MANAGEMENT OF DISASTERS AND CRISIS SITUATIONS IN INDIA WITH FOCUS ON THE POOR

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1. Introduction and Background

Natural and man-made disasters have been a bane of India's economy since time immemorial. In ancient Indian literature, there are references to natural disasters such as prolonged droughts, flash floods, hail storms, land slides, cyclones and forest fires. All those disasters were generally then attributed to planetary factors and evil spirits (Kanwar 2001: 3). According to the Kautilya's *Arthashastra*, disaster management was a prime duty of the state. The state used to provide relief, when the distress conditions became acute (Sharma 2003: 3). According to the Indian Famine Commission (1888), droughts were the root cause of the devastating famines of the nineteenth century in India. In a nutshell, we could say that India was then and still is vulnerable to almost every type of natural disaster. About 60 % of the landmass in India is vulnerable to earthquakes; over 40 million hectares (ha) is prone to floods[4]; about 8 % of the total area is prone to cyclones; and about 68 % of the total area is susceptible to droughts. Eight thousand kilometer long coastline is prone to severe cyclonic formations. About 55 % of the total area lies in Seismic Zones III-V and is vulnerable to earthquakes. Sub-Himalayan regions and Western Ghats are vulnerable to land slides. (Kanwar 2001: 7, and GOI, 2004:32).

Besides, man made disasters such as fires; air, road and rail accidents; industrial accidents; strikes and *bandhs*, civil commotion; and wars take a heavy toll of thousands of lives in the country every year. The vulnerability of India's population, especially the poor, to both natural and man made disasters, has been increasing over time, with the increasing population densities, unplanned growth, urbanization, industrialization and other factors such as global warming, green house effect, social violence, terrorism, civil unrest and conflicts. Almost every day, news papers publish stories of natural and man-made disasters and crises occurring in one part, or the other of the country, and television channels show scenes of mishaps and their effects on people.

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[4] India is one of the most flood prone countries in the world and accounts for one fifth of the global death count due to floods. Over 30 million people are displaced annually

At the global level also, there has been a growing concern over enormous losses of lives and property caused by natural disasters[5]. This was reflected in a decision taken by the United Nations General Assembly in 1989 to declare 1990-2000 as the International Decade for Natural Disaster Reduction.

It is an irony that in many parts of India, we have droughts and in many others, we have floods occurring almost concurrently every year[6]. Yet, this kind of risk is not even recognised in India's policies and plans, not to speak of absence of any national policy for disaster management. It is a sad commentary that despite several programmes launched by the Government of India (GOI) from time to time for minimising their adverse impacts, natural disasters such as droughts, floods, and cyclones continue to haunt almost every year millions of people living in disaster- prone areas of India and there is no national policy on disaster management,

The natural and man-made disasters and crises create hardships for the poor, who are chronically vulnerable in terms of their access to resources, entitlements and livelihood support. In fact, the lives of people in the hazard- prone regions, particularly the poor, are almost completely insecure (Dreze and Sen 1988). Irrespective of the type of disaster, it is mostly the poor who are the worst sufferers. According to a study conducted in the 2001 earthquake-affected areas in Gujarat, most of the victims of the quake were the poor, comprising the landless households, rural artisans, and SC and ST people[7]. (Reference: Sudhir) Therefore, the poor should be the focal target group for disaster management.

Effective disaster management requires a multi-sectoral, multi-disciplinary, and holistic approach, encompassing pre-disaster preparedness initiatives, disaster response, and post-disaster rehabilitation, all with active participation of local people living in hazard-prone regions. As the incidence and severity of disasters has increased over time, disaster management deserves highest priority at both the national and sub-national levels and the traditional approach of post-disaster response and relief need to be replaced by an all-in-compassing holistic approach.

In this paper, we attempt to: (i) define and characterise various types of disasters and crises; (ii) examine current policies and strategies for disaster management; (iii) study the effects and impacts of disasters; (iv) document various technological and institutional innovations for disaster management; (v) identify and discuss the strategies that various organisations adopt to cope with disasters and crises; (vi) study the current practices for convergence and coordination of disaster management programmes adopted by various agencies; and (viii) finally outline a long –term approach to effective disaster and crises management.

The paper is mainly based on a critical survey of the literature that we could access from various sources, visits to a few governmental organizations (GOs) and non-governmental organisations (NGOs) engaged in disaster and crises management[8], and partly on the research work done by the authors in the field of natural resources management over the last two decades or so. The issues involved are illustrated with suitable examples from disaster prone states of India, particularly, Bihar, Gujarat, and Orissa.

2. Types of Disasters and Crises

[5] According to the World Disaster Report, 2001, as quoted in GOI (2004:33), on average, 211 million people lost their lives, or were seriously affected by natural disasters in the world every year over the period, 1991-2000.

[6] Over the last 125 years or so, droughts of moderate to severe nature have occurred in India in at least 40 years. Thus, on average, India suffers from droughts once in every three years (Singh and Ballabh, 2004).

[7] Personal communication with Dr. P.K. Mishra, Additional Secretary (CS), Ministry of Home Affairs, Government of India, New Delhi.

[8] We visited two Ahmedabad-based NGOs, namely, UNNATI, and the Disaster Mitigation Institute (DMI), two GOs, namely, the Gujarat State Disaster Management Authority (GSDMA), Gandhinagar, and the National Institute of Disaster Management, New Delhi. Besides, personal meetings and discussions were also held with Shri Ashok Kumar Rastogi, Secretary (Border and Disaster Management), Dr. P.K. Mishra, Additional Secretary (CS), (Formerly CEO, GSDMA), and Shri Saroj Kumar Ojha, Deputy Secretary (Disaster Management), all from the Ministry of Home Affairs, Government of India, New Delhi.

In this section, we briefly define the terms, disaster and crisis, and present a generic and a specific classification of disasters. This would help avoid any confusion subsequently about the meaning of these terms.

2.1 Concepts and Connotations of Disaster and Crisis

In common parlance, the terms, disaster and crisis, are used interchangeably, or synonymously. But strictly speaking, they have different meanings. According to the New International Webster's Comprehensive Dictionary of the English Language, the term, disaster, means " crushing misfortune, a calamity, a terrible accident", and the term, crisis, means " a turning point in the progress of an affair, or a series of events, critical moment". In this paper, we shall use these two terms to connote these meanings. However, we would like to highlight the point that an event becomes a disaster only if and when it results in substantial loss of life and / or property and a disaster becomes a crisis when the extent of damage done by it is well beyond the capacity of the victim to withstand it and the victim is almost at the breaking point. We would like to illustrate these distinctions with the help an analogy with the patient of a terminal disease , say, cancer. A person may be suffering from a cancer but unless it is diagnosed as cancer, it is neither a disaster, nor a crisis. But after it is diagnosed as cancer, it may be called a disaster, threatening the survival of the patient and when it has reached a critical stage which might eventually culminate in the death of the patient, it is a crisis. However, there are no objective criteria for determining whether an event is a disaster, or a crisis. Conventionally, *annawari* system is used for assessing the severity of droughts through personal inspection of crops by local revenue department officials with a view to assess the extent of damage done due to the drought. The procedure involved is very lengthy and cumbersome. It involves some 25 steps and is prone to bureaucratic delays and political manipulations (Singh and Ballabh, 2002). In the case of floods, aerial surveys are undertaken by the authorities concerned to assess the extent of damage done. In cases of other disasters, teams of officials of the nodal ministries concerned visit the disaster –affected areas and assess the extent of losses. There is need to evolve objective methods of damage assessment.

2.2 A Generic Classification

Disasters and crises are generally classified as natural and man-made. Natural disasters and crises are caused by such natural phenomena as floods, droughts, cyclones, land slides, and so on, where as man-made disasters and crises are the consequences of human actions, and include road, rail, and air accidents, industrial accidents, strikes, civil violence, and wars (Figure 1).

New man-made disaster threats that have developed, particularly since World War II are far more destructive in their potential than the traditional threats (Narayan, 200: 71-72). Increased social violence including trans-border terrorism has drastically affected many nations and communities. Threats from industrial accidents, such as the Bhopal gas leakage in 1984, production, transportation and dumping of hazardous materials and substances endanger unprotected and unaware people. Atomic and nuclear sources pose yet another threat. The possibility of use of nuclear weapons has added a new dimension to the problem of disaster management and mitigation.

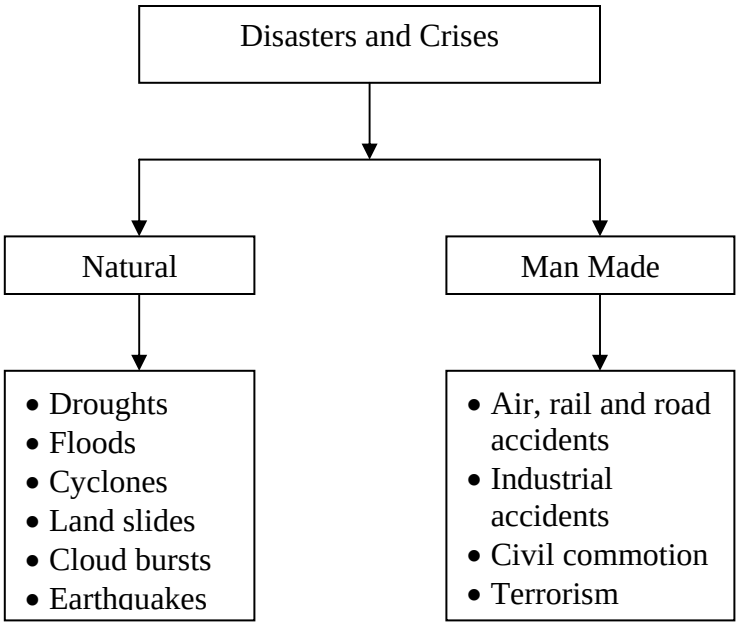


Figure 1: A generic classification of disasters

2.3 Classification by the High Powered Committee

The HPC (GOI, 2001: 71) has identified 31 disasters and classified them into the following five groups:

I. Water and Climate-related Disasters

1. Floods and drainage
2. Cyclones
3. Tornadoes & hurricanes
4. Hail storms
5. Cloud bursts
6. Heat wave and cold wave
7. Snow avalanches
8. Droughts
9. Sea Erosion
10. Thunder and lightening

II. Geological Disasters

1. Land slides and mud flows
2. Earthquakes
3. Dam failures / Dam Bursts
4. Mine fires

III. Chemical/Industrial/Nuclear Disasters

1. Chemical and industrial disasters
2. Nuclear disasters

IV. Accident-related Disasters

1. Forest fires
2. Urban fires
3. Mine flooding
4. Oil spills
5. Major building collapses
6. Serial bomb blasts
7. Festival related disasters
8. Electrical disasters and fires
9. Air, road and rail accidents
10. Boat capsizing
11. Village fires

V. Biological Disasters

1. Biological disasters and epidemics
2. Pest attacks
3. Cattle epidemics
4. Food poisoning

3. Current Policies and Strategies

In this section, we briefly trace the historical evolution of disaster management policies and strategies in India and then describe the salient features of current policies and strategies.

