state engineering agencies in the flood hazard mitigation. Information is gathered from the CWC's vast network of Forecasting Stations on various rivers in the country.

Cyclone Tracking

Information on cyclone warnings is furnished on a real-time basis to the control room set up in the Ministry of Agriculture, Government of India. High-power Cyclone Detection Radars (CDRs) that are installed along the coastal belt of India have proved to be a very useful tool to the cyclone warning work. These radars can locate and track approaching Tropical Cyclones within a range of 400 km. Satellite imagery received from weather satellite is extensively used in detecting the development and movement of Tropical Cyclones over oceanic regions, particularly when they are beyond the range of the coastal radars. The existing mode of dissemination of cyclone warnings to various government officials is through high priority telegrams, telephones, telex and fax.

Source: Information Technology and Disaster management in India by Dr. Alok Gupta available at www.iscgm.org/html4/pdf/forum2000/DrAlokGupta.pdf

3 Post-Disaster Strategies

Post-disaster strategies include all measures taken immediately in the aftermath of a disaster. The efficient and speedy response directly impacts loss to life and property. The capabilities developed in the pre-disaster phase are put to use. The information flow, deployment of trained personnel and machineries, speed and effective decision-making in emergency situations and in short the disaster management schemes as a whole is tested in post-disaster phase. This phase in the longer term includes apart from relief and rehabilitation efforts, the “reconstruction of livelihoods” which make the people better equipped in terms of potential to sustain the disaster shocks.

The Government’s response to the disaster in India has been of the following types:

Rescue and relief: the immediate response in the aftermath of a disaster is to minimize loss of lives by undertaking rescue and relief efforts and providing basic amenities to the affected ones in terms of food, clothes, safe water and proper medical treatment. The disaster management plans developed by state and national authorities have emphasized the speed and efficiency of these efforts.

Infrastructure restoration: infrastructure of the affected area bears the brunt of the calamity and essential services like roads, public buildings, airfields, ports, communication network etc get severely damaged. Government accords priority to the efforts to restore basic infrastructure and bringing these back to operating conditions.

Communication: government authorities communicate to the larger community the impact of the disaster and specific activities that are being (or need to be) undertaken to minimize the impact and preventing panic reactions by the communities and providing relevant information as well as handling welfare enquiries. The media management as well as feedback on relief measures are also being paid attention to in recent years.

Relief packages and compensations: relief packages and compensations based on preliminary need and loss assessment by the government authorities have been trademark of post disaster strategies.

The strategies, factors and government responses in mitigating disaster impact or post-disaster relief and rehabilitation measures in specific disaster cases such as Maharashtra floods, Indian Ocean Tsunami, Gujarat earthquake and Orissa cyclone is dealt in the following sections. Government’s responses to recurring disasters such as floods and droughts have also been elucidated.

3.1 Maharashtra Floods

Large part of the Maharashtra state including metropolitan city of Mumbai was flooded in last week of July 2005. In this more than a thousand people died and property worth billions was damaged. Initial estimates put financial losses at over a billion dollars.

Lack of public information and early warning systems added to the miseries. Many radio and television stations did not receive any weather warnings or alerts by the civic agencies leading to widespread chaos. The meteorological department put the blame on

the lack of sophisticated doppler radars which would have given a three hour prior warning.

Many reasons were attributed to the failure of the civic agencies. Geologists blamed the reclamation of the natural streams which used to provide natural drainage for the floods while many blamed the encroachment of slums over the storm water drains and the Mithi River, the main river, in Mumbai.

Outdated drainage system: The present storm-water drainage system in Mumbai is capable of carrying only 25 millimeters of water per hour which was extremely inadequate on a day when 944 mm of rain fell in a day the city.

Box: 4 Failed attempt to overhaul Mumbai's storm-water drainage system

In 1990, an ambitious plan was drawn to overhaul the city's storm water drainage system which had not been reviewed in over 50 years. A project costing approximately six billion Rs was proposed by UK based consultants hired by the Brihamumbai Municipal Corporation (BMC) to study the matter. Implementation of the project would have ensured that rainwater did not flood the streets of Mumbai. The project was planned to be completed by 2002 and was aimed to enhance the drainage system through larger diameter storm water drains and pipes and removing encroachments. The project, if implemented would have doubled the storm water carrying capacity to 50 mm per hour. The BMC committee rejected the proposed project on the grounds that it was "too costly".

