

NATURAL DISASTER REDUCTION

SOUTH ASIAN REGIONAL REPORT

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Natural Disaster Reduction,
New Delhi, March 30 – April 2, 1994)*

PRESENTED TO
THE WORLD CONFERENCE ON
THE INTERNATIONAL DECADE FOR
NATURAL DISASTER REDUCTION (IDNDR)
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Technical Papers

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MESSAGE

I am glad that a Workshop on Natural Disaster Reduction in the South Asia Region has been successfully held in New Delhi under the auspices of the South Asian Association for Regional Cooperation. I take note that the recommendations of the workshop would have wide ranging impact and would help to initiate new policy actions for natural disaster reduction in the region. I appreciate that my Ministry is bringing out a document on the workshop for presentation before the World Conference on Natural Disaster Reduction, being held in Yokohama, Japan, on 23 – 27 May, 1994.


(BAL RAM JAKHAR)



OVERVIEW OF NATURAL HAZARDS IN THE SOUTH ASIA REGION

The Asia Pacific region faces different kinds of natural hazards. Within this region, the South Asia sub-region is exposed to a high proportion of all disasters. This region consists of the countries of Bangladesh, Bhutan, India, Maldives, Nepal, Pakistan and Sri Lanka and accommodates a large population of over a billion. All the countries in the region are low-income economies which are making sustained efforts for economic growth. These efforts are often thwarted by recurrent natural disasters which have considerable impact, especially on the poor, and exacerbate poverty conditions in different parts of the region.

The countries in South Asia have diverse agro-climatic regions —high mountains, perennial rivers, arid and semi-arid regions, coastal belts and dry sub-humid regions and extensive forest cover with a high degree of bio-diversity. While long coastal regions are prone to cyclones and arid and semi-arid regions to persistent droughts, the Himalayan mountain terrain and parts of the continental crust are prone to earthquakes and landslides. The region's near perennial rivers are subject to periodic floods.

South Asia has been facing the onslaught of natural disasters since times of unrecorded history. The communities of the region have had to develop indigenous coping mechanisms to deal with disaster situations. But increased population pressures and environmental degradation have often overwhelmed the capacity of these people to face the challenge of natural disasters necessitating increasing interventions of Government and other sources of help.

BANGLADESH

Bangladesh faces problems like river bank erosion affecting millions of people living on river margins. Tornadoes occur quite frequently in the summer seasons. The country is prone to seasonal and non-periodic droughts during the summer period and is also susceptible to seismic disturbances.

The coastal regions are prone to severe cyclonic storms arising in the Bay of Bengal. Around 140,000 people lost their lives during the 1991 cyclones. The flood of 1988 affected more than two-thirds of the land and caused serious socio-economic disruptions in the country. The cyclone of 1990 killed about half a million people.

Bangladesh is a flat plain country with a population of 112 million and an area of 1,45,000 sq.

kms, 80 per cent of which is flood-plains of the Brahmaputra, Ganges, Meghna and smaller rivers, the elevation of most flood plain villages being only around 1 metre. It has a predominantly monsoon climate with heavy rainfall regions. Rainfall is largely confined to 3 to 6 months with an annual average rainfall of between 1250 mm and over 5,000 mm, marked by significant variations between years.

BHUTAN

The Kingdom of Butan has an area of 4,500 sq.kms. and a population of 0.6 million. Bhutan is broadly divided into three zones —southern foothills rising from the Indian plains, the northern high Himalayas bordering the Tibetan plateau, and the central valleys of the inner Himalayas.

The mountain regions in the high Himalayas of Bhutan of over 4,000 metres are covered by glaciers and perennial snow. There are several peaks rising well over 7,500 metres. The central inner Himalayas include some of the river valleys with much of the cultivated land. Several valleys rising from the contiguous Indian plains comprise a highly dissected terrain with some gentle slopes and river plains fit for inhabitation and cultivation.

The climate in the southern foothills is hot and humid with annual rainfall ranging from 1200 to 5500 mm. The inner central valleys are dominated by temperate climate with mild summers and cold winters with an annual rainfall of 500 to 1000 mm. The high Himalayan regions experience alpine climate with cool summers and freezing winters and receive annual rainfall of less than 500 mm.

Butan is relatively free from major natural hazards like cyclones, droughts and earthquakes. However, flash floods and landslides pose some problems. The economic impact of disasters is confined to localised areas and does not cause major disturbances.

INDIA

India has three distinct geographic regions — the Himalayan mountain belt, the Indo-Gangetic plains,

and the peninsular plateau. India has diverse agro-climatic regions with rainfall ranging from 150 mm in the western most part of the country to over 10,000 mm in the north-eastern region. Two-thirds of the country comes under arid and semi-arid region and dry sub-humid conditions and is prone to recurrent droughts. The coastal region is frequently affected by cyclones in the summer months of May and June and in October and November. Around 56 per cent of the area is susceptible to seismic disturbances. The Himalayan region and the north-eastern parts are highly unstable and hence subject to severe earthquakes. The 1993 earthquake of Maharashtra reveals that peninsular India is also under threat of modest to severe earthquake disturbances. Over 40 million hectares of land area in the country experiences periodic floods. The country's hilly region is prone to landslides and the Himalayan region to avalanches. Fire hazards inflict serious damage to life and property in rural habitations and urban slums, especially in the summer months. The recurrence of natural disasters causes major disruptions in socio-economic development.

MALDIVES

The Republic of Maldives consists of atolls. There are 26 atolls with 1190 islands of a total area of 298 sq. kms; 202 are inhabited and 75 other islands are used as tourist resorts. All the islands are low-lying and there is very little land in excess of 3.5 metres above sea level. The climatic conditions of Maldives are strongly influenced by the two monsoon seasons. The south-west monsoon brings considerable rains from May to November. The north-east monsoon gives rainfall between December and April.