3.1 The Historical Backdrop

Government intervention in the form of relief measures in the years of droughts and famines has a long history in India going back to the late 19th century, when the then British Government of India formulated a Famine Code specifying what is to be done by whom and under what circumstances. Following the Famine Code, every State (then Provincial) government formulated its own relief manual. The relief manuals of the states provide for provision of employment or relief only on a spasmodic basis. Yet even the colonial rulers recognised that there was a continuum of agricultural distress and that the timing of such intervention could not be accurately determined. They specified that this distress directly related to the fact that the wages offered did not command the purchasing power necessary for the sustenance of the affected people. They acknowledged that the present system of relief could only be looked upon as a temporary measure, which would have to be set aside later and replaced by more systematic measures. However, the ad hoc nature of relief has persisted. Since the Indian state provides no social security or unemployment relief, the official declaration of drought or flood continues to be the sole means of mitigating their harmful effects.

3.2 Current Policies and Strategies

In the post-independence era, until recently, disaster management was considered as a post-disaster activity, focusing mainly on rescue, relief, and rehabilitation. In the recent past, there has been a paradigmatic shift in India's approach to disaster management. The new approach is multi-sectoral, multi-disciplinary, holistic and proactive, and disaster management is now sought to be built into the development planning process itself. As it is the poor and under-privileged, who are most vulnerable to disasters, and hence are worst affected by them, the strategy is pro-poor. This new approach has been incorporated into a National Disaster Framework, or a Road Map, prepared by the Natural Disaster Management Division of the Ministry of Home Affairs (MOHA). The Framework is comprised of the following eight components: (i) institutional mechanisms; (ii) disaster mitigation / prevention; (iii) legal / policy framework;(iv) preparedness and response; (v) national network of emergency operation centres; (vi) early warning systems; (vii) human resource development and capacity building; and (viii) research and knowledge management. The MOHA has advised all the Central government and State government ministries / departments to prepare their own road maps following the National road Map as per the broad guidelines. In order to institutionalize the new approach, the GOI has decided to frame a National Policy on Disaster Management and accordingly a draft policy has been formulated and is expected to be promulgated soon (GOI, 2004 :1 & 5).

However, despite its importance, the subject of disaster management does not find any mention in any of the three lists included in the 7th Schedule of the Constitution of India, i.e., List I: the Union List, List II: the State List, and List III: the Concurrent List. As per Entry 97 of the Union List, the Union government should deal with this subject. However, in practice, it is a state subject. In view of this dichotomy, a lot of confusion exists when it comes to pinpointing specific responsibilities for dealing with various problems. Recently, the Constitutional Review Committee has recommended that disaster management be included in the Concurrent List of the Constitution (List III).

Besides, there is no specific legislation to provide an appropriate legal framework for disaster management, and the existing codes/regulations are not enforced strictly and the adoption of various standards and guidelines is not mandatory. In view of this, it is necessary to review the existing laws/codes/regulations relating to various aspects of disaster management and evolve a

suitable mechanism for their strict enforcement preferably through a Central Act and State Acts as recommended by the High Powered Committee on Disaster Management (GOI, 2001)[9].

Furthermore, there is no integrated programme for disaster management. What we have is an assortment of several projects and programmes that aim at reducing the vulnerability of people to disasters. Some of those programmes are: Integrated Rural Development Programme (IADP), Drought Prone Area programme (DPAP), Integrated Wastelands Development Programme (IWDP), Desert Development Programme (DDP), Flood Control Programmes, National Afforestation and Eco-development Programme (NA&ED), Accelerated Rural Water Supply Programme (ARWSP), Indra Awas Yojana (IAY), National Agricultural Insurance Scheme, Crop Insurance Scheme, Sampoorna Grameen Rozgar Yojana (SGRY), and Disaster Risk Management Programme. Most of these programmes have the rural poor as their main target group and hence they may be called pro-poor.

Until recently, disaster management was not conceptually linked with developmental planning in India. It was only in the 10th Five Year Plan that it was mainstreamed into the planning process and a separate chapter on Disaster Management was included in it. But even now, there is no long-term strategy for mitigation and development of hazard prone areas for disaster reduction. The Eleventh Finance Commission has suggested that this task needs to be addressed by the Planning Commission, which in consultation with the state governments, and the concerned ministries of Government of India should identify works of capital nature to prevent the recurrence of specific calamities, to be financed under planned funds.

4. Effects and Impacts of Disasters

Natural and man-made disasters cause enormous loss of life and property every year in India. Floods, droughts, cyclones, earthquakes, and land slides have become recurrent phenomena and also strikes, *bandhs*, and civil commotion. Disasters have several physical, economic, social, and environmental effects and impacts and cause immense misery to people and animals living in the hazard-prone areas. Some of the major effects and impacts of disasters are briefly discussed in the following paragraphs:

4.1 Physical and Biological Impacts

Droughts evoke scenes of men and women with worn faces, dying animals, wilting crops, parched fields and dried up rivers and lakes, and floods cause water-logging of crops in low lying areas, collapse of buildings and bridges, disruption of road and rail traffic, breaches in dams and canals, pollution of water bodies, and the consequent water-borne diseases. In the decade, 1990-2000, on average, 4,344 people lost their lives and 30 million people were affected by disasters in India every year (GOI 2004:1). Tables 1-4 present estimates of physical and economic losses due to natural disasters for selected years (GOI, 2004:34-35).

At an disaggregated level, an idea of the types and extent of losses caused by cyclones and floods could be had by looking at the Orissa Cyclone (1999) and Bihar floods (2004) figures presented in Annexure Tables 1 and 2 respectively. The Cyclone affected almost all the coastal districts of Orissa and a few inland areas also. It is estimated that some 166.69 lakh people were affected by the cyclone (Table 4). Similarly, in the 2001 Gujarat Earthquake, more than 14,000 lives were lost, 10 lakh houses were damaged and the assets worth Rs. 15,000 crore were damaged / lost (GOI, 2004:33). The Bhopal gas leakage in 1984 - a chemical disaster- took away 16,000 lives, and affected almost two lakh people (Panigrahi, 2003:1).

[9] The Committee was set up in August 1999 by the Department of Agriculture and Co-operation, Ministry of Agriculture, Government of India, New Delhi, with the approval of the Prime Minister of India. In its Interim Reports I and II, it has proposed, *inter alia*, the draft of a National Act, and a model State Disaster Management Act.

Table 1 : Damages due to natural disasters in India, 1985-2001

Year	People affected (Lakh)	Houses & buildings, partially, or totally damaged (Lakh)	Value of property damaged/lost (Rs. Crores)
1985	595.6	24.50	40.05
1986	550.0	20.49	30.74
1987	483.4	29.19	2.57
1988	101.5	2.43	40.63
1989	30.1	7.82	20.41
1990	31.7	10.20	10.71
1991	342.7	11.90	10.90
1992	190.9	5.71	20.05
1993	262.4	15.30	50.80
1994	253.3	10.51	10.83
1995	543.5	20.88	40.73
1996	549.9	23.77	50.43
1997	443.8	11.04	n.a.
1998	521.7	15.63	0.72
1999	501.7	31.04	1020.97
2000	594.34	27.36	800.00
2001	788.19	8.47	12000.00

Source: Annual Reports. Natural Disasters Management (NDM), Ministry of Agriculture as quoted in GOI (2004 : 34)

Table 2: Annual damage due to heavy rains, landslides and floods in India, 1999-2001

S No.	Year	Districts affected	Villages affected (No)	Population affected (Lakh)	Crop area affected (Lakh Ha.)	Housess damaged (No.)	Loss of human life (No.)	Loss of cattle	Estimated value of damages to houses (Rs., In Crore	Estimated value of public properties damaged (Rs. In crore)
1.	1999	202	33,158	328.12	8.45	884,823	1,375	3,861	0.72	
2.	2000	200	29,964	416.24	34.79	2,736,355	3,048	102,121	531.25	389.72
3.	2001	122	32,363	210.71	18.72	346,878	834	21,269	195.57	576.05

Source: Annual Reports. Natural Disasters Management Division (NDM), Ministry of Agriculture as quoted in GOI (2004 : 34)

Table 3: Damage due to cyclone in Orissa in October 2000

Date of occurrence	Total number of districts	Districts affected (No)	Villages affected (No.)	Population affected (Lakh.)	Crop area damaged (Lakh Ha.)	Houses lost / damaged (No.)	Loss of human life	Loss of cattle (No.)
17-18.10.99	30	4	5181	37.47	1.68	331,580	199	10,578
29-30.10.99	30	12	14,643	129.22	18.43	1,828,532	9,887	444,531

Source: Annual Reports, Natural Disasters Management Division, Ministry of Agriculture as quoted in GOI (2004: 34)

Table 4: Losses due to droughts in India, 1999-2001

Date of	Year	District affected	Villages affected (No.)	Population affected (Lakh.)	Damage to Crop Area (Lakh Ha.)	Estimated vale of (No.)	Cattle population (in Lakh)
1.	1999	125	--	369.88	134.22	6.44	345.60
2.	2000	110	54,883	378.14	367.00	371.87	541.67
3.	2001	103	22,255	88.19	67.44	NA	34.28
	TOTAL	338	77,138	836.21	588.66	378.31	921.55

Source: Annual Reports, Natural Disasters Management Division, Ministry of Agriculture as quoted in GOI (2004 : 35)

In droughts, water bodies including tanks and wells dry up, causing acute scarcity of water. Consequently, the problem of drinking water gets accentuated. For example, as a result of drought of the year 2000 in Gujarat, 25 million people in 9500 villages, four metros, and 79 towns were hit by drinking water scarcity (IRMA – UNICEF, 2000). The animals were the worst affected. In the drought conditions, it is almost impossible to get fodder and water for them. In the recent droughts, for example, thousands of cattle perished in many states because of the deficiency of fodder and drinking water.