Unplanned development: Development in northern suburbs of Mumbai is haphazard and buildings are constructed without proper planning. Moreover, the drainage plans in northern suburbs is choked.

Interfering with mangrove ecosystems: mangrove ecosystems along the Mithi river and Mahim creek are being continuously destroyed for construction. According to an estimate Mumbai has lost about 40% of its mangroves in the last decade to constructions and slums. These ecosystems serve as a buffer between land and sea and destruction of these scaled up the damages.

The government's focus in case of Mumbai floods was on providing immediate relief in terms of essential food items and health services. In the long run the efforts of the Government are aimed at reduction in long-term vulnerability of the flood-affected areas. For this purpose two major steps have been envisaged. First one is rehabilitating large number of people living in low quality housing and removal of encroachments in highly vulnerable area of the bed of the Mithi River. The State Government has set up Mithi River Development and Protection Authority (MRDPA) and Maharashtra State Disaster Management Authority (MSDMA) for this purpose. The other step is to revamp a century old Mumbai drainage system.

The government's focus in this case is focused in creation and improvement of physical assets. Increasing the depth of the Mithi River is planned, but the other determinant of the devastation, loss of mangroves, is conveniently being ignored in planning. The social and human capitals are also not being emphasized in the rehabilitation efforts putting a question mark on the sustainability. Livelihood strategies to reduce the vulnerability of the communities are largely being ignored in the government's vision.

3.2 Indian Ocean Tsunami

The Indian Ocean tsunami that hit the southern states of Andhra Pradesh, Kerala, Tamil Nadu, Pondicherry and the Andaman and Nicobar islands caused immense loss of human lives and fatalities. The official figures depicting the extent of losses are as follows: 12,405 fatalities; 6,913 injuries; 1089 villages and 2.79 million people estimated to be affected; estimated 157,393 dwellings destroyed; 83,788 boats damaged; 31,755 livestock lost; 39,035 hectares of crops damaged; and an estimated 730,000 individuals had to leave their homes. (<http://www.undp.org/tsunami/india.htm>)

The largest damages occurred in fisheries, housing and infrastructure. The most affected areas include coastal fisheries, agriculture, and micro-enterprise. The Government refused international offers to help with relief and rescue operations, as the GOI said it had sufficient resources to provide immediate disaster relief. India even dispatched immediate assistance to Sri Lanka, Indonesia, and the Maldives. The Indian government adeptly coordinated its efforts with UN agencies and other national and international non-governmental organizations providing humanitarian relief. The post disaster strategies in case of Tsunami was an often-followed three phased approach:

Phase I: Immediate response- immediately launching relief and rescue operations and assisting survivors, clearing debris, burning or cremating dead bodies and setting up temporary relief camps for survivors with food, safe water and control of communicable diseases.

Phase II: Rehabilitation and relief- building shelters and permanent homes for people displaced by Tsunami and providing them with monetary compensation and relief in order to rehabilitate them economically and ecologically. The infrastructure restoration and damage assessment are also entwined in this phase that goes on for a couple of years or so.

Phase III: Sustainable reconstruction-This phase is a long termed one focusing on creation of better and sustainable livelihood systems, reduction of vulnerability and improving the productivity and profitability of fisheries and agriculture as well as strengthening early warning systems and defense systems.

In addition, international donor agencies, including the WB, the UN, and ADB, have promised to help fund the rehabilitation process in coordination with the national effort. A recovery framework in support of GOI for the post-Tsunami Rehabilitation and Reconstruction Programme was also formulated by UN whose cost estimation was around US \$ 40 million funded through core resources and resources mobilized from bilateral donors.

The tsunami relief efforts coordinated through the government channels have been focused towards providing immediate compensation. The Government is compensating the loss of boats along with those of crops in cash and carrying out repair of houses and boats, creation of new houses and resettlement of peoples, creation of infrastructure as well as safeguarding traditional livelihood practices like fisheries and agriculture. The creation of physical assets is being taken care of through infrastructure and housing development activities. The financial asset creation is taking place through the compensation and credit provisions of the Government. While, the human and social capitals are being emphasized through conservation of traditional livelihood systems.