Maldives is free from hazards like earthquakes, floods and cyclones. High waves and storms sometimes cause damage in some areas. Fire hazards also occur.

NEPAL

Nepal has an area of 1,47,181 sq. kms. with a population of 18.5 million. The attitude variations in the country are the greatest on earth. It ranges from the low-land Terai almost at the sea level to the Mount

Everest of 8848 metres. The country has three geographical regions, namely the high mountains, the low-lying Terai region and the hills in between. The presence of active seismic faults makes Nepal prone to high seismic disturbances. Between 1890 and 1975, twenty-three major earthquakes affected the country. Earthquakes of lesser magnitude also occur every year. The land is also prone to serious floods and soil erosion. Landslides are frequent in the midland and avalanches cause serious disruptions in the upper Himalayan region.

PAKISTAN

Pakistan has an area of 8,88,000 sq.kms. and a population of 120 million. The average rainfall in the monsoon is 200 mm. The country has varied geographical features — highly elevated mountain ranges in the Himalayas, namely Karakoram and the Hindukush, and hot deserts in the south. The Indus basin forms the plains with five major rivers.

Pakistan is susceptible to floods, droughts, earthquakes and landslides. The country faced 8 major droughts since 1947. The Sind and southern Punjab regions are the most drought prone. The country has a long history of earthquakes. In 1935, the Quetta earthquake killed 35,000 people. Floods are caused by excessive monsoon rains and heavy snow melts. Since 1947, the country experienced major floods in 1972, 1986, 1985, 1986, 1988 and 1992.

SRI LANKA

Sri Lanka has an area of 72,560 sq.kms. with a population of 18 millions. It has two geographical regions—the coastal region and the central hilly region. The average annual rainfall is 5500 mm. The climate ranges from semi-arid in the coastal region to mild temperate in the hills. More than 25 rivers flow to the coastal area. The western part of the country is prone to floods. Droughts affect the northern and the eastern parts. The country is also prone to cyclones and coastal erosion. 665 kilometres of the coastal region is affected by sea erosion. There is increasing incidence of landslides in the central hilly region and the south-western region.

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STATUS OF DISASTER MANAGEMENT IN THE REGION

The countries of the region have evolved institutional and procedural arrangements to cope with natural disasters. The organisational arrangements vary depending on the level of economic development, science and technology infrastructure, availability of trained manpower and the nature of hazards faced by each country. The succeeding paragraphs give an account of the existing disaster preparedness mechanisms, emergency relief arrangements, mitigation efforts and involvement of communities, non-governmental organisations (NGOs), and the business sector, and also brings out the extent of regional cooperation for disaster reduction.

NATURAL DISASTER PREPAREDNESS

In Bangladesh, the institutional arrangements have evolved over the past decades for managing and mitigating the impact of disasters. There is a National Disaster Management Council headed by the Prime Minister and an inter-ministerial Disaster Management Co-ordination Committee headed by the Minister for

Disaster Management and Relief. There are also District, Thana (sub-District), and Union (cluster of about a dozen villages) disaster management committees. The Disaster Management Bureau was established in 1993 to coordinate all disaster management activities including training in disaster management, improving warning and dissemination system, etc. A committee headed by the Minister for Planning, monitors disaster mitigation projects including the annual development programmes.

The BWDB operates a National Flood Forecasting and Warning System. Between April and October, daily bulletins are issued giving water levels for the three major rivers and twenty-one small rivers. All the projects and reservoir operation procedures have in-built flood forecasting and warning arrangements. Cyclone warnings are issued by the Meteorology Department based on satellite imageries and two radars. There is a cyclone preparedness programme which lays down emergency management procedures. There are codes which contain instruction to Ministries in dealing with emergencies.

As Bhutan has been free of major disasters, assessment of natural hazards and their mitigation do not figure prominently in the development programmes. However, slope stability studies have acquired some significance and are carried out by the National Geoscience Organisation. The organisations supporting



BHASKARAN

disaster management activities in the country include the Land Use Planning Project, Structural Engineering Cell and the Hydrology and Meteorological sections of the Division of Power.

There is a hydro-meteorological network in the country. The meteorological network consists of 110 stations and the hydrological network with 23 gauging stations located in rivers and their tributaries. Bhutan has no seismic station or observatory. Since no specific natural hazard has been identified to be a serious threat, there are no warning systems.

The primary responsibility for management of natural disasters in India vests with the State Governments. The National Government supplements the efforts of the State Governments in dealing with disaster situations and also provides the major part of the financial resources for disaster response. There is an institutional arrangement at the national, State, District and sub-District levels to deal with emergency situations. A National Contingency Action Plan exists for ensuring emergency assistance in the wake of natural disasters at the national, State and District levels. The State Governments have their Relief Manuals/Codes which lay down the procedures and powers for emergency management and provision of relief.

The national organisational arrangements consist of a Cabinet Committee on Natural Disaster Management at the national level, and a Crisis Management Group presided over by the Cabinet Secretary. Disaster relief coordination is effected by a Central Relief Commissioner in the Ministry of Agriculture. Each State Government has a Relief Commissioner and State Cabinet level co-ordination committees. At the district level, the District Collector presides over the relief committee which consists of people's representatives.

A Calamity Relief Fund (CRF) is allocated to each State on an annual basis, 75% of which is contributed by the Central Government. The quantum of the CRF is determined by independent Finance Commissions once in five years.

India Meteorological Department (IMD) monitors the rainfall situation through a network of 4000 rain gauge stations spread all over the country. The IMD issues daily/weekly rainfall bulletins. Before the

onset of the monsoon, long range forecast is made available for the monsoon season for the country as a whole. The weekly rainfall analysis is available every week with 35 meteorological sub-divisions in the country, which cover 127 agro-climatic regions. This rainfall monitoring gives early warning about droughts. The National Remote Sensing Agency, through satellite technology, reports on the status of crops based on a moisture vegetative index which is used in planning for drought management. A Crop Weather Watch Group meets once a week during the monsoon season to assess the behaviour of rainfall, crop situation and water level in reservoirs.