India's rural and urban infrastructure including roads has been badly damaged due to disasters over the years and is degrading further with each flood or cyclone. Huge investments in infrastructure are envisaged in the Union Budgets year after year, but there is no provision made for the replacement of the damaged infrastructure.

4.2 Economic Impacts

Natural and man-made disasters cause immense loss of life, property and livelihoods every year. For example, according to an estimate made by the Ahmedabad-based Disaster Management Institute (DMI), India has suffered direct disaster losses of US $ 30 billion over the last 35 years, that is, almost US $ 1 billion a year. On average, almost two per cent of India's GDP is lost in disasters every year (TOI, 2004). A disaster like the Gujarat Earthquake of 2001 or Orissa Super Cyclone of 1999 can slow done the growth rate to up to two percent in the year immediately following the disaster. In droughts, due to the lack of water for irrigation, crops in the field perish, resulting in the fall of the crop production and consequent loss of income to farmers. For example, in Gujarat, an estimated loss of agricultural production worth Rs. 40,000 million during the drought of 2000 was reported (IRMA – UNICEF, 2000:5). There is a large scale destabilization of economy because of the loss of agricultural production and incomes, resulting in the overall fall in other rural economic activities allied to agriculture. The plight of daily wage labourers becomes distressing. According to an estimate made by the DMI based on micro-studies, up to 10 per cent of rural poor suffer the loss of work and employment or assets due to disasters every year in India. And yet, the current employment generation programmes do not directly target the 100 days of employment guarantee to those vulnerable to cyclones, floods or droughts. In the absence of work, they become incapable of even hand to mouth existence. This is evidenced by reports of starvation deaths in print and electronic media from parts of the country hit by droughts. They deserve the highest priority as the target group for provision of employment and institutional credit.

4.3 Impact on Health and Nutrition

We illustrate these impacts drawing upon a study conducted in Gujarat in the drought years of 1999-2000 by IRMA (IRMA-UNICEF, 2000: 56-60). In Gujarat, nearly half of the children aged less than five years are malnourished. The problem is, however, not inadequate food, but inadequate feeding, which is critically linked to drought. Droughts can affect feeding adversely in many ways, e.g., reduced food availability, less time available for food preparation as well as for child feeding, or adult care-providers being away for wage earning. Anemia and Vitamin A deficiency in the children and women are the major micronutrient deficiencies that are precipitated in situations of water scarcity. As these nutrients are found in green leafy vegetables and other protective foods,

water shortage limits their availability. While anemia results from the deficiency of iron, it causes serious health problems. It is directly responsible for predisposing to mortality in women and children. Similarly, Vitamin A deficiency leads to permanent loss of eyesight in children and predisposes them to infections. Vitamin A deficiency, iron deficiency and Iodine Deficiency Disorders are three common micronutrient-related problems in Gujarat, which have critical associations with drought.

Besides irreversible blindness in children, Vitamin A deficiency increases the risk of death due to common childhood illnesses, particularly measles. Prevalence of Vitamin A deficiency ranges from 1.1 % in Surat to 8.6 % in Panchmahals. Children between 6 months and 3 years of age are most vulnerable to it. Foods rich in Vitamin A like green leafy vegetables and yellow fruits (papaya, mango etc) become most scarce during droughts, which may precipitate severe deficiency of this nutrient among children.

During periods of drought, there are greater chances of gastro-intestinal infections. These range from diarrhea, which is often fatal due to consequent dehydration in children, to infections such as typhoid and hepatitis that have serious impact on adult populations as well. Epidemics are a threat during droughts unless meticulous care is taken to ensure that drinking water supply is safe.

To supplement family income during periods of droughts, women engage in wage earning activities that require a lot of physical labour. This puts additional physical strain on women, particularly if they are pregnant. Such women give birth to babies with low birth weight. It is estimated that about one-third of the babies in Gujarat are less than optimum birth weight of 2.5 kg. They are at a greater risk of death in infancy. Thus drought can potentially worsen the situation and thwart efforts to bring down IMR.

4.4 Social Impacts

In the events of droughts and floods, the rural masses, especially the poor, migrate from the hazard-affected areas to nearby urban areas where they are able to mange the food, and water from one or other sources and get some employment. Such seasonal rural-urban migration puts extra pressure on the limited civic amenities available in the urban areas concerned and causes hardships to every body due to the overcrowding. Besides, chances of sexually transmitted diseases and social crime rate also increase. Adverse impacts of droughts and water scarcity are by no means uniform across all socio-economic strata of society. Well-off sections are able to stave off the worst effects of disasters by drawing upon their savings, mortgaging their assets, and borrowing from friends and banks. In contrast, economically poor people are the ones, who are affected most; they have no savings, no assets, and nobody would lend them money.

Inequalities also exist in the access to public water systems in urban areas. Such inequities widen in drought years. In Rajkot, for example, in the drought year of 1999, people of upper class societies managed to get 84 litres pr capita per day (lpcd) of water, 30% of which was from private water tankers. On the other hand, the slum dwellers dependent on Municipal tankers had to manage their domestic needs with just 19 lpcd (IRMA-UNICEF, 2000:64).

Water scarcity also results in competition for and conflicts over water - between states (eg. Karnataka and Tamil Nadu), towns and villages, the rich and the poor, and industry and agriculture. In many parts of Gujarat, conflicts between farmers and urban dwellers over the re-allocation of water from irrigation reservoirs have in the recent times become more frequent, intense and occasionally violent (Ballabh and Singh 1997 and Ballabh 2002).

4.5 Ecological / Environmental Impacts

In Orissa, soon after the Super Cyclone, the entire sea coast was adversely affected by high sea tides, flooding the cropped area and depositing salts on good fertile soil. Floods cause increased erosion of soils and siltation of river beds and reservoirs, reducing their capacity to store water, and thereby increasing the incidence of flash floods. Among the major ecological effects of droughts

are decreased scrub growth, increased desertification, reduction in forest area and wet land and loss of mangroves. Among the ecological changes, the desertification cycle is of utmost concern. The impact of droughts and floods cannot be assessed on the basis of the economic loss alone. Many of the social and the ecological/environmental damages caused by them are irreversible, and their impacts remain for years together.

5. Coping Mechanisms Adopted by Various Agencies : A Critique

While thinking about effective ways and means of managing disasters, it should be clearly understood that it may not be possible to prevent the occurrence of natural disasters. In view of this, measures need to be directed at reducing their impacts.

There is a wide range of strategies adopted by GOs, and NGOs in India to cope with the problems caused by disasters. In this section, we briefly describe the strategies used by the GOs and some of the reputed NGOs.

5.1 Strategies and Mechanisms Adopted by GOs

Now, there exists an institutional mechanism for disaster management in India at both the Centre and the State levels. We now briefly describe the governmental institutional mechanism and the measures taken by the Central and State governments to cope with the problems of disasters.

5.1.1 The National Level

At the national level, the Ministry of Home Affairs (MOHA) is the nodal Ministry for all matters concerning disaster management, excepting drought management, for which the Ministry of Agriculture is the nodal Ministry[10]. The Central Relief Commissioner (CRC) in the MOHA is the nodal officer to coordinate relief operations for natural disasters. Besides, a National Crisis Management Committee (NCMC) under the chairmanship of Cabinet Secretary has also been set up in the Cabinet Secretariat. This Committee comprises the Nodal Ministry and other support Ministries; the Secretary to Prime Minister; Secretaries in the Ministry of Home Affairs, the Ministry of Defence, and the Ministry of Agriculture; Director, Research and Analysis Wing and Director, Intelligence Bureau and an officer of the Cabinet Secretariat. The Secretary, MOHA is responsible for ensuring that all disaster-related developments are brought to the notice of the NCMC promptly. The prime responsibility for handling different disasters has been assigned to Nodal Ministries according to disaster types (Table 1).

A Crisis Management Group (CMG) has been constituted in the MOHA under the chairmanship of CRC. NCMC gives direction to the CMG and all other Ministries/ Departments/ Organisations concerned, as and when deemed necessary, and monitors all disaster-related operations in the country. The nodal officers from various ministries concerned and representatives of other concerned departments are the members of the CMG. The main functions of the CMG (GOI, 2004:2) are to:

- Review every year contingency plans formulated by the Central Ministries/Departments/ Organisations and the measures required for dealing with natural disasters;
- Co-ordinate the activities of the Central Ministries and the State Governments in relation to disaster preparedness and relief; and
- Obtain information from the nodal officers on measures relating to the above.

Table 5 : Nodal ministries responsible for disaster management in India

Type of Disaster	Nodal Ministry
Civil strife and natural disasters except droughts	Ministry of Home Affairs
Railway accidents	Ministry of Railways
Air accidents	Ministry of Civil Aviation

[10] There are 23 GOI Ministries / Departments/ Organizations concerned with primary and secondary functions relating to management of disasters (GOI, 2004:2).