3.3 Orissa cyclone

According to the Government of Orissa's white paper on the Cyclone of October 1999, 10,000 people died and 1.6 million houses were destroyed or damaged during the cyclone. The power supply to 17,000 villages was severely damaged, 18,000 education buildings and 7,000 government offices were damaged, and 12,000 km of road and 1,400 bridges were affected, many by fallen trees.

According to a report by the UN the cyclone caused over 80% damage to standing crops especially the ready-to-be harvested paddy and loss of about 454,000 livestock. (<http://www.un.org.in/dmt/orissa/Reports.htm>) The cyclone impacted the social assets apart from natural, physical and financial assets as it led to severe depletion of future productive capacity and the breakdown of the tradition family-community social security system.

The Government along with other organizations immediately responded to this cyclone through relief measures such as running free kitchens and arranging for medicines and temporary shelters for people. The rescue and immediate relief efforts were carried out under strategy of rehabilitation, restoration and reconstruction. The Government of Orissa constituted a Government owned autonomous body Orissa state Disaster Management Authority (OSDMA) to have a systematic and planned approach to disaster management in the state. The Authority along with UN and other bilateral and multilateral agencies carried out the planning and implementation of relief and rehabilitation activities.

The relief and rehabilitation efforts tried to reconstruct resilient livelihood systems and improve access to the resources. The cyclone changed the whole shape of the livelihoods framework of the poor. This change increased their vulnerability in the short-term but the rehabilitation process has allowed that change to be an opportunity for development to occur on the back of rehabilitation.

The importance of sequencing of rehabilitation inputs became apparent as the rehabilitation project progressed. This awareness was partly due to different NGOs taking a holistic and location-specific approach, could see the wider implications of one type of intervention on other activities of the poor e.g. irrigation systems linking into planting seasons, and FFW (food for work) for road building linking into harvesting season and thus local food availability. Understanding the importance of sequencing is closely linked to the use of the SL framework because it highlights linkages between livelihood components

3.4 Gujarat earthquake

An earthquake of magnitude 6.9 on the Richter scale on 26th January 2001 struck the state of Gujarat. The earthquake led to massive loss of life and property. Thousands of villages and many towns were severely affected.

According to Gujarat Earthquake Reconstruction and Rehabilitation Policy document of Government of Gujarat: *About 13,800 people died, and approximately 1,67,000 suffered injury. Approximately 1.2 million houses were destroyed or damaged. The civic facilities and infrastructure were severely affected. The earthquake had a very severe impact on livelihood. More than 10,000 small and medium industrial units stopped production due to damage to plants, factories and machinery. Work at thousands of saltpans stopped and a large number of craftsmen and artisans were affected by loss of work and tools.*

There was also a heavy loss of livestock in the region, an important source of peoples' livelihood.

The Government of Gujarat understanding the need for an integrated approach for disaster management came out with a disaster Management Act in 2003 and created a Gujarat State Disaster Management Authority. The preamble of the said Act clearly outlines the need as *"to provide for effective management of disaster, for mitigation of effects of disaster, for administering, facilitating, coordinating and monitoring emergency relief during and after occurrence of disasters and for implementing, monitoring and coordinating measures for reconstruction and rehabilitation in the aftermath of disasters, in the State of Gujarat and for these purposes to establish the Gujarat State Disaster Management Authority and to specify other agencies and for matters connected therewith or incidental thereto."*

The State Government launched a massive reconstruction and rehabilitation programme to reconstruct the houses and infrastructure after the earthquake. With the support of the WB, ADB, UN, and other multilateral and bilateral agencies, the Government of Gujarat prepared the Gujarat Earthquake Rehabilitation and Reconstruction Project to be implemented by Gujarat State Disaster Management Authority. The Project is aimed at rehabilitation of the affected people through provision of housing, social amenities, infrastructure, and livelihood support. This project is tries to improve all the capitals under the SL framework and envisages creation of better coping strategies and increasing the disaster resilience of the people. It is much more than disaster relief and rehabilitation and entwines the principles of disaster preparedness and response.

The relief aspect has been ingrained through activities like building, repairing and strengthening private houses and public buildings, health support and psychological counseling to the people injured or traumatized by the earthquake. The rehabilitation and strengthening of livelihood support system is being looked at through efforts to revive the local economy by providing assistance for agriculture, industries, small business, and handicrafts, rebuilding and upgrading community and social infrastructure, improved education and health system, and strengthening social protection measures for weaker sections of the population. The reconstruction efforts are aimed at restoring lifeline infrastructure of transport networks and utility infrastructure of power and water supply, and reduce the communities' vulnerability to disasters.