The IMD has an observation network to detect cyclones through 10 cyclone detection radars located on the coasts. A Geo-stationary Satellite (INSAT-B) monitors cyclone movements. There is a disaster warning system for rapid and direct dissemination of warnings.

The Central Water Commission (CWC) has a flood forecast system with 157 flood forecasting centres covering 62 inter-State river basins. The flood forecasting centres, in collaboration with IMD, monitor rainfall situation and water level in the reservoirs. With this information, the CWC issues flood forecast and warning about floods. The IMD's seismological branch has 35 observatories for monitoring seismic disturbances.

Maldives has had a Committee on Natural Disasters since mid-1980s and this committee has been integrated into the National Commission for Protection of the Environment. It is an advisory body comprising high ranking officials.

There is no national organisational structure for disaster management. However, specific disaster or emergency plans have been developed for the international airport and marine pollution events. A draft building code has been formulated. There are no formalised systems for the provision of disaster warnings. However, the Meteorology Department arranges to broadcast warnings about adverse weather conditions.

Nepal adopted the Natural Calamity (Relief) Act in 1982. The law originally provided for relief aspects of disaster management, but its amendments now provide for formulating a national policy for disaster

mitigation and preparedness. There is a Central Disaster Relief Committee presided over by the Home Minister and it coordinates the key disaster agencies including NGOs, in disaster related activities. The Act provides for declaring an area affected by natural calamity as 'disaster area'.

The Special Disaster Unit in the Ministry of Home functions as the Secretariat of the Central Disaster Relief Committee. There are District Disaster Committees (DDRCs) consisting of district level officials and NGOs, and political parties, and the DDRC is delegated necessary authority and responsibility for rescue and relief operations.

In rural areas, small scale localised disasters have been managed by village committee organisations.

In Pakistan, the primary responsibility for provision of emergency relief is that of the Provincial Governments. The Federal Government supports the efforts of the provincial governments. The National Calamities (Prevention & Relief) Act, 1958 confers special powers on Relief Commissioners to organise emergency response. An institutional arrangement at the provincial, divisional, district and sub-district level exists for emergency management. A National Disaster Plan was prepared in 1974, fixing responsibility with Government functionaries for implementing relief and rehabilitation programmes.

The Water and Power Development Authority has established flood warning system with 41 telemetric gadgets at key river locations for collecting river discharge data. The data collected by WAPDA through the radar at Sialkot, and the information furnished by the Indian authorities, are used for preparation of computerised rainfall run-off and for flood forecasting purposes.

In Sri Lanka, the Ministry of Social Services, Welfare & Rehabilitation, in the Central Government, is responsible for natural disaster management. The Ministry is entrusted with policy matters, allocation of funds to the provincial ministries and also coordination of activities related to disasters. Provincial councils are established for implementing disaster management schemes and programmes. A Divisional Secretariat exists for disaster management at the grass-root level.

Representatives of the Government and the public constitute the Secretariat. The Government has been attempting to evolve a comprehensive legislative framework for disaster management.

MITIGATION

Bangladesh has evolved mitigation measures with the following strategies:

- embankments in the coastal area and off-shore islands to prevent on-rush of tidal surge water;
- afforestation in the coastal areas;
- road networks in cyclone prone areas to facilitate evacuation and relief;
- construction of cyclone shelters;
- embankment on river sides in some areas where flood causes devastation; and
- raised earth platform in low-lying areas which come under water during flood season.

Disaster mitigation programmes have been undertaken over the years to mitigate the impact of droughts, floods and cyclones in India. The programmes such as Drought Prone Area Programme, Desert Area Development Programme, and the National Watershed Development Programme are intended to mitigate the impact of droughts. The main thrust of mitigation efforts in different river basins has been to modify the floods through specific structural measures such as reservoirs, embankments, channel improvement and town protection. From 1952 to 1992, the main flood management works included 15,800 kilometres of embankments; drainage improvement of 32,000 kilometres. 850 towns have been protected from floods through embankments. These measures provided a reasonable degree of protection to an area of 1400 million hectares. The total cost of mitigation efforts from 1951 to 1992 is around Rs.31.50 billion. A national effort has been made to construct cyclone shelters in the cyclone prone areas. Around 1,200 cyclone centres have been constructed in the coastal region. Efforts have been made to forest the coastal areas to break winds. Efforts have been made to build cyclone

resistant houses. A cropping strategy has been evolved, keeping in view cyclone seasons to reduce the loss of crops. Attempts are now being made to link development programmes with disaster mitigation efforts.

There are no major disaster reduction projects in Bhutan, Maldives and Nepal.

In Pakistan, the Federal Flood Commission prepares and operates flood protection plans comprising schemes for protection of vital installations and large towns and cities. Dredging of river beds is undertaken to moderate flood waters. The protection schemes generally envisage erection of protection embankments.

COMMUNITY PARTICIPATION IN DISASTER MANAGEMENT

The South Asian countries have mechanisms to involve community and NGOs for disaster management at various levels. Recently, efforts are being made to involve business sector in disaster reduction. In all the countries, the emphasis is slowly shifting from disaster response to mitigation. Towards this end, a conscious attempt is being made by all the countries for linking development programmes with mitigation schemes. There is an increased awareness to pay attention to environmental degradation which aggravates disaster impacts. Incorporating disaster concerns into environmental and developmental programmes are being undertaken to mitigate the impact of disasters. The support activities such as documentation, research, creation of public awareness and education and training are likely to get attention in the key areas.