Biological disasters	Ministry of Health
Chemical disasters	Ministry of Environment & Forests
Nuclear disasters	Dept. of Atomic Energy
Droughts	Ministry of Agriculture

Source: GOI (2004:35)

A Control Room (Emergency Operations Room) has been set up in the MOHA to assist the CRC in the discharge of his functions. A National Contingency Action Plan (NCAP) has also been formulated by the MOHA for dealing with contingencies arising in the wake of natural disasters. It facilitates the launching of relief and rescue operations and identifies the initiatives to be taken by various Central Ministries/Departments in the wake of natural calamities, sets down procedures and determines the focal point in the administrative machinery. Every State / Union Territory has its own Relief Manual /Code that lays down the procedures, and specifies the powers for emergency management and provision of relief along with allocation of resources on regular basis.

Following one of the recommendations of the 11th Finance Commission, a National Institute of Disaster Management has been set up in New Delhi under the MOHA. Its main functions are to provide policy support to the GOI in matters of disaster management, to monitor and document all types of natural disasters, including calamities of rare severity, to build the capacity of all the key role players, and to network and liaise with national and international agencies engaged directly, or indirectly in disaster mitigation and management.

5.1.2 The State Level

As per List II (The State List) of the Constitution of India, management of disasters is the responsibility of the State concerned. At the State level, disaster management is handled by the Departments of Relief and Rehabilitation (DORR). The GOI is now working with the State governments to convert the DORR into Departments of Disaster Management (DODM) with an enhanced area of responsibility to include mitigation and preparedness, apart from their present responsibilities of relief and rehabilitation. As of February 2004, eight of the State governments had already created DODM and the others were in the process of doing so. The States have also been advised by the MOHA to set up State Disaster Management Authorities (SDMAs) under the chairmanship of their Chief Ministers with Ministers of relevant Departments as members and to enact Disaster Management Acts. The main objective of SDMAs is to mainstream disaster management into the development programmes of the States and to ensure the adoption of a holistic and multi-disciplinary approach to disaster management. A few of the States including Gujarat and Orissa have already set up the SDMAs and Gujarat and Madhya Pradesh have also enacted the legislation and the others are in the process of doing so[11]. Besides, State Crisis Management Committees have been set up in all the States under the chairmanship of Chief Ministers concerned and a Control Room established in each of the States under the charge of the State Relief Commissioner concerned. Like the National Contingency Action Plan, State Contingency plans are prepared at the state level also for responding to natural calamities.

5.1.3 The District and Lower Levels

At the district level, the Collector co-ordinates the relief and rehabilitation activities in accordance with the provisions of the Relief Manual of the State concerned. When a disaster occurs, the entire machinery of the district including officers of technical and other departments take immediate action. District Disaster Relief Plans (DDRP) are also prepared, which entrust specific tasks to various agencies at the district level to undertake actions. The existing District Coordination and Relief Committees are being converted into District Disaster Management Committees with representatives of district level development departments added to them. Each district is expected

[11] For example, Gujarat State Disaster Management Authority (GSDMA) was created on 8 February 2001. GSDMA is registered as a 'Society' under the provisions of the Societies Registration Act and the Bombay Public Trust Act. Gujarat State Disaster Management Act was passed in April 2003 to provide statutory and legal status to GSDMA.

to prepare a long term disaster mitigation plan, besides drawing up preparedness and response plans as at present.

Block / taluka level Disaster Management Committees (DMCs) are also proposed to be set up in 169 multi-hazard prone districts in 17 States. At the village level also, in these 169 districts, DMCs and Disaster management Teams have been constituted in a large number of villages. Each village will have a Disaster Management Plan (GOI, 2004:4-5).

5.2 The Funding Mechanism

Now India has a well defined policy and funding mechanism for providing relief assistance to the victims of disasters. The policy and funding mechanism are reviewed by the Finance Commissions appointed by the GOI every five years. On the recommendations of the 9th Finance Commission, a Calamity Relief Fund (CRF) was established separately for each state to undertake relief and rehabilitation measures. CRF is allocated to each state on an annual basis and is released in four installments. The Central Government contributes 75% of the CRF and the remaining 25 % is contributed by the State government concerned. Also, for assistance to the states affected by natural calamity of rare severity, the 10th Finance Commission had recommended setting up of a separate Central Fund, "National Fund for Calamity Relief (NFCR)" under the Ministry of Agriculture. However, the 11th Finance Commission has recommended the discontinuation of NFCR in view of the difficulty in evolving an unambiguous definition of calamity of rare nature, and the difficulty in providing adequate financial assistance to the states from the limited amount available in the fund. Instead, it has recommended the creation of a National Calamity Contingency Fund (NCCF) with an annual contribution of Rs. 500 crore by the Centre and further augmentation by way of surcharge on central taxes (Sharma 2003:6).

5.3 Specific Measures taken by GOs

Recently, the GOI and a few state governments has taken several initiatives for mitigating disasters (GOI, 2004: 7-19). In the Union Budget 2004-2005, there is a statement about the risks involved in agriculture and need for policy measures to reduce it. And three of the Government of India - sponsored pilot schemes, namely, the National Agricultural Insurance Scheme, the Farm Income Insurance Pilot Scheme and the Weather Insurance Scheme are a welcome step in mitigating the impacts of droughts and floods on rural population. Similarly, the national scheme to build water harvesting structures, with 50 per capital subsidy is also a good step in the direction of drought mitigation and so also the provision of Rs. 30 crore in the Union Budget 2004-2005 for flood control in Assam, West Bengal, Bihar and Uttar Pradesh. However, India's vulnerability to disasters and the consequent risks need to be recognised in India's development policies and plans and an institutional structure should be created at the national and state levels for mainstreaming disasters into development planning process and for monitoring and evaluation of such pilot schemes and for their expansion to other areas.

In order to increase public awareness and knowledge, efforts have been made to integrate disaster management as a part of curriculum at various levels of school education and engineering/technical institutions. Initiatives are also being taken to involve media, both print and visual for increasing public awareness, social preparation and long-term disaster mitigation and preparedness in the country.

Initiatives are also being taken to network all training institutions/organisations offering training in disaster management in the country as well as to formulate a national strategy for disaster management.

Bilateral agreements with some countries have been proposed for emergency response. In order to enhance the emergency response capability, particularly in the specialized search and rescue, medical First-Aid response, and hospital preparedness, a programme called "PEER" is being implemented with the aid of the United States of America (USA). The main objectives of the programme are to: (i) improve the search and rescue capability and performance of first responders from Government and NGOs; (ii) enable the first responders to effectively assess, treat and

transport victims of a disaster; and (iii) plan for undertaking and managing effective search and rescue operation and also enhance the preparedness level of hospitals in a disaster situation.

In addition, a proposal for raising a Specialized Disaster Response Unit (SPRU) is under consideration of the GOI to reinforce the resources of state governments and the nodal ministries to respond with specialized resources in case of an unprecedented disaster event.

India is now a member of the Asian Disaster Reduction Centre, Japan; Asian Disaster Preparedness Centre, Bangkok and has joined the United Nations Disaster Assessment and Co-ordination (UNDAC). Besides, efforts are also being made to have regular interaction with other leading institutions/organisations working in the various fields of natural disaster reduction in different countries.

All that the government has done so far and proposes to do in future seems to be impressive on the face of it. However, one is tempted to ask this question: How far has the State been successful in performing the critical function of disaster managemnt? Bhopal (1984), Andhra Cyclone (1990), Latur (1993), Jabalpur (1997), Orissa Cyclone (1999) and Gujarat Earthquake (2001) have all shown that government has not been able to effectively manage the post- disaster situation. Annual recurrence of major disasters also highlights that government do nothing worthwhile in the peace time to prevent or mitigate the disasters. Many times the golden rule is: call the army. Civil administration must be trained to handle the disaster situation on its own (Kanwar, 2001: 104).

5.4 Strategies and Measures adopted by NGOs

In addition to the governmental organisations, a multitude of other non-governmental national and international agencies also complement and supplement the efforts of the government in emergency situations created by disasters. We now briefly describe some of the measures taken by a few reputed NGOs for reducing the vulnerability of people to natural disasters in their project areas and to provide relief to the victims of disasters.

In the wake of Super Cyclone of Orissa (1999), 35 Indian NGOs and 11 international NGOs/ donors were engaged in distributing the relief materials to the victims of the Cyclone. Table 6 presents the details of the relief measures undertaken by the international NGOs.

Table 6: Measures/activities undertaken by various international in the Super Cyclone affected regions of Orissa

Agency	Parters	Activities
Action Aid	Action Aid works both directly operationally and with a number of local partner NGOs, the key one being BGVS	Relief: Communications (HAM Radio operators) • Health : 40,000 families • Food supplies • Psycho-social interventions Rehabilitation: • Food For Work &Livelihood Restoration • Community Shelter & Shelters for Widows & Orphans (Mamata Gruhas) • Advocacy & Legal Aid • Water & Sanitation
BRCS	IFRC Indian Red Cross	• Food, Shelter, Materials, & Blankets for 50000 families • Shelter-25,000 families • Housing Programme
CAFOD	Caritas India	• Livelihood Programme-Supply of 170 boats for constructions of low cost houses
CARE UK	Some supplies channelled through Govt. of Orissa & ODMM. DEC funding Fishing Programme implemented directly	• Food-100,000 Families for 15 days • Rehabilitation – seeds & tools supplied through ODMM • Supply of boats and nets for fisherman • Housing programme planned but not implemented
Christian	Gram Vikas, Awareness	• Relief: food, clothing, shelter materials distributed by 4

Aid	VHAI, Prepare	NGO partners. Rehabilitation: • Water supply & irrigation • Livelihood restoration • House reconstruction using loans
Concern	Concern worked with 6 local NGOs including ODMM & SHEDS	• Food & shelter materials for 34,129 families • Other relief items for further 10,000 families • Rehabilitation- capacity building, credit & income generation programmes with 6 NGOs
Help the Aged	Help Age International (HAI) India Partner Help the Aged India Worked through 7 different local NGOs	• Immediate Relief – food, plastic sheeting & blankets to 5,000 people for 15 days • 2 mobile Health Units-Emergency medicines to 100-150/people days • Food, health and house hold items- supply for vulnerable older persons for 130 days (until 23/4/00) • House repairs for 4,100 people.