The project also aims for implementing a comprehensive disaster management programme, which will lead to better disaster preparedness and emergency response capacity of the government while dealing with different types of disasters. This not only calls for immediate and short-term provisions but also long-term mitigation programmes aimed at watershed management and drought mitigation, and improve people's resilience and food security through diversification of sources of income-generation and asset building. The mandate of the Project also calls for pursuing broader household- and community-level development and empowerment.

The Project supports gender empowerment and women involvement, provides support to children affected by disasters. The involvement, partnership and collaboration with people and representative institutions, civil-society institutions are emphasized along with developing institutional mechanisms to bring about transparency and accountability in the programme.

3.5 Government's Response to Droughts

The Government's responses to droughts can be categorized into two broad heads - drought proofing and drought management. (Swami, 2001). The drought proofing programmes includes programmes like DPAP, DDP, Integrated Afforestation and Eco-development Project Scheme (IAEPS) along with WSD programmes such as NWDPPRA, IWDP.

Drought management includes making available drinking water, provision of health services, food availability, along with livelihood support and development. These are emphasized through employment generation and social security programmes. The social security programmes include- Antyodaya Anna Yojana (AAY), National Old Age Programme (NOAP), Annapurna Scheme, Integrated Child Development Scheme (ICDS) and Mid day meal –to school while employment generation programmes include Food For Work (FFW), Employment Assurance Scheme (EAS) Jawahar Gram Samridhi Yojana (JGSY), Pradhan Mantri Gram Sadak Yojana (PMGSY) Swarnajayanti Gram Swarozgar Yojana (SGSY). These programmes support assets development along with reducing vulnerability from droughts. (See Box-5)

Apart from these programmes, there are public and private sector efforts to create Watershed structures which take into consideration both ground and surface water flow), and the Command Area Development Programme (CADP), to strengthen water management capabilities and enhance the effectiveness of irrigation programmes.

Box-5 Drought management practices in India

According to Send and Chander (2003) the drought management practices followed in India includes the following:

- a) **The operation of an early warning system:** meteorological conditions, particularly the monsoon rains from June to September, and hydrological conditions, such as reservoir and groundwater levels, are closely monitored. Early warning means that better preparations can be made, which improves the effectiveness of drought mitigation strategies.
- b) **Drought preparedness measures:** this involves communities developing plans so that health care and veterinary care institutions, water resources and disaster assistance resources can expand their services in times of drought.
- c) **Conservation of water:** developing additional water supplies for drought- affected areas and those with chronic shortages.
- d) **Stabilizing crop production:** contingency crop planning, which involves trying to prevent crops from drying out, planting alternative crops, using seed reserves, and implementing measures to improve production in order to stabilise crop production in drought-prone areas.
- e) **Ensuring access to food:** a national food security system has been implemented to make grain available at a reasonable price and to stabilise the market price. Food is transferred from areas where there is a surplus to areas where there is a deficit. Nutritional surveys help to identify the communities most in need, and additional food supplies are distributed accordingly.
- f) **Preserving farmers' assets:** employment generation schemes are offered to the rural work force to stabilize incomes. In addition, to enable farmers to keep their livestock, fodder from areas where there is a surplus is transferred to those areas where there is not enough. At district level, a standard procedure for drought mitigation is in place, which, if implemented promptly, can substantially reduce the vulnerability of people and livestock. However, seasonal vulnerability to drought is a reality in India and the transfer of food, fodder and water resources to drought-affected areas is costly and may increase dependency and undermine the ability of local community systems to cope. Therefore, what is needed urgently is to strengthen the local system or the traditional household system and ensure that there is local community involvement in disaster mitigation strategies.

3.6 Government's Response to Floods

The Government emphasized on the structural measures in flood mitigations till 1980s. These measures included construction of embankments, dams and barrages, raised platforms etc. Out of 40 million hectares prone to floods in the country, around 15 million hectares has been protected by construction of embankments.

