

Natural Disaster Management in India

(Country Report)

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NATURAL DISASTER MANAGEMENT IN INDIA (Overview & Executive Summary)

India is one of the most disaster-prone countries in the world. The locational and geographical features render it vulnerable to a number of natural hazards such as cyclone drought, floods, earthquakes, fire, landslides and avalanches.

The country has an integrated administrative machinery for disaster management at National, Provincial (State), District and Sub-District levels. India has a federal system of Government with role of Union and Provincial Governments specified by the Constitution, The responsibility for undertaking rescue and relief measures in the event of natural calamities is that of the State Government concerned. The Union Government supplements the State relief efforts by initiating supportive action. Elaborate procedural mechanism outlined in relief manuals & codes and backed up by Contingency Action Plans along with allocation of resources on a regular basis facilitates emergency management operations. A National Contingency Action Plan has been notified.

The country has an elaborate cyclone detection, tracking system, flood forecasting and warning systems covering major rivers and drought monitoring arrangements.

Long term planning and preparedness for disaster mitigation form part of the process of development planning in India. Science & technology inputs constitute its basic thrust which is manifested in development of forecasting and warning systems, disaster resistant construction technologies, appropriate cropping systems.

A number of special programmes are in operation over many years for mitigating the impact of natural disasters. As the country has been facing natural hazards over centuries, the local communities have developed their own indigenous coping mechanism. The rich store house of this knowledge is the country's proud inheritance. At times of emergencies, spontaneous mobilisation of community action supported by Non-governmental Organisations add strength to national capability in disaster management. However, the areas where efforts made and results achieved have not been commensurate with the magnitude of the problem faced by natural disasters are forging linkages between disaster reduction and development, training and education, participation at the community level, enlisting people's participation in integrating social and human science inputs in vulnerability assessment and appropriate resource allocation against competing demands.

Accepting the fact that the trend of losses is not indicating any sign of improvement inspite of initiating various disaster mitigation measures, the country is planning to give more stress in some vital areas in this field during next century. These include linkage of disaster mitigation with development plans, effective communication system , use of latest information technology, insurance, extensive public awareness and education campaigns particularly in the rural areas ,involvement of private sector , strengthening of institutional mechanism and international co-operation .

India is committed to take necessary steps to achieve the goals and objective of the International Decade for Natural Disaster Reduction . Country believe that co-operation among the various countries particularly of the Asian region, is very essential for effective disaster reduction and preparedness. There is a need o have continuous exchange of experience and know how. As a part of regional co-operation, India has hosted some regional conferences. World Disaster Reduction Day is observed on 2nd Wednesday of October every year to create public awareness about natural disasters and motivate them to adopt preparatory measures. India has also became the member of the Asian Disaster Reduction Centre, Kobe, Japan.

1. INTRODUCTION

India covers an area of 32,87,263 sq. kms. extending from now covered Himalayan heights to the tropical rain forests of the South. It is the seventh largest country in the world and is well marked off from the rest of Asia by mountains and the sea which give the country a distinct geographical entity. In the North, it is bounded by the Great Himalayas and stretches southwards tapering off into the Indian Ocean between the Bay of Bengal and the Arabian Sea. The main land extends between latitudes 8°4' and 37°6' North and longitudes 68°7' and 97°25' East. It means about 3,214 kms from North to South between extreme longitudes. It has a land frontier of 15,200 kms. and coastline of 7,500 kms. It has also group of islands located both in the Bay of Bengal and Arabian Sea.

The main land comprises of four regions, namely, the Great Mountain Zone, Plains of the Ganges and the Indus, Desert Region and the Southern Peninsula. The Himalayan range comprises three almost parallel ranges interspersed with large plateaus and valleys. The mountain wall extends over a distance of 2,400 kms. with a varying depth of 240 to 320 kms.