Agency	Partners	Activities
OXFAM	Worked both directly operationally & for both Relief and Livelihoods Restoration Programme through 45 local NGO	• Relief distribution -food packages and survival kits to 50,000 families in short term (1 month) • Shelter materials • Water and Sanitation, Health/Hygiene-promotion, training and protection of public health status for 250,000 people • Advocacy • Supply of vegetable & winter crop seeds • Cash for work scheme for 18,000 households • Other livelihood support for further 15,500 households.
SC(UK)	PREM in collaboration with 5 local NGOs	• Food and Non- food Relief-plastic sheeting and clothing to 100,000 people • Grain banks & food for work • Education—reconstruction/repair of schools, educational materials etc • Research & advocacy on child protection issues
Tear Fund	EFICOR, EHA, SHALOM The discipleship centre	• Food • Non-food relief –cooking utensils, clothing, anti-diarrheas, disinfectant & blankets • Medical Teams-assistance to 5,000 families • Food for Work-rehabilitation of housing/and desalinating irrigation ponds.
World Vision	Operational Agency	• Shelter materials (asphalt roofing sheets) & food for 5,000 families • Utensils & clothing for 20,000 families • Medical supplies & services

Source: Panigrahi (2003 : 10-11)

Similarly in the case of Gujarat Earthquake of 2001, more two dozen NGOs were engaged in providing relief to the victims of the quake. Their activities were coordinated by the Gujarat State Disaster Management Authority (GSDMA) at the State level and by a federation of NGOs – ABHINAVA- at the local (Bhuj) level[12]. SEWA – a reputed NGO based in Ahmedabad, Gujarat - has launched a comprehensive project, Livelihood Security for Earthquake Affected Rural Households in Gujarat with financial assistance from the International Fund for Agricultural Development (IFAD). The project has several components such as disaster preparedness and mitigation, drought proofing and diversification of livelihoods, rural craft production and marketing, social development, micro finance services, and capacity development. The Project has had a very positive impact in the area and has substantially enhanced the capacity of its target group, mainly poor women, to

[12] Personal communication with Shri V.Thiruppugazh, IAS, Joint CEO, Gujarat State Disaster Management Authority.

cope with the problems of droughts and earthquakes[13]. Similarly another NGO, UNNATI, undertook many activities including organizing poor women and building their capacity to cope with the problems created by the earthquake[14].

In the years of severe droughts of 1986-1998 in Gujarat, several NGOs including SEWA, and Aga Khan Rural Support Programme (India) undertook several activities to provide succour to the drought-affected households. Their activities included setting up and operating fodder banks, cattle camps, supply of water through tankers, and so on.

NM Sadguru Foundation for Water and Development – a reputed NGO based in Dahod, Gujarat - has done pioneering work of drought proofing in semi-arid areas tribal areas of Gujarat, Madhya Pradesh and Rajasthan (Singh and Gupta, 1998). In a nutshell, there are umpteen examples of good work done by NGOs in India to help the victims of disasters. In most of the cases, NGOs are the first ones to arrive at the scene and provide immediate to victims of disasters and crises.

6. Technological and Institutional Innovations for Disaster Management

GOs and NGOs in India and in other countries of the world have adopted several innovative technologies and institutional mechanisms to mitigate the adverse effects of disasters and crises. However, at a given point in time, there is a wide gap between the availability of best practices and technologies and their actual use at the grassroots level in various regions of India. In addition, allured by the modern technology, people are gradually drifting away from the time-tested low-cost indigenous practices for countering disasters. What is needed is an eclectic approach to choose a mix of appropriate modern and traditional / indigenous technologies and institutional mechanisms for disaster management. In this section, we try to identify and briefly describe some of the technological and institutional innovations adopted by GOs and NGOs for managing disasters and crises.

6.1 Scientific and Technological Innovations

There are many scientific and technological innovations that are now widely used in India and other countries for forecasting natural disasters and mitigating their harmful effects. The technological innovations include hazard mapping, hazard-resistant construction technologies, elaborate cyclone detection/tracking system, flood forecasting/ warning systems, space technologies for monitoring and assessment of impact of natural hazards, drought monitoring systems, and appropriate cropping systems.

There are many reputed research and development organisations in India that are engaged in developing appropriate technologies for disaster prevention and mitigation. Their expertise and research outputs are being utilized for the benefit of the common man and vulnerable sections of the society. For example, Indian Meteorological Department (IMD) is mandated to monitor and issue warnings regarding tropical cyclones. The monitoring process has been revolutionized by the advent of remote sensing techniques (Singh, R.B., 2000: 12-15). Satellite-based observations are now being used extensively for forecasting and monitoring of cyclones. Commercial jet aircraft equipped with the Aircraft Meteorological Data Relay System are also being increasingly used for data collection. The data so collected are used by the IMD for analysis and forecasting. Cyclones Detection Radars are also being used for providing useful information about storms. Recently, the IMD has improved its earlier two-stage warning system by adding two more stages – the Pre-Cyclone Watch and the Post-Landfall Scenario. The improved system is very useful for administrators and crises managers (GOI, 2004:7). Similarly, the Central Water Commission has developed a system of flood forecasting and warning. Its network of flood forecasting stations now

[13] Personal communication with Ms. Reema Nanavaty, Project Director, Livelihood Project, and personal observations of Dr. Katar Singh as a Member of the State level Project Advisory Committee, Livelihood Project.
[14] Personal communication with Ms. Alice Morris, Programme Coordinator, UNNATI, Ahmedabad.

covers all the major flood-prone inter-state river basins in the country. All these development have made disaster management easier and cost-effective.

6.2 Institutional Innovations

The institutional innovations include the national- and state-level mechanisms for disaster and crises management, revision of relief codes / manuals, preparation of guidelines for construction of hazard resistant buildings as per the norms prescribed by the Bureau of Indian Standards (BIS), preparedness guidelines, modernisation of control rooms, human resource development, capacity building of non-governmental organizations (NGOs) and community-based organizations (CBOs), and development of a Disaster Warning System for rapid and direct dissemination of warning through satellite.

The MOHA has prepared a framework for disaster management and has initiated several actions for mitigation, preparedness, response and rehabilitation. Keeping in view the need for creating a cadre of trained professionals for disaster management, the National Centre for Disaster Management has been upgraded and renamed as the National Institute of Disaster Management. Disaster Management Cells have been established in 29 Administrative Training Institutes (ATIs) in 28 States and Advisory Committees have been constituted under their Relief Commissioners for their operation. Their main objective is to build disaster management capacity of governmental organizations (GOs) and NGOs through training.

Furthermore, disaster management has now been mainstreamed into the India's development planning process. As stated earlier in this paper, the Tenth Five Year Plan has a detailed chapter on Disaster Management. The plan emphasizes the fact that development cannot be sustainable without mitigation of disasters through appropriate public interventions. It is expected that each of the States would prepare a plan scheme for disaster mitigation in accordance with the approach outlined in the Tenth Plan. Besides, the 12th Finance Commission has been mandated to estimate the requirements of funds for mitigation and prevention of disasters, apart from those of relief and rehabilitation, and make suitable recommendations. The GOI have also issued guidelines that projects designed to address mitigation of disasters will be given a high priority and that each project in a hazard-prone area will have disaster prevention / mitigation as a term of reference (GOI, 2004:11).

6.3 Use of Indigenous Knowledge

India, being one of the oldest civilizations in the world, has a huge stock of knowledge relating to forecasting of disasters and coping with their adverse effects. This knowledge has evolved, developed and accumulated indigenously over thousands of years, and has been handed down from one generation to the next. To be precise, there are many indigenous methods of forecasting monsoon rains, storms, and earthquakes rooted in astrology, and folklores, and rituals including *yagnas* and chanting of *mantras* for minimizing the adverse effects of natural disasters (Pilgrim, 2000: 34-36). There are references to such rituals in the *Vedas* – the oldest store house of knowledge. People living in remote rural areas of India still believe in and follow those methods and rituals. Some of the indigenous methods have been found to be having scientific bases also and hence need to be used in conjunction with the modern methods. For example, there are many indigenous breeds of cattle which can thrive in very harsh climatic conditions such as those prevailing in Rajasthan desert on very low levels of nutrients and produce reasonably good quantity of milk. Similarly, there are many crop varieties which are drought-and pest-resistent and which can withstand floods and high levels of salinity. We need to conserve and propagate such breeds of animals and varieties of crops through a national policy.

7. Convergence and Coordination of Disaster Management Programmes

Disaster management is an important issue that cannot be addressed by one agency, technology or institution alone. It calls for convergence of technologies and institutions with the goal of fulfilling the various dimensions such as timeliness, accuracy, scope and coverage, formats and standards to match the user needs and finally assimilation of information for decision-making. In view of this,

the HPC has laid emphasis on multi-disciplinary, multi-sectoral and multi-hazard approaches to disaster management (GOI, 2001). This is evidently because disaster management involves a large number of Ministries and Departments at both the Central and the State levels. For example, at the Central level, some 23 GOI Ministries/ Departments/ Organisations are directly, or indirectly involved in disaster management (GOI, 2004:2). In this section, we examine the present state of affairs in matters of convergence and coordination of activities of various GOs and NGOs engaged in disaster management, and suggest measures for better convergence and coordination.