The structural measures alone were insufficient so non-structural measures are now being focused on. The non-structural measures are cost and time effective and include flood forecasting, flood plain zoning, flood proofing of the civic amenities of affected villages, changing the cropping pattern, and public participation in flood management. (Sen and Chander, 2003)

The GOI also constituted a Central Task Force under the Chairmanship of Chairman, Central Water Commission. The Task Force's term of reference includes examining causes of the problem of recurring floods and erosion in states and region prone to flood and erosion as well as suggesting short-term and long-term measures.

3.7 Government's Response to Cyclones and the Tsunami

Due to shallow ocean bed and coastal configuration, the Indian sub-continent is affected by cyclones more than any other regions of the world. The Indian Ocean is one of the six major cyclone and tsunami-prone regions of the world. India has a long coastline of 7,516 km, which is exposed to tropical cyclones arising mainly in the Bay of Bengal and the Arabian Sea. The states most exposed to tropical cyclone surges are West Bengal, Orissa, Andhra Pradesh and Tamil Nadu along the Bay of Bengal, and Gujarat and Maharashtra along the Arabian Sea.

According to the Concept note on Tsunami developed by GOI(2005)t has been mentioned that, *"Tsunami is least probability event in India. As such, there are no codal provisions of Tsunami warnings in India as yet though; there is a good seismological network in India to record any earthquake within the country and its neighbourhood. The need of a Tsunami Warning Centre (TWC) in India is now being conceptualized at the Government of India level."* The same concept note mentions that now the Department of Ocean Development in Cooperation with Departments of Space and Science and Technology is developing a plan of tsunami warning system in the Bay of Bengal and the Arabian Sea.

4 Issues in Disaster Responses

The focus of the Government efforts under disaster response has been creation and/or rejuvenation of physical assets such as houses, roads, communication networks, irrigation canals etc. Coupled with this is the typical response of providing compensation or cash relief to cope up with loss of natural and physical capitals. This cash flow certainly increases the financial capital mostly through the "one-time compensation" provision of the government. But, the sustainability of this response approach is questionable.

The livelihood generation and support activities coupled with the ongoing government programmes of rural development, watershed development, and poverty alleviation, as mechanism of effective disaster response and reduction of future vulnerability can be an alternative approach.

Relief, rehabilitation and development are often thought of as distinct phases but they need to work side-by-side and can often complement each other. Rehabilitation is an important bridge between relief and development but it is a form of support that must be seamlessly linked into these other two if sustainable benefits are to be achieved. In many cases rehabilitation is seen as offering the opportunity to get back to the state before the disaster; however, it can also create the momentum to go beyond this into new development directions. These new directions need to be sustainable. The super cyclone in Orissa in October, 1999 and the Bhuj earthquake in Gujarat in January, 2001 underscored the need to adopt a multi dimensional endeavour involving diverse scientific, engineering, financial and social processes; the need to adopt multi disciplinary and multi sectoral approach and incorporation of risk reduction in the developmental plans and strategies. (GOI,2004)

The response to any disaster will have elements of chaos but establishing relief and rehabilitation response mechanisms before, rather than after, a disaster can greatly speed up support efforts. Ideally, these should be established as part of a disaster preparedness programme. Hazard and disaster preparedness are important at all levels from the community to the government, and through the donor and support agencies.

Different people have different abilities to respond to disaster preparedness measures. For example, the supply of reliable and timely information about potential disasters is an essential part of preparation but its dissemination needs to be tailored to the diverse needs and capacities of the intended audience. The poor (women in particular) who do not have access to good information services are severely disadvantaged.

Targeting during relief and rehabilitation is important and, in spite of the urgency, it is possible to achieve. This may require some innovative thinking and should form a part of disaster preparedness plans.

Following a disaster, the knowledge that the poor have about their lives and livelihoods is often the most comprehensive and accurate information available. Using local knowledge to identify the poor can be a rapid and effective method of targeting. The participatory planning of interventions, such as agriculture, fisheries and livestock inputs is likely to generate the best conditions to help the poor to replenish their natural capital in ways that address local needs and capacities. Likewise, the skills and capacities of the local people are well suited to the local situation. Using these capacities (in such activities as road building, house reconstruction, tree and crop planting) is an important part of ensuring that the people can contribute meaningfully to the rehabilitation process and sustain gains made into the future. However, participatory planning needs to be balanced by the need for speed of implementation and to be supported.