The plains of the Ganges and Indus, about 2,400 Kms. long and 240 to 320 Kms. broad are formed by basins of three distinct river systems, viz.; the Indus, the Ganges and the Brahmaputra. The desert region is clearly delineated in two parts - the Great Desert running beyond Rann of Kutch to Rajasthan - Sindh Frontier while the little desert extends between Jaisalmer and Jodhpur upto the Northern wastes. Between the two deserts is a zone of absolutely sterile region, consisting of rocky land cut up by limestone ridges.

According to 1991 census, Indian has a population of 843.93 million consisting of a male population of 437.60 million and female population of

406.33 million. The average population density in the country as a whole is 267 persons per sq. km. The literacy rate as per 21991 census is 52.2 percent - 64 percent for male and 39 per cent for female.

The country is a Union of 25 States and 7 Union Territories. The Union Territories are subject to the direct rule - making powers of the National Parliament and the administrative control of the Union Government. The States have elected Legislatures and Governments, which are fully autonomous in relation to the sphere of activities entrusted to them under the Constitution. The States are further divided into Administrative Units called Districts.

2. Country & Climate

India is a large country with a geographical area of 3.28 million sq. kms. Situated between the latitudes 8°4' N and 37°6' N and Longitudes 68°7' E and 97°25', India has a tropical and subtropical Climate. The country is bounded in the north by the Himalayan mountain ranges. The wide Indo-Gangetic plain lies between the Himalayas in the north and the Deccan Plateau, that occupies most parts of the southern peninsula.

India. The western and the eastern Ghats constitute long mountain ranges, running along the west and the east coasts of the peninsula. These Ghats leave narrow stretches of coastal plains along the Arabian Sea on the west and wider plains on the Bay of Bengal coast on the east. The country receives an annual precipitation of 400 million hectare metres, 73 per cent of which is received between June and September.

The heavy concentration of rainfall within a span of three months in most of the areas causes heavy run-off and high floods. Non-availability of moisture over most parts of the year, particularly in the arid and semi-arid regions, renders 68 per cent of the land-mass vulnerable to drought. The tectonic plates of Indian sub-continent makes it vulnerable to frequent earthquake disturbances.

The Asia Pacific Region faces over 60% of the world's natural disasters. India, on account of its geographical position, climate and geological setting, has had from time immemorial, a fair share of these disasters. There is hardly a year when some part of the country or other does not face the spectre of drought, due to the failure of monsoons in vulnerable areas. One or two cyclones strike the peninsular region of the

country every year. Similarly, floods are a regular feature of the Eastern India where Himalayan rivers inundate large parts of its catchment areas uprooting people, disrupting livelihood and damaging infrastructure. The fragility of the Himalayan mountain ranges are a continuing source of concern for their high vulnerability to earthquakes, landslides and avalanches. The recent earthquakes in Maharashtra and Madhya Pradesh have demonstrated that the areas considered comparatively safe till now, are really not so.

3. Overview of Natural Disasters

A natural disaster is an event of nature, which causes sudden disruption to the normal life of a society and causes damage to property and lives, to such an extent that normal social and economic mechanisms available to the society are inadequate to restore normalcy. Viewed in this manner, a host of natural phenomena constitute disasters to a society, whether they are related to an occurrence in micro environment

or not. In macro terms, the disasters, which cause widespread damage and disruption in India, are drought, flood, cyclone and earthquakes.

3.1. Floods

Of the annual rainfall, 75 per cent is concentrated over four months of monsoon (June - September) and as a result almost all the rivers carry heavy discharge during this period. The flood hazard is compounded by the problems of sediment deposition, drainage congestion and synchronisation of river floods with sea tides in the coastal plains. The rivers originating in the Himalayas also carry a lot of sediment and cause

erosion of the banks in the upper reaches and over-topping in the lower segments. The most flood prone areas are the Brahmaputra and the Gangetic basins in the Indo- Gangetic plains. The other flood prone areas are the north-west region of the west flowing rivers like Narmada and Tapi, the Central India and the Deccan region with major east flowing rivers like Mahanadi, Krishna and Cauvery. While the area liable to floods is 40 million hectares, the average area affected by floods annually is about 8 million hectares. The annual average cropped area affected is approximately 3.7 million hectares. The average annual total damage to crop, houses and public utilities during the period 1953-95 was about Rs.972.00 Crores, while the maximum damage was Rs. 4630.00 Crores in 1988.