The countries in the region still retain the many traditional values and there is a strong sense of community inter-dependance. This is an important disaster management resource. There are traditional coping mechanisms against disasters built up by affected communities. These have, however, not been documented.

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MASTER PRABIR DHAR



REGIONAL COOPERATION FOR DISASTER REDUCTION

In recent decades, there has been growing concern about the increase in incidence and severity of natural disasters. There has also been increasing realization that environmental degradation on account of heavy pressure on population, agricultural development, industrialisation, mining, decline in forest cover, over-exploitation of ground water etc., aggravate the impact of natural disasters. In view of the geographical proximity and the similar climatic conditions, the region is subjected to similar type of natural hazards. As large number of poor people live in this region, these countries share common socio-economic vulnerabilities to natural hazards.

Recognising the linkages of environmental degradation, poverty and incidence of natural disasters, the third SAARC Summit held in Kathmandu in November 1987 decided to commission a regional environmental study on the causes and consequences of natural disasters and the protection and preservation of the environment. In pursuance of this, each country in the region had prepared its own national study outlining the problems relating to environment and natural disasters and the efforts undertaken to deal with them. These national studies were consolidated into a regional study titled, "Causes and Consequences of Natural Disasters and the Protection and Preservation of the Environment."

At the Sixth SAARC Summit held at Colombo, an Environment Committee was established and was mandated to implement the recommendations contained in the regional study. The Environment Committee has identified several important areas for action. These are:

- i) **Networking of Institutions on natural disasters planning and management** :- This envisages identification of existing institutions in the SAARC region to undertake appropriate research and training programmes and over a period of time develop specialisation and to make their centres of excellence. The networking of such institutions in the region would enhance collective capabilities to reduce the impact of disasters.
- ii) **The establishment of SAARC Relief & Assistance Mechanism for Disasters** :- This is in recognition of the fact that occasionally the scale of disaster will be such that a single country may not be in a position to cope with it efficiently and adequately and other countries of the region may be required to extend assistance to tide over the crisis. The cooperation strategies for helping one another in rescue, relief and rehabilitation operation is to be facilitated under a SAARC mechanism like expanding the role of SAARC Food Security System, etc.
- iii) **Regional Cooperation on the Development of Modern Disaster Warning Systems** :- Some countries have developed disaster forecasting and warning systems based on the latest technologies and the regional cooperation for exchange of information, training and equipment would facilitate improving disaster warning systems in the region.
- iv) **Regional Programme for Research related to Drought Prone Areas** :- As the region shares a common monsoon rainfall pattern and agriculture is greatly dependent on the behaviour of the monsoon rains, weather aberrations cause loss in crop production in the region. It is recognised that there is a need to set up a mechanism for cooperation among agronomists, meteorologists, social scientists of concerned Member States for promotion of research with a view to mitigate the impact of droughts.
- v) **Regional Information Exchange System on Management of Human Activities in Disaster Prone Areas** :- Growing population in the region has been one of the reasons for over-exploitation of natural resources and degradation of the environment and life support systems. The increased human activities in the marginal fragile areas aggravated natural hazards. The countries in the region have initiated countermeasures such as landslide stabilisation, hazard zone mapping etc. Sharing of regional exchange which would facilitate the sharing of experience in these areas would help mitigate the impact of natural disasters.

Further efforts towards regional cooperation, in disaster management assumed urgency in the context of the global initiatives being taken as part of the International Decade of Natural Disaster Reduction (IDNDR). The basic objective of the IDNDR is to reduce, through concerted international action, the loss of life, damage to property and disruption of economic and social activities caused by natural disasters, especially in the developing countries.

In this context, the Committee on Environment organised a workshop on "Disaster Preparedness and Management" in Dhaka from 17 to 19 October 1993. The workshop also assessed the disaster impacts in the region and counter measures undertaken by various countries in the region. The SAARC conference of the Council of Ministers held in Dhaka on 4-5 December, 1993 decided to formulate a common strategy in the context of world conference of natural disaster reduction scheduled to be held in Yokohama (Japan) from May 23-27, 1994 which will, inter alia, review the accomplishments of the IDNDR at national, regional and international levels and chart an action plan for the remaining period of the decade to realise the goals of the IDNDR.

TOWARDS A COMMON STRATEGY

In order to formulate a common strategy and a collective position by the member countries of the

SAARC for presentation in the World Conference on Natural Disaster Reduction in Yokohama, Japan, the Government of India hosted a workshop in New Delhi from March 30 to April 2, 1994. This was attended by official representatives of all the seven countries in the region, and a representative each of the SAARC Secretariat and U N bodies in New Delhi including WHO, UNDP and UNICEF, besides Indian scientists and administrators involved in disaster management. (The list of participants is annexed)

Mr. Babu Jacob, Joint Secretary (Natural Disaster Management) and Additional Central Relief Commissioner in the Department of Agriculture and Cooperation in the Government of India, which is the nodal ministry to deal with natural disaster management activities in India, gave the welcome address. He observed that the Workshop was being held under the auspices of the South Asian Association for Regional Cooperation (SAARC), is a manifestation of the determination of peoples of South Asia to cooperate regionally and work together towards finding solutions to their common problems in a spirit of friendship, trust and understanding and to create an order based on mutual respect, equity and shared benefits.

He recalled the deep concern expressed at the Third SAARC Summit in 1987 over the frequent occurrence of natural disasters in the region and the follow-up action taken by way of preparation of a regional report on the causes and the consequences of natural disasters in the region. He also recalled that the Committee on Environment deliberated upon natural disasters and their impact. The Committee had organised a workshop on disaster preparedness and management in Dhaka in October 1993. The decision to hold the present Workshop in New Delhi, in preparation for the World Conference at Yokohama, was taken by the Council of Ministers of SAARC in December 1993 at Dhaka. The Workshop would look at the problems created by natural disasters and explore how best to reduce the impact of disasters through sustained efforts.