7.1 The Problem

There are numerous governmental and non-governmental, and international and national organisations and agencies directly or indirectly involved in disaster management. At present in most of the States, there is no institutional mechanism to coordinate their activities. This results in avoidable overlaps in their functions and thereby wastage of scarce financial, human, and material resources. Besides, due to the lack of communication and coordination, many of those organizations work at cross purposes and end up undoing what the other organisations are doing or reinventing the wheel as it were, albeit unintentionally. In a poor country like India, this is a criminal waste of money, time, and energy and hence must stop forthwith.

Although, as stated in Section 5 of this paper, an institutional mechanism has been developed and put in place at the national and sub-national levels for coordinating the activities of all the organizations involved in disaster management, effective convergence of various programmes at the grassroots level is not yet actualized. For example, in the case of Bihar floods in 2004, the buck was being passed around from one department to another, with nobody ready to accept the blame of failure of the government to mitigate the problem (see Box 1). Similarly in the case of Orissa Super Cyclone of 1999, besides the Government of Orissa, 35 Indian NGOs and 11 international NGOs/ donors were engaged in distributing the relief materials to the victims of the Cyclone but there was no effective convergence of their programmes (Panigrahi, 2003: 9 & 21). This poses a challenging task of coordination and convergence, when you have so many GOs and NGOs involved in a task. A senior Indian Service Officer of the Government of Gujarat, while lamenting the lack of coordination among government departments, observed " In government, there is no coordination; it is only subordination that works"[15].

7.2 A Possible Solution

In view of the problem stated above, we suggest that the present institutional mechanism set up at the national and state levels could be given a legal sanctity through enactment of appropriate legislation as suggested by the HPC. In the absence of a legal back up, no policy and institutional mechanism for coordination is likely to be successful.

Sincere attempts should be made by the State to de-bureaucratise and de-politicise the processes of State functioning while dealing with disastrous situations. In the disaster management training curricula for personnel of GOs and NGOs, need for and practicable mechanisms of coordination and convergence should be sufficiently addressed. The State Disaster Management Authorities need to be sufficiently empowered to achieve effective coordination and convergence. A good example is furnished by the Gujarat State Disaster Management Authority (GSDMA), which took several pioneering initiatives in securing public-private cooperation in the wake of devastating earthquake of 2001[16].

[15] Personal communication of one of the authors with the officer concerned.
[16] Peresonal communication with Dr. P.K. Mishra, Additional Secretary (CS), MOAH, and Formerly, CEO, GSDMA.

Box 1: Passing the Buck-The Annual Saga of Floods in Bihar

Bihar is facing its annual floods. This is first year after a long time that the ruling combinations at the centre and at Patna are the same. That leads to a funny situation because the blame for floods cannot be passed on to the Centre which is what had been happening in the past. Centre, too, cannot say, at the moment, that it is the State subject and pass on the buck.

Since there is nobody available to pass the buck up on, the State Government accepts its helplessness in the matter that it cannot do anything but to reach relief to the people. The floods have created a situation of reciprocal inaccessibility. The Government cannot reach the people and the people cannot reach the Government.

Quite often, one is told that the Government is helpless in such an extreme situation and what can it do to save the people? Let us see what the helpless Government could have done in that situation and failed to perform and want to get nation's sympathy.

Rashtriya Barh Ayog (National Commission on Floods-1980) had given 207 recommendations for improving the flood situation. The government accepted 25 of them (in 1995) and did nothing to implement it.

Blame for floods and breaches in the embankment were first attributed to the holes dug by the rats in the body of the embankments. This hearsay story was ratified in 1968 by the Chief Engineer (Flood Control) of the Central Water Commission, P.N. Kumra, when the Kosi embankment breached near Jamalpur in Darbhanga district in Bihar.

This was followed by passing the buck on to the 'anti-social elements' and then on to Nepal for releasing the floodwaters. This Nepal bogey is so wide spread and deeply entrenched in the minds of the people and media that even the news channel of Aaj Tak (14th July) repeatedly announced that water has been released by Nepal. The other channels are no better either. There are only two control works in the form of barrages, one on the Kosi near Bhimnagar and the other at Valmikinagar on the Gandak. Both these barrages are manned by the engineers of Water Resources Department (WRD) of Bihar Government who draw their salaries from the Government of Bihar and if any water is released, it is the handiwork of Bihar engineers with full knowledge of the WRD Ministry at Patna and with their approval.

The Minister of WRD, Bihar Govt, denied the same that there is no such control and that Nepal could release the water. Obviously Nepal cannot be blamed for this debacle. The politicians, however, either because of their ignorance or willfully, encouraged the Nepal canard to be spread and when the desired results were obtained, they issue mild denials now. Instead of giving lame excuses in its defence, the Government should have evaluated its programmes that the investment in the flood control sector is doing more harm than good and should have taken the corrective measures long back.

For a long time, the people and the legislatures have been demanding that the job of flood control be entrusted to only one department but it is shared between WRD and Revenue Department, the latter being responsible for Maharaji and Zamindari embankments. Since it is not inscribed on the embankments whether it is Maharaji, Zamindari, or the one belonging to the WRD; the passing the buck game is very skillfully played. It was in 1966 that a demand was made in Bihar Vidhan Sabha that the departments are merged so that the people know who they have to contact in case of emergency but it has not been conceded till date. What, other than lethargy and inefficiency, prevents the Government from adopting such simple measures that do not cost anything?

Source: Dinesh Kumar Mishra, DNRM bulletin dated July 28, 2004

NGOs can provide a suitable alternative as they have an edge over GOs for invoking community involvement. Hence the capacity building of NGO's and co-ordination among them at various levels is very crucial. The HPC recommended that there was need for establishing a nation-wide network of NGOs to promote cooperation among NGOs during emergency situations, increase people's capacity to cope with disasters, undertake Panchayat level planning for disaster prevention and mitigation as well as documentation of traditional knowledge to cope with disasters. As a follow-up measure, a nation-wide network of 600 NGOs called “VASUDEVA” (Voluntary Agencies for Sustainable Universal Development and Emergency Voluntary Action) has been established.

In the convergence process, emphasis should be given on rehabilitation packages which must equally restore all livelihood sources like agriculture, irrigation, infrastructure reconstruction, forestry, rebuilding assets of fishing community, and rural artisans.

Now the major challenges that confront us are as follows (Sharma, 2003:141):

- Integration of disaster mitigation and preparedness in development programmes;

- Multi-sectoral / inter-departmental co-ordination and multi-hazard approach of disaster management planning;
- Long-term development plan for the hazard prone areas;
- Regional and international co-operation;
- Community participation at every level of disaster management from decision-making to implementation of programme / project;
- Social preparation through public awareness and community capacity building to cope with the hazards; and
- Reducing dependence on government and building a culture of self-help.

8. A Long –Term Approach to Effective Disaster Management

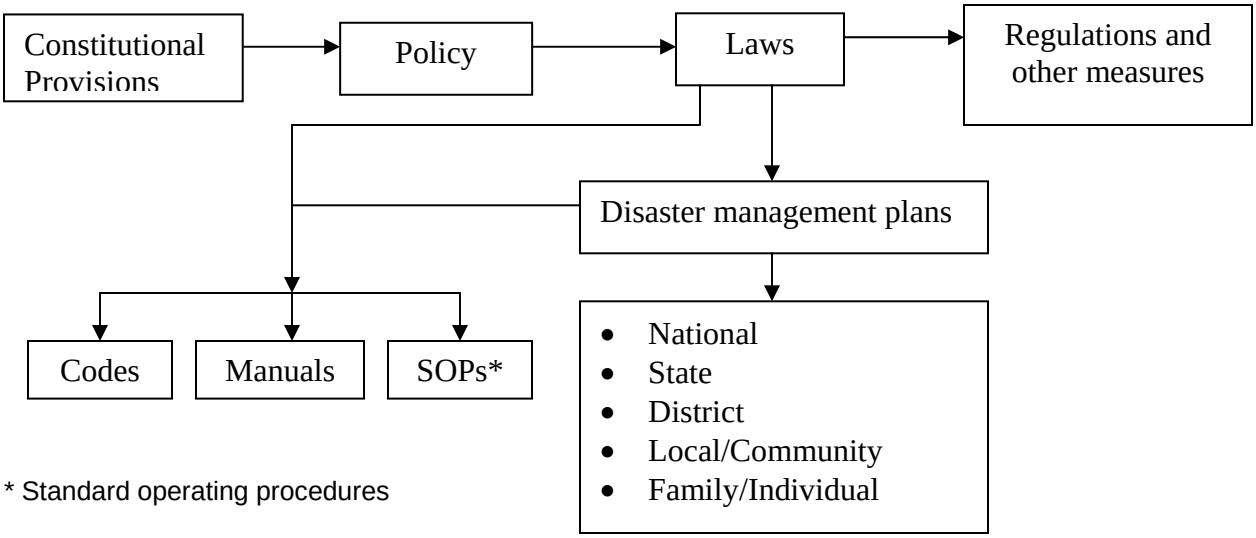
There is no long term national perspective plan yet formulated by the GOI for disaster management. Year after year, whenever a natural, or man-made disaster occurs, government finds itself unprepared to cope with its effects. In its aftermath, every one starts finding fault with government and its policies and programmes and the mishap becomes more of a political issue. Newspapers are full of articles, editorials and special stories for quite some time. TV Channel representatives land up at the mishap sites like vultures and probe into what happened, why, and how, and how many people lost their lives and how many suffered injuries, and so on. But as soon as they get the next big story, they move on. But then this is the character of our media. A sad commentary is that the issues highlighted by the media and others tend to be forgotten soon and no lessons are learnt and institutionalised. Nothing can highlight this tendency better than the national apathy and indifference in the intervening period between Orissa Cyclone of 1999 and the Gujarat Earthquake of 2001.

In this section, we outline and briefly discuss the main elements of a pragmatic strategy for disaster management.