3.2. Drought

As much as 73.7 per cent of the annual aggregate precipitation of 400 million hectare metres is received during the south-west Monsoon period, June to September. Due to erratic behaviour of monsoon, both low (less than 750 mm) and medium (750 - 1125 mm) rainfall regions, which constitute 68 per cent of the total areas, are vulnerable to periodical droughts. The analysis of 100 years of rainfall behaviour reveals that the frequency of occurrence of below normal rainfall in arid, semi-arid, and sub-humid areas is 54-57 per cent, while severe and rare droughts occur once every 8- 9 years in arid and semi-arid zones. In semi-arid and arid climatic zones, about 50 per cent of the severe droughts cover generally 76 percent of the area. In this region, rare droughts of most severe intensity occurred on an average once in 32 years and almost every third year was a drought year. The impact of drought varies from year to year. The 1987 drought, which was one of the worst drought of the century, with the overall rainfall deficiency of 19 per cent, affected 58-60 per cent of cropped area and a population of 285 million.

3.3. Cyclone

India has a long coast line of 8,000 kms. On an average, about five to six tropical cyclones form in the Bay of Bengal and Arabian Sea every year, out of which two to three may be severe. There are two distinct cyclone seasons: pre-monsoon (May-June) and post-monsoon (October-November). Analysis of cyclone events during the last 100 years period from 1891 to 1991 reveals that as against 117 cyclones of varied intensities formed in the Arabian Sea, 442 cyclones were formed in the Bay of Bengal.

The impact of these cyclones is confined to the coastal districts, the maximum destruction being within 100 Km. from the centre of the cyclones and on either side of the storm track. The principal dangers from a cyclone are: (i) gales and strong winds, (ii) torrential rain, and (iii) high tidal waves (also known as 'storm surges'). Most casualties are caused by coastal inundation by tidal waves and storm surges. The worst

devastation takes place when and where the peak surge occurs at the time of the high tide.

3.4. Earthquake

The Himalayan mountain ranges are considered to be the world's youngest fold mountain ranges. The subterranean Himalayas are, therefore, geologically very active . The Himalayan frontal arc, flanked by the Arakan Yoma fold belt in the east and the Chaman fault in the west constitutes one of the most seismically active regions in the world. Four earthquakes exceeding magnitude 8 in the of 53 years. These are the Assam earthquakes of 1987 and 1950, the Kangra earthquake of 1905 and the Bihar-Nepal earthquake of 1935.

The peninsular part of India comprises stable continental crust regions which are considered stable as they are far away from the tectonic activity of the boundaries. Although these regions were considered seismically least active, an earthquake that occurred in Latur in Maharashtra on September 30, 1993 of magnitude 6.4 in the Richter scale caused substantial loss of lives and damage to infrastructure.

3.5. Landslides

The Himalayan, the north-east hill ranges and the Western Ghats experience considerable landslide activities of varying intensities. The rocks and the debris carried by the rivers like Kosi originating in the Himalayas cause enormous landslides in the valleys. The seismic activity in the Himalayan region also results in considerable landslide movement. The heavy monsoon rainfall, often in association with cyclonic disturbances, results in considerable landslide activity on the slopes of the Western Ghats.

3.6. Avalanches

Avalanches constitute a major hazard in the higher reaches of the Himalayas. Heavy loss of life and property have been reported due to avalanches. Parts of the Himalayas receive snowfall round the year and adventure sports are in abundance in such locations. Severe snow avalanches are observed during and after snowfalls in Jammu & Kashmir, Himachal Pradesh and the Hills of Western Uttar Pradesh. The population of about 20,000 in Nubra and Shyok valleys and mountaineers and trekkers face avalanche hazard on account of steep fall of 3000 to 5000 metres over a distance of 10 to 30 kilometres.