The geographical approach like concentrating on district and blocks and bringing the policies/programmes of all line departments under the district or block administration can build on strengths of government. Similar recommendation has been brought out in a study of DFID's support for post-cyclone livelihoods rehabilitation in Orissa carried out by IMM Limited. The study says that *"SL's holistic nature and the sectoral focus of Government do not always fit easily together and no project submitted by government line ministries... This needs to be considered carefully for future interventions in Orissa and elsewhere. However, there are facets of both systems where some harmony could have been achieved and built upon"*.

Good sequencing of interventions is crucial to ensuring that those interventions are complementary to each other. These should also be in tune with the coping strategies of the poor and responsive to the changes occurring in the natural, social and economic environment.

Some of the other sector policies have also provided its part in reducing vulnerabilities; the major ones are the agriculture policies, the wasteland development or degraded land development policies along with policies to improve Information technology.

5 Recent Disaster Management Provisions in India³

Disaster management in India was initially dealt by the Ministry of Agriculture as the focus was on management of floods and droughts. The scale of devastation brought about by Orissa cyclone in 1999 and Gujarat earthquake in 2001, the realization crept in that a multidisciplinary effort is required in managing disasters. The Ministry of Home Affairs was made the nodal Ministry for disaster management. This was established in response to the felt need to adopt a multi dimensional endeavor involving diverse scientific, engineering, financial and social processes. Incorporation of risk reduction in the developmental plans and strategies was also accepted.

The Government is slowly accepting this and the focus is shifting towards creation of assets and reducing vulnerability of the poor in an integrated manner. The Gujarat Earthquake Rehabilitation and Reconstruction Project under GSDMA and Disaster Management Bill, 2005 are point to this shift. Moreover, the disasters can also be treated as an opportunity .As in case of Orissa where the existing social structure was severely strained the opportunity existed to new social organizations to develop and increase the social capital. Cases of decreasing caste barriers and increased social cohesion at the time of distress in the aftermath of cyclone were such an opportunity.

Some of the recent disaster management provisions, which have potential for vulnerability reduction and risk mitigation, are:

- Disaster management Bill, 2005
- National Disaster Management Force
- Restructuring of Relief Departments in the States
- National Institute of Disaster Management
- National Policy on Disaster Management
- National Cyclone Mitigation Project
- Disaster Management Framework
- Disaster Risk Management Programme

5.1 Disaster Management Bill, 2005

The Disaster Management Bill already passed by the parliament is a big step towards reducing disaster risk and vulnerability. The Bill is based on the experiences of National Institute of Disaster Management, Calamity Relief Fund of Gol, Orissa State Disaster Management Authority and Gujarat State Disaster Management Authority.

The Bill proposes creation of National level disaster Management authority (already been created under Chairmanship of Prime Minister) and State level disaster Management authority under the chairmanship of state chief ministers. OSDMA and GSDMA in states of Orissa and Gujarat have already been created. At the lowest level the Bill will create

³ This section draws majorly from Disaster Management in India –A Status Report (August 2004), Ministry of Home Affairs, Government of India. Available at

<http://www.ndmindia.nic.in/EQProjects/Disaster%20Management%20in%20India%20-%20A%20Status%20Report%20-%20August%202004.pdf>

³ <http://www.nidm.net/>

District Disaster Management Authority under chairmanship of District Magistrate. Under the provisions of the Bill, Ministries and Departments will draw up department-wise plans in accordance with the national disaster management plans, a national disaster response force and a disaster fund will be created. Under this District Authority shall act as the district planning, coordination and implementing body for all disaster management related functions including mitigation and preparedness measures also, besides response, relief and rehabilitation. The Bill further emphasizes the role of PRI in disaster management.

With enactment of this Bill, the Government has now put in place requisite institutional mechanism for drawing up and monitoring the implementation of the disaster management plans at all levels, national, state and district level for prevention and mitigating effects of disasters and for undertaking a holistic response to any disaster situation. The Bill also seeks to constitute a National Institute of Disaster Management. A National Disaster Response Force shall also be constituted for specialist response. The Bill further seeks to constitute Disaster Response Fund and Disaster Mitigation Fund at the National, State and District level.⁴

5.2 National Disaster Management Force

In accordance with Disaster management Bill, 2005 a National Disaster Management Force comprising nearly 8,000 paramilitary personnel is to be set up as part of the National Disaster Management Authority (NDMA). The member of NDMA, M. Shashidhar Reddy announced in a news conference here that the force would be trained and equipped to conduct rescue operations. The NDMA, constituted recently to lay down the plans and policies for disaster management, would start functioning by the end of the year.⁵