He observed: "We have mighty mountains, fertile plains, lush forests, teeming rivers and bountiful

oceans. Many of us share the Himalayan ranges, the Indo Gangetic plains, coral island systems and long coastlines in the Bay of Bengal and the Arabian Sea. South Asia is the home of Mohenjodara, Anuradhapura and the Taj Mahal; Patan and Kyi-Chu; Mainamati and the Hukuru Mosque. We have also an extraordinary ecological diversity in the region, ranging from the cold arid deserts of the trans-Himalayan region to the hot arid desert of the Thar, from the high mountains of the sub-temperate Himalayan ranges to the tropical ranges of the Nilgiris and from the vast Indo-gangetic alluvial plains to the swamp lands of the Sunderbans. We have rich natural human resources and flora and fauna. Rich we are in water and scientific and technological skills".

"The SAARC region was home to a third of the population of Asia and constituted one-tenth of the landmass of Asia. The density of population in the SAARC region is more than three times that of Asia as a whole. All the countries in the region faced problems of poverty, illiteracy and diseases. They faced a range of calamities caused by the forces of nature which were beyond their control. These included almost all natural calamities of geological and climatological origin that struck the surface of the earth.

"Of all the natural disasters in the region, drought affects more people and larger areas than any other disaster and it afflicts many countries in the region, barring perhaps Bhutan and Maldives. Earthquakes visit and cause considerable destruction in all our countries except Sri Lanka and Maldives. Bangladesh and India are among the most flood-prone countries on the earth. Pakistan, Nepal and Sri Lanka face serious problems from damage to due to floods. The potential for flood damage lies in the very nature of our ecological systems, namely, the monsoon, the highly sedimented river systems and the steep and highly erodable mountains, particularly those of the Himalayan range. In the SAARC region, Bangladesh has the worst record of cyclones and tidal surges. Devastating cyclones also affect India and Sri Lanka.

"Coastal erosion is a serious problem that affects our countries, especially Sri Lanka, India, Bangladesh and Pakistan. The presence of the Himalayas, which

constitute the youngest fold mountain region of the world, causes substantial incidence of landslides in Pakistan, India, Nepal and Bhutan. In fact, about 30 percent of the world's landslides occur in the Himalayan region.

"Our countries are also confronted by environmental degradation, arising out of improper use of land and water and other natural resources. All this is accentuating the problem of natural disasters. The types of natural disasters, their frequency and impact being largely similar in the region, we hope that our deliberations would take us to a common position in dealing with calamity reduction in the region. We can also look forward to this workshop as a precursor of an increasing level of activity in the region for natural disaster reduction"

Mr. Babu Jacob welcomed Mr. J C Pant, Secretary to the Department of Agriculture and Cooperation, Government of India and invited him to inaugurate the Workshop. He noted that Mr Pant, who had been the Central Relief Commissioner of India earlier, had a keen interest in disaster reduction efforts, being personally committed to problems of economic development in general and micro-level planning for sustainable development in particular.

Mr Babu Jacob said that the participation of all seven SAARC countries in the Workshop reflected the commitment of all the SAARC countries to joint efforts for disaster reduction. He also welcomed Mr Ahmed Latheef of the SAARC Secretariat, Mr Bhaskar Mitra, Joint Secretary in the External Affairs Ministry of the Government of India, Mr K B Saxena, Central Relief Commissioner of India, Indian scientists and administrators who had been invited to make presentations and representatives of U N Bodies in New Delhi.

ISSUES IN DISASTER REDUCTION

Mr K B Saxena, Central Relief Commissioner of India, in his opening remarks, observed that this Workshop, though delayed, was significant because this region faced a major share of natural disasters in the world. He said that most countries, poor or rich, suffered from natural hazards of one kind or the other. Developing countries got an overwhelmingly large share of them but were least equipped to handle them adequately. This situation, in his opinion, is likely to aggravate in the years to come. The pressure of population, impact of development and environmental degradation have the potential of increasing the incidence of disasters, as a large number of vulnerable persons are forced to inhabit risk-prone marginal areas



Mr J. C. Pant, Secretary, Deptt. of Agriculture & Cooperation lighting the traditional lamp before inaugurating the SAARC Workshop on Natural Disaster Reduction, in New Delhi on 30 March 1994.

with poor quality of life coupled with diminishing access to productive resources.

Elaborating the various issues involved in disaster reduction, Mr Saxena observed: "Disasters, as we all know from experience, have a crippling effect on the economy and infrastructure of the region. Disasters not only undermine development efforts and waste scarce resources; they put back development by destroying initiatives. The direct effect of disasters on economies is damage to infrastructure, crops and productive assets of the local population, besides imposing huge financial burden on relief and rescue operations. Indirectly, disasters also lead to decline in production, loss of income due to unemployment, indebtedness of the poor and increased cost of goods and services etc.

"Disasters also create differential impact on the affected population depending upon their social position and access to productive resources. Therefore, vulnerability of the people to disasters increases with poverty level. The socially disadvantaged groups, as for example the rural and urban poor, the women, the scheduled castes and scheduled tribes in our context, suffer disproportionately as they are also the groups who perforce have to live in the most disaster prone areas and are least equipped in terms of resources to cope with the disruption.

"Environmental degradation, as a result of over exploitation of resources, undertaking development activities ignoring disaster concerns under various social pressures and certain patterns of consumption and development, has the cumulative effect of aggravating the vulnerability of the poor people. At the same time, low level of development exposes the people, private property and public infrastructure to high risk from natural disasters. The global picture shows that there is positive correlation between loss of property due to disaster and level of development and inverse correlation between development and loss of human life.