4. Disaster Response

4.1. Administrative Response

The basic responsibility for undertaking rescue, relief and rehabilitation measures in the event of natural disasters is that of the State Governments concerned. The role of the Central Government is supportive, in terms of physical and financial resources and complementary measures in sectors such as transport, warning and inter-state movement of food grains. Relief Manuals and Codes are available for undertaking emergency operations.

A broad view of the administrative response at national, state and district levels is given below:

4.2. National Organisation

Under the Indian federal system, disaster management is the responsibility of State Governments. However, there is a Crisis Management Group headed by the Cabinet Secretary and consisting of nodal ministries in charge of various types of disasters and supporting ministries. For natural disasters, the Ministry of Agriculture is the nodal Ministry and the other Ministries play a supportive role. In the event of a disaster, a multi-disciplinary Central Government team, at the invitation of the affected State, carries out disaster assessment and makes recommendation for assistance.

4.3. State Level Organisation

Disaster preparedness and response in the State is usually delegated to the Relief and Rehabilitation Department or the Department of Revenue. The Crisis Management Group at the State level is headed by the Chief Secretary of the Government, with participating of all the related agencies.

4.4. District Level

A District Level Co-ordination and Review Committee is constituted and is headed by the Collector as Chairman with participation of all other related agencies and departments.

4.5. Contingency Action Plan

A National Contingency Action Plan (CAP) has been notified. It facilitates the launching of relief operations without delay. This is updated every year. The CAP identifies the initiatives required to be taken by various Central Ministries/Departments in the wake of natural calamities, sets down the procedure and determines the focal points in the administrative machinery.

At the State level, the State Relief Commissioner (or Secretary, Department of Revenue) directs and controls the relief operations through Collectors or Deputy Commissioners, who are the king-pin of all relief operations, co-ordination, direction and control at the district level.

4.6. Arrangements for Financing Relief

Schemes for financing expenditure on relief and rehabilitation in the wake of natural calamities are governed by the recommendations of Finance Commissions appointed by Government of India after every five years. Under the existing scheme, in operation for the period 1995-2000, each State has a corpus of funds called Calamity Relief Fund(CRF), administered by a State Level Committee, headed by the Chief Secretary of the State Government. The size of the corpus is determined having regard to the vulnerability of the State to different natural calamities and the magnitude of expenditure normally incurred by the State on relief operations. The corpus is built by annual contributions of the Union Government and the State Governments concerned in the ratio of 3:1. At present, the aggregate accretion in the States' CRF for a period of five years from 1995-2000 amounts to Rs. 63042.70 million. The States are free to draw upon this corpus for providing relief in the event of any natural calamity. In the event of a major disaster warranting intervention at the national level, a provision exists in the form of National Fund for Calamity Relief with a corpus of Rs. 7000.00 million (for 1995-2000) for the Union Government to supplement the financial resources needed for relief operations.

5. Forecasting and Warning

India has over the years developed, upgraded and modernised the monitoring, forecasting and warning systems to deal with cyclones, floods, droughts and earthquakes.

5.1. Cyclone

The India Meteorological Department(IMD) is responsible for cyclone tracking and warning to the concerned user agencies. Cyclone tracking is done through INSAT Satellite and 10 cyclone detection radars. Warning is issued to cover ports, fisheries, and aviation departments. The warning system provides for a cyclone alert of 48 hours, and a cyclone warning of 24 hours. There is a special Disaster Warning System (DWS) for dissemination of cyclone warning through INSAT Satellite to designated addresses at isolated places in local languages.

The extent of headway made in cyclone warning is evidenced by two situations of 1977 and 1990 in Andhra Pradesh coast which was hit by cyclones accompanied by high storm surges of almost the same intensities. The number of deaths in 1977 was over 10,000 whereas the loss of human lives in 1990 was less than 1000. Timely warnings issued by the IMD enabled the administration in evacuating and transporting over half a million people from the affected areas.