5.3 Restructuring of the Relief Department in the States

The GOI is working with the State Governments to restructure the Departments of Relief and Rehabilitation, which handled the work of post calamity relief into Department of Disaster Management. The restructured Department will have an enhanced area of responsibility to include mitigation and preparedness apart from their present responsibilities of relief and rehabilitation. The States have been advised to restructure/re-group the officers/staff within the Department of Disaster Management with definite functions to pursue the holistic approach to disaster management. The restructuring proposes formations of four functional groups which will be assigned with specific tasks within the departments. These Functional Groups proposed are indicated below:-

- Functional Group 1: Hazard Mitigation
- Functional Group 2: Preparedness and Capacity Building
- Functional Group 3: Relief and Response
- Functional Group 4: Administration and Finance

⁴ http://www.rxpgnews.com/medicalnews/healthcare/india/article_2993.shtml

⁵ <http://timesfoundation.indiatimes.com/articleshow/1258132.cms>

5.4 National Institute of Disaster Management⁶

National Disaster Management Bill has a proviso of National Institute of Disaster Management (NIDM) which shall plan and promote training and research, documentation and development of national level information base relating to disaster management policies, prevention mechanism and mitigation measures.

Before passing the Bill the GOI initiated setting up of NIDM. The NIDM came into existence since October 16, 2003 by a Government of India order upgrading the National Centre for Disaster Management (NCDM), which was located at Indian Institute of Public Administration, New Delhi. The NCDM was established by the Ministry of Agriculture, Department of Agriculture and Cooperation, Government of India, in March 1995. The NCDM had been functioning as a nodal Centre for the human resource development in the area of disaster management.

NIDM will be gearing up the national, state and district level administration to tackle natural calamities and will also be coordinating research projects, training programmes and will build a database on natural disasters with case studies. This will also act as a premier national organization working for human resource development at national level in the area of disaster mitigation and management.

5.5 National Policy on Disaster Management

A National policy on disaster management has been envisaged by GOI. In the line with the changed focus, the policy proposes to integrate disaster mitigation into development planning. The policy shall inform all spheres of Central Government activity and shall enjoin upon all existing sectoral policies. The broad objective of the policy are to minimize the loss of lives and social, private and community assets because of natural or man-made disasters and contribute to sustainable development and better standards of living for all, more specifically for the poor and vulnerable section by ensuring that the developments gains are not lost through natural calamities/ disaster.

The main features of the National Policy on Disaster Management are as follows-

- i) The approach of the Government to disaster management has so far been reactive - concerned with post disaster relief and rehabilitation. A holistic and pro-active approach emphasizing on prevention, mitigation and preparedness is an essential element of the new policy.
- ii) Initiative to reduce vulnerability is an activity, which has to be undertaken as part of Government endeavor in all spheres and not confined to any one Department. It follows that all Ministries/Departments should undertake risk analysis in all earthquakes/cyclones/floods prone areas and take suitable initiatives to reduce vulnerability.
- iii) Measures for disaster management should be an integral part of the development process and appropriate fund allocation should be made in projects for such initiatives.
- iv) The policy lays stress on community involvement and awareness generation.

⁶ <http://www.nidm.net/>

- v) The policy emphasizes on Institutional arrangements required to ensure coordinated and quick response at all levels for effective disaster management.
- vi) The policy facilitates development of inter state and inter department arrangements for sharing of resources during emergencies.
- vii) Due emphasis has been given to capacity building measures including post recruitment basic training of all categories of field staff in their relevant disciplines. Special emphasis has to be given by State Governments in building especially trained risk and rescue teams.
- viii) The policy mandates that concerned Ministries/Departments shall be responsible for ensuring vulnerability reduction in civil construction. The designs must correspond to the requirements of safe construction as laid down by the Bureau of Indian Standards
- ix) The policy provides for strengthening the local authorities for effective enforcement of construction standards.
- x) The policy mandates that all lifeline buildings like hospitals, railway stations, control towers, fire stations, buildings of major administrative centers etc. in seismic zones IV & V need to be retrofitted to reduce earthquake damage vulnerability within five years.
- xi) Standing Operating Procedures for Disaster Management will have to be drawn up to introduce a culture of planning and preparedness for Disaster Management at all levels
- xii) Control rooms would be established at the National, State and District levels with adequate fail-safe telecommunication equipment. All communication systems available with different branches of the Government would be available for use by parties responsible for coordinating response to a disaster.
- xiii) Major disasters would be documented and lessons learnt used to reduce future vulnerabilities.
- xiv) All Ministries/Departments would revise their guidelines concerning disaster management to bring them in line with the policy of the Government of India.