"This inevitably brings us to the crucial linkages between development and disaster reduction. A long-term approach to reduce the impact of disasters and its differential vulnerability would lie in working out a

strategy and a programme of action which promotes environmental restoration and sustainable development, consistent with poverty alleviation and empowerment of the poor.

"Land use plays a very crucial role in determining the severity of natural disasters like earthquake, floods and drought. Therefore, the suggested strategy should ensure that changes introduced by technology and economic development do not permit a pattern of land use which aggravates the vulnerability of an area to natural disasters. At the same time, our prescriptions for environmental restoration and sustainable development should adequately take note of the legitimate concerns of the poor and the disadvantaged for survival as dignified members of the society. This is particularly important because often measures for disaster reduction suggested by experts have the potential of further aggravating the condition of the disadvantaged groups.

"One such example is the recommendation to remove all human settlements and buildings from flood prone areas. Human settlements in flood prone areas in Indo-Gangetic plains etc. and cyclone prone areas have come to stay. It would be appropriate to recognise this fact and devise ways to reduce the adverse impact of floods/cyclones on these settlements by devising appropriate shelters, evacuation procedures and alternative constructional technologies.

"However, there are a number of constraints in realising the needed integration between development and disaster reduction. For example, planners and administrators often do not involve local communities in the development process and the strategies of development tend to focus too sharply on individual family without enhancing community solidarity. Further, the issues concerning access to common property resources and mechanism of sharing fruits of development do not adequately take into account the position of assetless poor in society. The concerns of equity reflecting their interests are not sufficiently built into the development models and the decision making apparatus operationalising them. This has the effect of weakening traditional modes of operation within the community and consequent erosion of the resilience of the community to face disasters unitedly.

"Development planners may also lack training and capability to effect this integration. Government agencies and non-governmental organisations involved in developmental planning and disaster management often do not work in tandem. Then, there is the oft-quoted lack of coordination between the disaster manager and the planner, the former enjoying lesser authority to influence the decision making process on matters pertaining to development which falls in the domain of the latter.

"At present, there is also no machinery to take care of perspective planning and formulation of initiative for long-term disaster reduction due to pre-occupation of the planning bodies with other pressing issues of economy and development. The subject of disaster management does not get the priority it deserves under pressure of other competing demands.

"It needs to be emphasised that any delay in resolving these issues will escalate the costs of disaster reduction which developing economies could ill-afford. As resources spent on disaster reduction are an investment for the future, sensitization of higher decision making levels about the priority to be given to dovetailing of disaster reduction into development activities is the most urgently needed step which should be followed by a multi-disciplinary approach to operationalise this integration so that the capacity of vulnerable communities to mitigate disasters is strengthened.

"Our region has been the cradle of one of the most ancient civilisations of the world. Much before the advent of present industrial civilisation, a vibrant community lived on the river banks of the region in perfect harmony with the nature, practised developed agriculture and had planned urban settlements with flourishing centres of trade and commerce. With its young mountains and violent rivers, the people of the region had to cope with disasters caused by vagaries of nature. The challenges faced by local communities led them to develop their own mechanisms to reduce the impact of such events within the limitations of their capabilities and human resources.

"While there is evidence of rulers intervening to mitigate famine conditions, basically, it was the community which develops its own resilience system to cope with such disasters. That is how the region has survived the crippling droughts, devastating cyclones and floods and shattering earthquakes. The rich storehouse of knowledge and skills available with the local communities is our proud inheritance of the common intellectual property resources. Sadly, this resource and the value system built around it has gone into disuse and the traditional technology is getting obliterated under the impact of modern science and education. This trend needs to be reversed. Availability of such time-tested knowledge and skills with local communities is our best asset against the onslaught of natural disasters. Vulnerable communities should therefore be enabled to revive, apply and share traditional methods to reduce natural disasters in a cost effective manner suitably supplemented and strengthened by recourse to modern scientific and technical knowledge.

"A community so equipped and empowered would cope with disasters more confidently and enhance the quality and effectiveness of outside assistance and efficient use of scarce resources. Our efforts in the field of planning, development and disaster reduction should, therefore, aim at capacity building of the communities in this direction. In this process, education and training for disaster reduction, preparedness and mitigation measures is the most crucial input.

"One aspect of this education involves creating awareness in the vulnerable communities and other segments of society, dissemination of knowledge and skills to them with a view to eliciting their spontaneous cooperation and vigorous participation in various programmes of relief, rehabilitation and development. Community perception would have to be fostered through a programme addressed to the leaders of the community, democratically elected representatives of the people, social activists and other groups engaged in mobilisation of people for disaster reduction and development.

"The other aspect relates to training of disaster managers, professionals, development administrators and public servants who are associated with disaster reduction, mitigation and developmental activities at various levels. This would involve, among other things, technical training for handling programmes and attitudinal orientation for mobilising people and community resources.

"There is another group whose resources, skills and capacity have yet to be adequately tapped to achieve our objectives. Private/public sector organisations engaged in banking, trade, manufacturing and service have to play a crucial role in providing various kinds of support in the overall strategy of the disaster reduction, preparedness and mitigation.

"Reaching appropriate technologies to vulnerable groups, providing institutional finance for infrastructure development, disaster reduction and poverty alleviation projects, outlining framework of schemes for risk insurance are only some of the areas where the role of the private sector, as also the public sector in some cases, would be most crucial. Here, the role of the non-governmental organisations can hardly be ignored. Their skills and experience in mobilising people for participation and cooperation, reaching the benefits of disaster programmes to the targeted groups, utilisation of local skills and resources for disaster reduction and development and providing the most needed link between the Government agencies and the people are most valuable in obtaining optimum results from efforts, both public and private.

"The sharing of experience and documentation of disasters would also be a significant input in this task. Sadly, the infrastructure for achieving this stupendous task of education and training is lacking, although the region is not deficient in human resources and motivation. The Workshop would no doubt focus its attention on this important matter, among other issues."