5.2. Floods

The Central Water Commission(CWC) has a flood forecasting system covering 62 major rivers in 13 States with 157 stations for transmission of flood warnings on real time basis. In 1995, 8,566 forecasts were issued with a percentage accuracy of 95 per cent. There are 55 hydro-meteorological stations also in the 62 river basins.

VHF/HF wireless communication system is used for data collection with micro- computers at the forecasting centres. Hydrological models are increasingly used for inflow and flood forecasting and the forecasts are communicated to the administrative and the engineering departments for dissemination.

5.3. Droughts

The IMD has divided the entire country into 35 meteorological sub-divisions. It issues weekly bulletins on rainfall indicating normal, excess and deficient levels and also the percentages of departure from the normal.

The CWC monitors the levels of 60 major reservoirs with weekly reports of reservoir levels and corresponding capacity for the previous year and the average of the previous 10 years. Similar monitoring of smaller reservoirs by the Irrigation Departments of State Governments give advance warnings of hydrological droughts with below average stream flows, cessation of stream flows and decrease in soil moisture and groundwater levels.

Based on the input from IMD and CWC on the rainfall behaviour and the water levels in the reservoirs respectively and the information on crop situations received from the local sources, the National Crop Weather Watch Group monitors the drought conditions. Remote sensing techniques are also used for monitoring drought conditions based on vegetative and moisture index status.

5.4. Earthquake

On the basis of past earthquakes of magnitude 5 and above and intensities ranging from V to IX superimposed on the magnitude information and also drawing upon tectonic features in the near past, Earthquake Zonation maps have been prepared. IMD operates a network of 36 seismic monitoring stations. After the Maharashtra earthquake of September 1993, a plan to upgrade and modernise the National network of seismological operations equipped with the State-of-art technology instruments is now in progress.

6. Preparedness and Mitigation Measures

India, besides evolving effective post-disaster management operations, has also formulated and implemented pre-disaster mitigation programmes and sectoral development programmes to reduce the impact of disasters as well as reduce the socio-economic vulnerabilities. The reconstruction programmes in the aftermath of disasters such as cyclones and earthquakes are also aimed at building disaster resistant structures to withstand the impact of natural hazards in the future.

6.1. Floods

Structural methods of flood mitigation has attracted an investment of about Rs. 4,000 crore between 1957 and 1995 in construction of new embankments (16200 kms), drainage channel (32000 Km) and raising 4700 critical villages above the flood level. These measures have protected an estimated area of 14.4 million hectares.

Multi-purpose dams and reservoirs have been built with flood moderation as one of the objectives. Examples of flood moderation through multi-purpose dams are the Damodar Valley systems in eastern India, Hirakud dam in Orissa and the Bhakra on river Sutlej. The Damodar valley system has a flood absorption capacity of 1,867, mcm. which moderates probable floods of 28,300 cusses to 7,075 cusses in the valley.

Control of premature siltation of multi-purpose reservoirs and checking degradation of catchment areas is attempted through a scheme of soil conservation, River Valley Project (RVP) in the catchments of major rivers. The scheme covers 581 watersheds in 27 catchments spread over 17 States.

The increasing trend in the flood damage observed in India during the seventies led to attempts for the development of flood plains in a regulated manner. A model Bill on flood plain Zoning was circulated to the State Governments as early as 1975 to enact suitable legislation for restricting the encroachment of the flood plains and for their development in regulated manner. The model Bill emphasises on non- structural measures. The main features of the model bill were:

- (a) designating flood zoning authority;
- (b) delineation of flood plain;

- (c) notification of limits of flood plains;
- (d) restrictions on use of flood plains;
- (e) compensation; and
- (f) power to remove construction after prohibition.

During the decades of 1960s to 1980s there has been dependence on structural measures. As structural measures alone have not yielded the desired results and flood damages continue to show increasing trend, non-structural measures such as flood forecasting, flood plain zoning, flood proofing of the civic amenities of the affected villages, changing the cropping pattern and public participation in flood management works are being given a fair trial. These measures are also cost and time effective.