8.1 A Conceptual Framework

Right to life and right to property are two of the fundamental rights enshrined in the Constitution of India. It follows from this that it is the responsibility of the State to provide to its citizens the security of both life and property. As disasters cause the loss of both life and property, it is mandatory for the State to take pro-active measures to prevent, or at least minimise such losses. Therefore, the State is the key actor in disaster management. The State must frame a long-term strategy and should pursue it with appropriate policies, laws, and programmes. Following HPC (GOI, 2004: 68), a conceptual framework based on this thinking is presented in Figure 2.

Figure 2: A conceptual framework for evolving an appropriate strategy for disaster management



* Standard operating procedures

8.2 Ensuring Food Security

This is the most important element of any pragmatic strategy of disaster management. Amartya Sen and Jean Dreza compared the experience of Maharashtra and the Sahelian countries of Africa, both of which were hit by several consecutive droughts in the early 1970s. Food availability (local production plus food brought in) was far lower in Maharashtra than in the Sahel, almost 50 per cent less in one year. Yet, there was no starvation in Maharashtra while people died like flies in the Sahel, where food availability was higher. Why? Because in Maharashtra, the Employment Guarantee Scheme provided income to those in distress, enabling them to buy enough foodgrains to survive. The Sahel had more food but no income for the needy (Anklesaria Aiyar, 2002).

For poor families, household food security can be a threat during droughts and floods. It can be strengthened through a more effective Public Distribution System (PDS), uninterrupted and flexible supplementary nutrition through Intensive Child Development Schemes (ICDS) and creation of food grain banks. Food for work scheme may be linked with food grain banks. Alternative distribution system like "Shakti" packet programme run by an NGO, Self-Employed Women's Association (SEWA) to provide good quality food grains, oil, sugar to needy families at wholesale prices can also be expanded.

Now rural employment schemes have been institutionalised in India as an instrument of poverty alleviation as well as providing relief in times of natural calamities including droughts. Employment schemes are devised to provide employment at the minimum wage to help the needy in times of droughts and other calamities.

8.3 Drought Proofing

In the post-independence era, Drought Prone Areas Programme (DPAP) was the earliest area development programme launched by the Central Government in 1973-74 to tackle the special problems faced by those fragile areas which are constantly affected by severe drought conditions. These areas are characterised by large human and cattle population which continuously exert heavy pressure on the already fragile natural resources base for food, fodder and fuel. The major problems are continuous depletion of vegetative cover, increase in soil erosion and fall in ground water levels due to continuous exploitation without any effort to recharge the underground aquifers. Though the programme has had some positive impact in terms of creating durable public assets, its overall impact in effectively containing the adverse effects of drought was found to be not very

encouraging (GOI, 2002: 114 – 117). Thus, DPAP has not been able to achieve its primary goal of drought proofing.

India now has the requisite technology, manpower, and material resources available for solving this problem. An NGO, the Sadguru Water and Development Foundation based in Dahod, Gujarat, has done pioneering work in designing and building cost-effective small check dams in its project area comprising over 600 semi-arid villages in three western Indian states of Gujarat, Madhya Pradesh and Rajasthan (Singh and Gupta, 1997). This strategy is people centred and community based and seems to be appropriate for replication in other drought prone areas in India. The financial resources required could be mobilised from the on-going programmes.

Deficient rainfall together with the overuse of the groundwater in many semi-arid and hard rock areas has led to the lowering down of water table. This implies that groundwater extraction in those areas exceeds the natural recharge rate. This has not only increased the cost of water extraction from tube wells but also has resulted in the drying up of shallow wells in the areas. In view of this, there is dire need of recharging groundwater aquifers and improvement in the on-farm water management. The extraction of groundwater needs to be regulated by the communities concerned, or water users' associations, wherever they exist. Here again, several innovative methods have been tried by NGOs in Saurashtra and North Gujarat regions of Gujarat. They are cost effective and simple to construct and maintain. They also are suitable for replication in other water scarce areas in India.

Watershed management approach has been found to be the most appropriate strategy for optimum and sustainable use of land, water and other resources in rainfed farming areas. There are many success stories including those of Sukhomajri, Ralegan Siddhi, and PIDOW (Gulbarga), that document how the adoption of watershed approach led to overall development of the watershed and restoration of its natural capital in semi-arid areas of India (Singh, 1995). Improved watershed development technologies are now available with various research institutes in most states in India. Modern techniques are also available for early warning and monitoring of droughts. Some of the techniques are vegetation index map, remote sensing, and Geographic Information System (Singh, R.B., 2000 : 20-22). What is needed is an organisation structure for compiling, collating, screening and releasing new technologies found suitable for adoption by farmers (Singh, 1991).

8.4 Flood Proofing

As we stated earlier in this paper, many regions in India are highly prone to floods and over 40 million ha of land is prone to floods. Although India had formulated its first Flood Policy as far back as in 1954, even to date floods continue to cause havoc every year; we have failed to achieve any semblance of flood proofing. What is needed urgently is a long term policy and a plan for flood proofing. The policy should be backed by a floodplain management act as recommended by the Central Water Commission (Subbiah, 2004:206). The plan should comprise, among other things, flood risk zoning, prepared by using satellite-based remote sensing, mapping of river configuration and flood control works, estimates of the area likely to be affected by flood, and expected duration of floods, and the measures required for control of floods, and their cost implications. Some of the important flood management measures adopted in India so far include (i) dams / reservoirs; (ii) embankments ; (iii) drainage channels; (iv) raising flood level of flood-prone villages; (v) flood forecasting; and (vi) flood relief and rehabilitation. However, we still have to go long way before any substantial progress in resolving the problem is made.

The only solution to the problem of floods in Bihar is to allow a smooth passage to the floodwater and removing, as far as possible, all the impediments to such a passage and allow the rivers to perform their normal functioning. Embankments obstruct the flow and the proposed dams will do even worse. Almost all the Government Reports recognize this basic fact but when it comes to doing something on the ground, only obstructions are created. Bihar Government minces no words in ridiculing the embankments but the same Government does not mind building the embankments

on the Bhutahi Balan. The farmers, too, will support such moves of improving drainage as they always maintain that earlier the water used to come and go and we used to welcome the floods. Now, water only comes, but it takes a very long time to go.

8.5 Preparedness at the Household Level

Gujarat earthquake has made us realise painfully once again that disaster management is something that should not be left to the bureaucrats alone. There is no doubt that the role of government is very important In disaster management, but unless NGOs, CBOs and all other local organizations are actively involved in the process the results will not be satisfactory. In advanced countries there are family disaster management plans. In India also, we need that kind of preparedness. The families are supposed to have supply of high energy dry food items ready along with other essentials such as flash light, signal devices etc. All the members are trained to act in a particular manner in disaster situation to save not only their own life but also the life of other members of family and community. The members must have local and out - station phone numbers, common meeting places, contact addresses to reach out to other members of family in case of emergency. We too must strive in the same direction.

8.6 Using Mass Media to Create Awareness about the Problems

Mass media could play an important role in generating mass awareness about the impending floods, droughts, cyclones, and other natural disasters. At present the electronic and print media has not given a high priority to educating and sensitising the general public and different stakeholders about the problems and the need for disaster management (Narayan, 2000: 22-24). There is urgent need to devise innovative ways as well to use the indigenous methods such as folklore and folk songs for the purpose. Programmes like “water campaign”, water day, and so on need to be used more widely to cover all parts of India and to generate public opinion on disaster related issues. There is need for developing a mass communication strategy and a national campaign for building public consensus on institutional and individual actions with regard to improved disaster management (IRMA-UNICEF, 2000: 117-121).

8.7 Covering More Households under Crop and Livestock Insurance

With cost of cultivation going up and given the risk and uncertainty involved in agriculture, specially in natural hazard prone areas, every farmer is concerned about the investment he makes and the returns he expects for his and his family’s labour. It is indeed a matter of satisfaction that the Union Ministry of Agriculture has already launched the National Agriculture Insurance Scheme. While the implementation aspects and difficulties therein are subject matter for detailed discussion, we would like to offer a suggestion that its coverage should be extended to all the farmers in the multi-hazard prone areas in the country.

It is however necessary to develop objective criteria for risk assessment and use them rigorously to avoid misuse of insurance schemes. A number of principles and guidelines for risk assessment are now available (Narayan, 2000: 290-296).

8.8 Facilitating Migration

Migration in response to both push and pull factors is a worldwide phenomenon. Generally speaking, the rich migrate in search of greener pastures (pull factor) and the poor migrate in search of livelihood options as their present resource endowments, entitlements, and rights are too inadequate to secure them even the basic minimum subsistence (push factor). As we know in hazard prone areas, seasonal, semi-permanent and permanent migration is a predominant coping strategy adopted by the poor to get out of the poverty trap. As a matter of fact, an informal market for migrant labour has developed over time in India. Such informal markets play an important role in balancing the regional supply and demand of casual labour in India. For example, it is now a common observation that poor labour from poor areas in Bihar, and eastern Uttar Pradesh

seasonally migrate to relatively agriculturally more developed areas in Punjab, Haryana, and western Uttar Pradesh. This kind of voluntary migration is an example of a win-win strategy in the sense that both the migrant labour and the employer are better off with the deal.

Although the informal migrant labour markets in India are, by and large, working well, we believe that their efficiency could be improved and many more poor could benefit from them, if an institutionalized system of collection and dissemination of information about the supply, demand, and wage rates is put in place at the district level in selected hazard-prone areas of India. We would recommend that the State governments must intervene more effectively in labour markets and ensure that the wage rates are fair and reasonable and that there is no exploitation of labour through such practices as bonded labour, attached labour, and so on. This should be done through the involvement of some reputed NGOs having a track record of good social service and committed to serving the cause of the poor labour. A service fee may be charged to cover the costs. For facilitating immigration to foreign countries, there are hundreds of private agencies operating successfully in every part of India. Why not for the poor migrant labour.