5.6 National Cyclone Mitigation Project

A national project for Cyclone Mitigation with an estimated cost of Rs 1050 crore has been drawn up in consultation with the cyclone prone States. This project envisages construction of cyclone shelters, coastal shelterbelt plantation in areas, which are prone to storm surges, strengthening of warning systems, training and education etc. This project has also been given in principle clearance by the Planning Commission and is being taken up with World Bank assistance.

5.7 Disaster Management Framework

The GOI has come up with a National Disaster covering institutional mechanisms, disaster prevention strategy, early warning system, disaster mitigation, preparedness and response and human resource development. The expected inputs, areas of intervention and agencies to be involved at the National, State and district levels have

been identified and listed in the roadmap. This roadmap has been shared with all the State Governments and Union Territory Administrations. Ministries and Departments of Government of India, and the State Governments/UT Administrations have been advised to develop their respective roadmaps taking the national roadmap as a broad guideline. There is, therefore, now a common strategy underpinning the action being taken by all the participating organisations/stakeholders.

Institutional mechanisms, which would facilitate this inter-disciplinary approach, are being put in place. It is proposed to create Disaster Management Authorities, both at the National and State levels, with representatives from the relevant Ministries/Departments to bring about this coordinated and multi-disciplinary with experts covering a large number of branches. The National Emergency Management Authority is proposed to be constituted.

The States have also been asked to set up Disaster Management Authorities under the Chief Minister with Ministers of relevant Departments (Water Resources, Agriculture, Drinking Water Supply, Environment and Forests, Urban Development, Home, Rural Development etc.) as members. Many states and UTs such as Tamil Nadu, Arunachal Pradesh, Uttaranchal, Orissa, Gujarat, Kerala, Nagaland, Delhi, Andaman and Nicobar Administration and Chandigarh Administration have already notified the authority.

5.8 Disaster Risk Management Programme

A Disaster Risk Management Program has been taken up in 169 districts in 17 multi-hazard prone States with the assistance from UNDP, USAID and European Union. These States are Assam, Arunachal Pradesh, Bihar, Delhi, Gujarat, Maharashtra, Meghalaya, Mizoram, Manipur, Nagaland, Orissa, Sikkim, Tamil Nadu, Tripura, Uttar Pradesh, Uttaranchal and West Bengal,

Under this project, the States are being assisted to draw up State, District and Block level disaster management plans; village disaster management plans are being developed in conjunction with the Panchayati Raj Institutions and disaster management teams consisting of village volunteers are being trained in preparedness and response functions such as search and rescue, first aid, relief coordination, shelter management etc. States and District level multi-hazard resistant Emergency Operation Centres (EOCs) are also being set up under the programme. Equipment needs for district and State Emergency Operation Centres have been identified by the State nodal agencies and equipment is being provided to equip these EOCs. Orientation training of masons, engineers and architects in disaster resistant technologies have been initiated in these districts.

The mission of the Programme is vulnerability reduction to all types of hazards, be it natural or manmade. This is not an easy task to achieve, keeping in view the vast population, and the multiple natural hazards to which this country is exposed. However, the task, though difficult, is achievable. Significant steps towards vulnerability reduction have already been taken such as, putting in place prevention and mitigation measures and preparedness for a rapid and professional response. With a massive awareness generation campaign and building up of capabilities as well as institutionalization of the entire mechanism through a techno legal and techno financial framework, the Programme is gradually moving in the direction of sustainable development. The various prevention, mitigation measures outlined above are aimed at building up the capabilities of the communities, voluntary organisations and Government functionaries at all levels.

Particular stress is being laid on ensuring that these measures are institutionalized considering the vast population and the geographical area of the country. This is a major task being undertaken by the Government to put in place mitigation measures for vulnerability reduction. The ultimate goal is to make prevention and mitigation a part of normal day-to-day life.

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