6.2. Drought

India has given attention to irrigation development by harnessing water through the medium reservoirs, developing traditional systems of tanks and exploiting groundwater. The average annual investment on major and medium term irrigation projects rose from 75.00 Crores in the First Five Year Plan to Rs. 2500.00 Crores in the Eighth Five Year Plan creating a total potential of 38.0 million hectares.

The irrigation potential has not been fully utilised for want of on-farm development works like field channels, land levelling, field drains and absence of appropriate system of water distribution to ensure appropriate water management. The Government of India is now operating a Command Area Development Programme(CADP) to strengthen the water management capabilities and enhance the effectiveness of irrigation water application.

The Desert Development Programme(DDP) started in 1977-78 aims at controlling the process of desertification and mitigating the adverse effects on drought in the desert areas through such projects as afforestation, sand-dune stabilisation, shelter belt plantation, grassland development and soil and moisture conservation. A similar programme directed at drought prone areas is under implementation since 1973 and is titled Drought Prone Areas Programme(DPAP). The DPAP is under implementation in 149 districts in 14 States and the DDP in 36 districts in 7 States.

Seventy per cent of India's cultivated land is in the rainfed areas, which often suffer reverses in agricultural production and face drought conditions. A programme titled National Watershed Development Project for Rainfed Areas(NWDPRA) has been devised and is under implementation. This programme adopts development measures for all the spatial components of watersheds i.e. arable land, non-arable land and drainage lines as one organic geo-hydrological entity. The objective is to achieve conservation of rain water, control of soil erosion, regeneration of green cover and promotion of dryland farming systems including horticulture, agro-forestry, pasture development and livestock management as well as household production systems.

There are large areas of degraded land of over 100 million hectares in the country which could be reclaimed. Most of the land needs only basic water and soil conservation measures and some amount of plantation and protection work. By protecting, regenerating and restoring the degraded land the pressure on remaining land, forests and pastures can be reduced. A National Wasteland Development Board has been constituted for promoting integrated wasteland development. The National Forest Conservation Act(1980) is an attempt to bring down the erosion of forest cover all over the country.

Natural disasters, particularly droughts throw up huge unemployment and under-employment problems in the rural areas. Providing wage employment to the rural poor has been an integral part of rural development efforts. The Jawahar Rozgar Yojana (JRY) envisaged for this purpose is the largest such programme in the country. The objectives of the programme is to generate additional gainful employment for the unemployed and under-employed men and women in rural areas. The Employment Assurance Schemes (EAS) are implemented to provide employment opportunities mostly in drought prone areas.

6.3. Cyclone

Measures such as building of cyclone shelters, afforestation in coastal areas, etc. have been undertaken to deal with cyclones. Reconstruction projects have been taken up in areas affected by major calamities by building elements for mitigation of possible future calamities. The Cyclone Reconstruction Project implemented in the coastal Andhra Pradesh during 1990-93 consisted of such components as housing and public infrastructure, drainage and rural water supply. It also included such mitigation efforts as expanding road and communication network, planning of shelter belt plantation and building up of cyclone shelters.

6.4. Earthquake

Since much loss of life during the past earthquakes in the world has occurred due to the collapse of non-engineered traditional buildings of clay, stones and bricks, and since the bulk of the housing in India consists of such buildings, studies on this problem were started at the University of Roorkee in 1960. Very useful recommendations regarding upgrading of such buildings were available in the G.S.I. Memories on the 1934 Bihar Earthquake and 1935 Quetta (now in Pakistan) Earthquake. These efforts resulted in the preparation and publication of IS:4326 in 1976. After the Koyna Earthquake, the research efforts were devoted to shake-table

tests on larger scale specimens for checking the validity of the reinforcing recommendations of IS:4326 and also to further refine the analysis procedures. The Monograph published by the International Association of Earthquake Engineering, namely, Basic Concepts of Seismic Codes, Part II, Non-Engineered Construction, 1980 included many results of the Indian experience, particularly in regard to masonry and wooden buildings. This Monograph has been revised and updated as "Guidelines for Earthquake Resistant Non-Engineered Construction", October, 1986.