Mr Saxena referred to the framework provided by the IDNDR to work out a programme of action for coping with natural hazards and said that most countries had either prepared or were in the process of preparing a national action plan to set in motion

activities for disaster reduction. In this background, the SAARC region with a major share of natural disasters affecting the world would have to take a lead in drawing up an action plan for strengthening national preparedness, promoting regional cooperation and seeking international assistance in areas where the region was deficient to achieve the objectives of the decade. He hoped that the Workshop would succeed in accomplishing this onerous task.

INAUGURAL ADDRESS

Mr. J C Pant, Secretary to the Ministry of Agriculture and Cooperation in the Government of India, while inaugurating the Workshop, welcomed the participants and hoped that their deliberations would enable them to project the problems of disaster reduction in the region on the basis of a collective strategy and a common position before the World Conference in Yokohama.

Mr Pant observed: "There is increasing realisation in the world today on the crippling effects of natural disasters on the social and economic life of mankind. It is this realisation that has led the United Nations to declare the 1990s as the International Decade for Natural Disaster Reduction (IDNDR). It is now acknowledged that fatalism about natural disasters is no longer justified and that specific human interventions are called for so that we can scale down the adverse impacts of calamities, if not avoid them altogether. Hazards are unavoidable, but disasters are not unavoidable. The IDNDR has, therefore, rightly focussed on the objectives of reduction of loss of life, property damage and social and economic disruption caused by natural disasters.

"As persons working in the area of disaster reduction in one way or the other, you all are aware of the targets of the IDNDR. However, it may still be relevant to remind ourselves of these, namely: comprehensive assessment of risks from natural hazards; mitigation plans for prevention and preparedness and community awareness; and access to warning systems and dissemination of warnings. We are now fast approaching the middle of the IDNDR decade. What have we achieved? Can we look back and confidently reassure ourselves that we are well on the way to

achieving these targets? If not, are we mustering enough courage and determination to change course and commit ourselves to achieving the objectives? These will be the questions facing you over the next four days. Let us look at ourselves critically and be not satisfied with unclear objectives, ill-planned strategies and inefficient implementation, if that is what we are faced with.

"We, in this region, have very similar and often shared eco-systems. Most of us in this region share the monsoon and substantially similar soil types and climatic and geological conditions. We have also shared vulnerabilities in the region. Countries in our region have been successful in building up scientific and technical institutions and trained manpower. With the back-up of these capabilities, are we not in a position to widen our net in preventing and reducing the impact of disasters? Are our IDNDR National Committees sufficiently active to influence decision making across a spectrum of economic activity in our Governments so that disaster reduction components are necessarily built into our ongoing programmes? If our Committees are not widely represented or are not clothed with sufficient responsibility and authority, we should then recast these forums so that they register visible presence in the national scene of economic and social activity.

"Our countries may even need some legislative and regulatory actions to be brought in so that there is enough support in controlling disaster-causing human actions. It needs no emphasis that man's actions have aggravated environmental degradation which is contributing to increased vulnerability on account of natural disasters. But we may also appreciate that it is not necessarily by legislative measures or controls but by positive administrative actions and commitment that we can support the community's efforts to withstand the onslaught of disasters

"Disaster reduction is not a single point activity in Government. It needs to be the concern not only of a number of Government departments and agencies but also be the concern of everyone in the Government system and those outside, namely non governmental

organisations and of the community. There are coordinating relief departments which are mostly charged with the responsibility of immediate response in disaster situations. While the effectiveness of disaster response needs to be strengthened through better management skills, higher level of coordination and involvement of all concerned, we have also to move away from the concept of confining ourselves to disaster response actions and throw our net wider and aim at preparedness efforts for disaster mitigation. This calls for introspection on our part in identifying appropriate programmes and projects which can directly and indirectly influence and reduce the impact of calamities.

"Who are the people affected by disasters? Where are they located? What do they need? Are we reaching them? The problems are complex and the people affected are in large numbers. The population density in the region is very high. Majority of the people are poor and illiterate. They may not be vociferous enough to catch our attention at the national level or to extract benefits or to influence policy making in favour of lessening of their problems. These are the people who need to be in the focus of our attention. Are we keeping them in view while designing our programmes? We have to consider whether our schemes are really trickling down and benefitting these people especially in the area of natural disasters, as most vulnerable people are the poor and economically under-privileged.

"We are to be clear in our minds regarding the hazards, the risks involved, the regions and areas likely to be affected and the vulnerability of the people taking into account their socio-economic status. In order that this becomes clear, hazard assessments employing science and technology inputs and vulnerability evaluations taking into consideration the stage of economic development need to be developed. Only these can enable us to focus attention on areas and peoples who are faced with considerable risks from natural calamities.

"I am afraid that in most of our countries in the region, we still do not have detailed hazard and vulnerability assessments which should impel us to formulate prevention and preparedness strategies with determination. Such a situation reduces us often to

merely responding to calamities and at best organising reconstruction without much concern about preventive action to bring about disaster reduction.

"Scientific and technical progress is taking place at a very fast pace. These scientific advancements throw up great possibilities for prediction and warning about natural processes that lead to calamities. Our long chain of scientific institutions in the region are doing useful work and some of them may be as good as any other in the international arena. We have to support their efforts and provide the necessary resources so as to fully utilise our scientific manpower to come out with recommendations and solutions relevant to our context. I find possibilities for networking of institutions in our region which can mutually support and advance the cause of natural disaster reduction oriented studies and research.

"Science is one thing and its application another. Transfer of technology from our institutions to the ordinary men and women facing calamities so as to make them better equipped should receive high priority. Intermediation arrangements for effective transfer of knowledge to the disaster affected is a big task. This can be best done through the increasing involvement of the NGOs, opinion leaders in the villages and field level functionaries.