8.9 Professionalisation of Management

There is need for professionalisation of disaster management to cope with the rapidly changing environment. This could be achieved only slowly over a period of time by inducting professionally-trained disaster managers at all levels in the hierarchy of development administration. Reorientation of the existing staff through short-term training programmes in disaster management in NIDM, ATIs, and other reputed institutes is also necessary. Unfortunately, at present, supply of professional disaster managers and facilities for in-service training are both extremely limited in our country.

The HPC has advocated that a Trigger Mechanism is necessary to minimize response time when disaster strikes. Establishment of Civil Defense Warden System involving panchayat members as wardens and providing communication network through wireless stations and-HAM (Help AII Mankind) radio systems seems to be promising development in this context (GOI, 2001).

The HPC has also made a strong case for ushering a new culture of disaster management which will stand on the four pillars of culture of preparedness, culture of quick response, culture of strategic thinking, and culture of prevention.

9. Concluding Remarks

Until recently, in India, disaster management was normally viewed as a post-disaster function. It comprised such activities as rescue, relief and rehabilitation after the occurrence of a disaster. Such an approach was short-sighted, extravagant, and prone to unnecessary interference of politicians, and others having vested interests. However, in the recent past, there has been a paradigmatic shift in India's approach to disaster management. The new approach is multi-sectoral, multi-disciplinary, holistic and proactive, and disaster management is now sought to be built into the development planning process itself. Now India has a well defined institutional framework at the national and sub-national levels, and a funding mechanism for providing relief assistance to the victims of disasters. As it is not be possible to prevent the occurrence of natural disasters and measures altogether, there is need for taking appropriate measures for reducing their impacts.

Disaster management is an important issue that cannot be addressed by one agency, technology or institution alone. It calls for convergence of technologies and institutions with the goal of fulfilling the various dimensions, timeliness, accuracy, scope and coverage, formats and standards to match the user needs and finally assimilation of information for decision-making. A holistic approach encompassing a suitable mix of policy reforms, institutional changes and technology options. Without this, it will not be possible to achieve longer term immunity against natural and man-made disasters.

It is quite evident that economic development may not be sustainable under conditions of vulnerability to natural disasters. Recognizing the fact that hazard mitigation pays high social and

economic dividends, especially in a country like India such measures must be seen as investment and not a luxury that may or may not be affordable. Development and disaster management should go hand in hand. Disaster management must be mainstreamed into the development planning process at all levels and development models must have in-built components of disaster reduction, mitigation and preparedness. As per the HPC's recommendations, at least 10 % of the Plan Funds at the national, state, and district levels be earmarked and apportioned for schemes which specifically address prevention, reduction, preparedness, and mitigation of disasters (GOI, 2004: 38).

There is a pressing need for a focused, professional approach at all levels of government. But at the same time government must realize that disaster management to be effective has to be a community based response system with disaster driven strategic planning.

As advocated by the HPC a Trigger Mechanism is necessary to minimize response time when disaster strikes. Establishment of Civil Defense Warden System involving panchayat members as wardens and providing communication network through wireless stations and-HAM (Help AII Mankind) radio systems seems to be promising development in this context.

References

Anklesaria Aiyar, Swaminathan S. (2002), "Combat the Drought with Jobs", in SWAMINOMICS, *Times of India*, Ahmedabad Edition, dated August 11.

Dreze, J. and A. K. Sen (1988), "Public Action for Social Security: Foundation and Strategy", paper presented for STICERD/WIDER Workshop on Social Security in Developing Countries, London: London School of Economics.

GOI (2001) High Powered Committee on Disaster Management : Report, Department of Agriculture and Co-operation, Ministry of Agriculture, Government of India, New Delhi.

GOI (2004) Disaster Management in India: A Status Report, Natural disaster Management Division, Ministry of Home Affairs, Government of India, new Delhi

Indian Famine Commission (1988), Indian Famine Commission Report, 1880, Eyre and Spottiswoode, London. p. 34 quoted in "The 'Limit' of Drought", *Seminar* 346, June 1988, p.31.

IRMA-UNICEF (2000), *White Paper on Water in Gujarat, Institute of Rural Management, Anand* and United Nations Children's Fund, Gandhinagar, Gujarat.

Kanwar, Rakesh (2001) Disaster Management, *The Administrator,*Vol. XLIV, December, pp. 96-110

Narayan, B. (2000) Disaster Management, A.P.H.Publishing Corporation, New Delhi.

Panigrahi, Nilakantha (2003) "Disaster Management and the Need for Convergence of Services ofWelfare Agencies- ACase Study of super cyclone of Orissa", Social Change, Vol. 33, No. 1, pp. 1-26.

Pilgrim, Nicholas Kumoi (2000) Disaster Reduction and the Limits of Expectation: A Case Study from the Indian Himalayas: In R.B. Singh (ed.) (2000) *op.cit*..

Sharma, Vinod K.(2003) Disaster Management - Approach and Emerging Strategies in India, *VISION : The Journal of Business Prespective*, January - June, 2003.

Singh Katar (1991) Dryland Watershed Development and Management: A Case Study in Karnataka, Indian Journal of Agricultural Economics, Vol. 46, No. 2, April-June, pp. 121-131.

Singh Katar (1995) The Watershed Approach to Sustainability of Renewable Common Pool Natural Resources: Lessons of India's Experience, Research Paper 14, Institute of Rural Management, Anand.

Singh Katar and Gupta KK. (1998) The Sadguru Model of Community-Based Natural Resources Management. Occasional Publication No.14, Institute of Rural Management, Anand.

Singh, Katar and V. Ballabh (2002) Incidence, Impacts, and Management of Droughts in India: An Overview, Paper presented in a workshop on "Sustainable Livelihood and Drought Management in South Asia: Issues, Alternatives and Future" October 28-30, 2002, Islamabad, Pakistan.

Singh, R.B. (Ed.) (2000) Disaster Management, Rawat Publications, Jaipur and New Delhi.

Subbiah, A.R. (2004) Natural Disaster Management, Vol. 21, State of the Indian Farmer : A Millennium Study, Academic Foundation, New Delhi for the Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, New Delhi.

TOI (2004), "Budget has moved closure to risk mitigation: DMI", The Times of India, Ahmedabad Edition, dated July 10, 2004.

ANNEXURE

Table 1

Damages and loss caused by the October 1999 Super Cyclone of Orissa

Particular	Loss
Deaths (No.)	
Human deaths	9885
Human injuries	2507
Cattle death	315886
Small animals death	316372
Poultry death	1883468
Assets Damaged	
Power supply affected villages	17032
Primary schools	14901
High schools	3425
Colleges	66
Trees uprooted	9000000
PWD buildings	10059
R.D Dept. buildings	7020
P.R Dept. buildings	7326
Fishing boats	9085
Nets	22143
Lift irrigation points (Govt.)	5636
Crop damaged (ha.)	
Paddy crops	130000
Vegetable crop	176000
Other crop land	257000
Potential *ravi* crop	64900
Flood embankment breached (Nos.)	2005
Canal embankment breached	8647
Minor irrigation dam partially breached	31
Minor irrigation tanks affected	6967
Prime Minister Rojgar Yojana (PMRY)	1339
Units affected	
Districts roads damaged (km)	7500
Rural roads damaged (km)	444
Drinking water wells damaged (No)	6391

Source: White Paper on Super Cyclone in Orissa. Revenue Department, Government of Orissa, December 1999, quoted in Panigrahi ((2003:5).

ANNEXURE
Table 2

Flood losses in Bihar as of July 24, 2004

Particular of the loss	Estimated extent of the loss
Districts affected (No)	19
Blocks affected (No)	189
Gram Panchayats affected (No)	2531
Villages affected (No)	8737
Population affected (million)	20.10
Flood affected area (Lakh ha)	48.12
Crops damaged (Lakh ha)	13.83
Value of crop damage (Rs. crores)	232.24
Houses Damaged (No)	428,877
Value of houses damaged (Rs. crores)	133.09
Loss of public property (Rs. crores)	39.10
Human lives lost (No)	351
Cattle lives lost (No)	1192

Source: Department of Disaster Management, Government of Bihar as quoted by Shri Dinesh Mishra in a DNRM Bulletin dated July 30, 2004

Abbreviations and Acronyms

ARWSP	Accelerated Rural Water Supply Programme
ATIs	Administrative Training Institutes
BCM	Billion Cubic Metre
BIS	Bureau of Indian Standards
CBOs	Community-Based Organizations
CMG	Crisis Management Group
CRF	Calamity Relief Fund
CRC	Central relief Commissioner
DDP	Desert Development Programme
DMI	Disaster Mitigation Institute
DODM	Departments of Disaster Management
DORR	Departments of Relief and Rehabilitation
DPAP	Drought Prone Area Programme
GDP	Gross Domestic Product
GO	Governmental Organisation
GOI	Government of India
GSDMA	Gujarat State Disaster Management Authority
Ha	Hectare
HPC	High Powered Committee
IAY	Indra Awas Yojana
IADP	Integrated Rural Development Programme
ICAR	Indian Council of Agricultural research
IFAD	International Fund for Agricultural Development
IMD	Indian Meteorological Department
INREM	India Natural Resource Economics and Management
IRMA	Institute of Rural Management, Anand
IWDP	Integrated Wastelands Development Programme
MoA	Ministry of Agriculture

MOHA	Ministry of Home Affairs
NADAMS	National Agricultural Drought Assessment and Monitoring System
NA&ED	National Afforestation and Eco-development Programme
NCCF	National Calamity Contingency Fund
NCAP	National Contingency Action Plan
NCMC	National Crisis Management Committee
NDM	Natural Disasters Management
NFCR	National Fund for Calamity Relief
NGO	Non-Governmental Organisation
NIDM	National Institute of Disaster Management
NRSA	National Remote Sensing Agency
PDS	Public Distribution System
SEWA	Self-Employed Women's Association
SDMAs	State Disaster Management Authorities
SGRY	Sampoorna Grameen Rozgar Yojana
SPRU	Specialized Disaster Response Unit
TOI	Times of India
UNICEF	United Nations Children's Fund