The Department of Science and Technology(DST) is executing a World Bank assisted project on Seismological Instrumentation Upgradation and other Collateral Geophysical studies in the Indian Peninsular region. Major organisations like India Meteorological Department, National Geophysical Research Institute, Survey of India, Geological Survey of India and some academic institutions are participating in the World Bank project. Under the project, it is planned to (i) upgrade 20 existing seismological observatories of IMD, (ii) set up 3 Telemetered Seismic Clusters (iii) 10 new Digital Seismic Observatories in the shield region and (iv) Strong Motion Instruments both for free field and structural response studies (v) Geodetic studies using GPS technology.

7. Long Term Mitigation/Reduction Measures

To improve disaster management strategy and to enhance our capability to mitigate the impact of disasters in the country in the long-run, the following areas have been identified for implementation:-

- i) Intensive training for building up human resource development to improve awareness and capabilities for successful disaster management.

- ii) The documentation of events of various natural disasters so as to highlight the lessons learnt in tackling future disasters.

- iii) Long-term mitigation measures which will focus on various programmes keeping in view the goals and objectives of IDNDR.

- iv) For achieving long-term results there is need to examine critically the development programmes in relation to disaster management in different areas and suggest priorities and strategies for inclusion in the ongoing plans.

- v) To create awareness among the general public about the various aspects of disasters and benefits of the counter-measures.

- vi) Programmes of undertaking consultancy services, research programmes etc. to increase the level of understanding and evolving appropriate measures to improve the quality of the disaster management.

- vii) To have an integrated approach in developing professional disaster management strategy.

- viii) Improvement of forecasting, warning and communication system for effective disaster management.

A Central Sector Scheme on Natural Disaster Management Programmes (NDMP) is being implemented for the first time from December 1993. The main objective of the programme is to enhance the national capability for disaster reduction, preparedness and mitigation. The programme is also expected to enhance the level of awareness of the community about disasters they are likely to face and prepare them adequately to face the crisis situation.

The components of the programme are:-

- i) Human resource development,
- ii) Activities under IDNDR,
- iii) Research and consultancy services,
- iv) Documentation of major events,
- v) strengthening of NDM Division,
- vi) Establishment of National Centre for Disaster Management (NCDM) at the Centre and the Natural Disaster Management Faculties in States.

The major achievements of the programme so far are :-

- i) Setting up of the National Centre for Disaster Management in the Indian Institute of Public Administration , New Delhi, in 1995.
- ii) Setting up of separate Disaster Management Faculties in Training Institutes in 16 out of 25 States in the country,
- iii) Documentation of major events like Uttarkashi and Latur earthquakes, research studies on land-slides in Kerala and Sikkim, droughts in Rajasthan and cyclone mitigation in Andhra Pradesh.
- iv) Preparation of source book for use of trainees of the Lal Bahadur Shastri National Academy of Administration,
- v) Organising/Sponsoring of about training programmes/seminars on various aspects of natural disaster management,
- vi) Public education and community awareness campaign through Newspapers, postal stationery, observation of World Disaster Reduction Day and films,
- vii) Reprinting of 45000 copies of IDNDR publication for children in English and Hindi for distribution among school children.

8. INDIA AND INTERNATIONAL DECADE FOR NATURAL DISASTER REDUCTION

India is committed to the goals and objectives of the International Decade for Natural Disaster Reduction. A special plan programme is now implemented for development of human resources, encouraging research and documentation and enhancing community awareness in the field of natural disasters. A strong delegation led by Agriculture Minister participated in the World Conference on Natural Disaster Reduction held in Japan in 1994. Every year world Disaster Reduction Day (falls on 2nd Wednesday of October) is observed in a befitting manner. State Governments, State Level Training Institutes and some organisations observe this day by organising various activities of public awareness.

8.1. Organisation of International Seminars/Conferences

- i) India hosted the 4th Session of the Scientific and Technical Committee of IDNDR during February, 1-5, 1993.
- ii) Government of India hosted on 30th March and 2nd April, 1994, a workshop on Natural Disaster Reduction in the South-Asian Region under the auspices of the SAARC. The Workshop reviewed the status of Natural Disaster Reduction Programme in the Region and finalised a common approach on various issues in the context of the May, 1994 World Conference on Disaster Reduction held in Yokohama, Japan.
- iii) A delegation led by Agriculture Minister participated in the World Conference on Natural Disaster Reduction in May, 1994.
- iv) Government of India hosted the two day Seminar in New Delhi on 28th & 29th September, 1994 on Comprehensive Flood Loss Prevention & Management organised by ESCAP.
- v) India has recently accepted the membership of Asian Disaster Reduction Centre at Kobe, Japan.

9. VISION 2020

In spite of initiating various disaster mitigation measures, the trend of losses is not indicating any sign of improvement. Population pressure, environmental degradation , migration and unplanned urbanisation are some of the major factors contributing to increase vulnerability. As such need has been felt to accelerate the pace of disaster mitigation efforts in the country. It is planned to give more stress in the following areas :-

- linkage of disaster mitigation with development plans,
- effective communication system ,
- use of latest information technology,
- insurance,
- extensive public awareness and education campaigns particularly in the rural areas
- legal and legislative support,

- involvement of private sector ,
- strengthening of institutional mechanism including Natural Disaster Management Division in the nodal Ministry of Agriculture,

international co-operation at regional and bi-lateral level

10. REGIONAL CO-OPERATION - in 21st Century

Most of the worlds worst disasters tend to occur between the Tropic of Cancer and Tropic of Capricorn. Coincidentally, this cover most of the Asian countries and some of them are most poorer countries of the world. The disasters cause enormous destruction and human suffering in the developing countries . Environment degradation, which is often a result of economic development associated human settlement pattern that ignore appropriate resource management increase the vulnerability of these countries to natural hazards and exacerbate their impact. The losses due to the natural disasters reduce the pace of sustained economic development and often lead to a heavy drain on available resources diverting them from pursuing development aims.

Each country rich or poor should try to develop and maintain an effective disaster management capability appropriate to their needs. The management system must be seen as logical and desirable in the cost benefit terms and fit within the existing socio- economic system. It also underline the necessity for co-ordinated international action in order to strengthen all aspects of disaster management wherever possible.

Regional co-operation for effective disaster management system is needed broadly in the following areas :-

- Hazard and vulnerability analysis
- Human resource development
- Exchange of information through inter-net
- Disaster management network at the regional level
- Networking of the regional institutes

11. INDIA AND REGIONAL CO-OPERATION

India is facing various types of disasters on account of its larger size and geographical location. The country has over the years well tested disaster relief and rehabilitation mechanism. Relief manuals and codes backed by contingency action plan along with the allocation of resources, facilitates the emergency management operations. A Plan scheme has been initiated with the objective of enhancing the national capability for disaster reduction and preparedness. The institutional mechanism has been strengthened by establishing the disaster management centres at the national and state levels.

The National Centre for Disaster Management , New Delhi is working in the area of natural disaster management for human resource development, creation of data base, documentation of disaster events, research studies and networking of the institutions at national and international level. In addition small Centres on disaster management are also operating in the state level training institutes. A large number of institute already engaged in the activities related to disaster reduction activities. Some of these are:-

- Department of Earthquake Engineering, University of Roorkee,
- Building Material Technology Promotion Council, New Delhi.
- Central Building Research Institute, Roorkee.
- National Civil Defence College, Nagpur.
- National Institute of Rural Development, Hyderabad.
- Indian Institutes of Technology, Delhi, Kanpur, Mumbai.
- Structural Engineering Research Centres, Hyderabad.
- Central Road Research Institute, New Delhi.
- Council for Scientific and Industrial Research, New Delhi.
- Anna University, Chennai.
- Indra Gandhi National Open University, New Delhi.

India can provide the available expertise for disaster relief and rehabilitation, human resource development , preparation of relief manuals and codes , contingency action plans , post disaster evaluation and information technology