"Under the U N banner of IDNDR we are in a position to pool our resources and make ourselves more effective by sharing of information, experience, expertise and human and material resources. But we have to devise specific projects for such sharing of skills and resources. We do not have at present many projects funded by international agencies in the region nor do we have many programmes of regional cooperation in the area of disaster reduction. We could look around for formulating some programmes which deal with our shared vulnerabilities so that our cooperation in the region itself comes out as a strategy for disaster reduction.

"There are no definitive solutions for dealing with calamities because the approach in the region and in our countries may have to be necessarily different from

, say, that in the Caribbean or in the South Pacific or elsewhere. What is appropriate for them may not be appropriate for us. This is where the pooling of our own experience and talent becomes quite relevant and it holds out possibilities for substantial regional cooperation.

"Every problem creates an opportunity. Natural disasters are our problem that opens up opportunities that we may not have dreamed of in the past. The Maharashtra earthquake of 1993, for instance, has shaken us up in India and has helped to ask ourselves questions in this country about how prepared we are. The earthquake occurred in a region which was considered least vulnerable to earthquakes and thus has thrown up new challenges for acquisition of knowledge into the natural phenomena causing natural disasters.

"We have a long way to go. We do not yet know nature in all its true manifestations. We can only ask the right questions. All the answers may not be immediately flowing in our direction but the more important thing is to keep striving for a right solution".

Ms. Janak Juneja, Director (Natural Disaster Management) in the Department of Agriculture and Cooperation, Government of India proposed a vote of thanks.

WORKSHOP PROCEEDINGS

After the inaugural session, the delegates met for discussions which were held in six sessions, namely:

1. Drought Proofing and Management
2. Earthquake Disaster Management
3. Role of Non-governmental Organisations
4. Management of Cyclones and Floods
5. Mitigation of Disasters due to landslides, fire and other natural calamities
6. Science and Technology inputs in disaster management.

The first session was presided over by Mr Ghulam Murtaza (Bangladesh) and papers were presented by Mr K.B. Saxena, Dr B.V. Ramana Rao and Dr P. K.

Dixit. After presentation, the participants discussed the extent of drought experiences and the existing management technologies in different countries and identified the relevant issues.

The Second Session, chaired by Mr K. P. Saxena (India), devoted deliberations on earthquake mitigation. Dr V. P. Kamble presented a paper on Monitoring of Seismic Disturbances and Hazard Assessment. Mr K. S. Siddhu (India) gave a presentation on the salient features of the emergency response to the 1993 earthquake in Latur (Maharashtra). Dr S. K. Thakkar (India) presented a paper on Research, Design and Construction of Earthquake Resistant Structures. The participants discussed the issues relating to earthquake management and mitigation, particularly measures such as earthquake resistant structures, organising prompt emergency responses, etc.

The third session was devoted to analysis of issues relating to role of non-governmental organisations and the private sector. This Session was chaired by Mr T. Lankaneson (Sri Lanka). This Session began with a presentation by Mr Lalit Mathur (India), Dy. Director General, Council for Advancement of People's Action and Rural Technology, on the role played by Indian voluntary agencies in disaster management and Mr M. C. Gupta (India), Secretary General of the Federation of Indian Chambers of Commerce and Industry, on Interface of Private Sector in Disaster Management. The delegates identified the areas in which the NGOs and private sector could extend assistance for efficient disaster management and mitigation systems.

The fourth session discussed various aspects of cyclone and flood mitigation efforts. This was presided over by Mr. Mohammed Khaleel (Maldives). The discussions followed the presentation of Mr A.V.S. Reddy (India) on disaster response and mitigation; Dr G.S. Mandal (India) on Cyclone Forecast and Warning; Mr H.N. Das (India) on Non-Structural Measures for Management of Floods, and Mr A.B. Joshi (India) on Flood Forecast and Warning, and Structural Mitigation Measures. The participants discussed various areas relating to structural and non-structural for mitigating

the impact of floods and identified key issues.

The fifth Session deliberated the issues relating to mitigation of landslides, fire and other natural hazards under the chairmanship of Mr Jnan Kaji Sanya (Nepal). Mr K. B. Saxena made a presentation on management of fire incidence and Mr P. Jagannatha Rao (India) on landslides, avalanches, snow-storms and hail storms. On completion of the presentations, the delegates discussed issues relating to landslides and identified common strategies for future action.

The sixth session was devoted to science and technology inputs in disaster management. Mr R. Tshering Tashi (Bhutan), chaired the session. Dr R. K. Midha (India), Dr Thiruvengkatachari (India), Dr B. K. Verma (India) and Mr Prem Krishna (India) made presentations respectively on "Science and Technology Inputs in Disaster Mitigation", "Application of Remote Sensing Agency for Natural Disaster Mitigation", "Health Care in Disaster Situation"; and "Vulnerability of Buildings in Disasters". The delegates discussed the issues and formulated an Action Plan in this regard.

It was followed by a session presided over by Mrs. S. Yasaratne (Sri Lanka) at which the recommendations to be made by the workshop in the light of the discussions held in the six sessions were considered. A drafting committee with one member each from the participating countries was formed. The members of the Drafting Committee were : Mr Babu Jacob (India), Mr Ghulam Murtaza (Bangladesh), Mr Mohamed



SHAH NISCHAL RAJNIKANT



A section of the Audience at the SAARC Workshop on Natural Disaster Reduction held in New Delhi from 30 March to 2 April 1994.

Khaleel (Maldives), Mr Jnan Kaji Shakya (Nepal), Mr Tshering Tashi (Bhutan), Mr T. Lankanesan (Sri Lanka) and Mr Ahmed Latheef, SAARC Secretariat.

The Drafting Committee had two sittings. The recommendations drawn by the Drafting Committee were presented to the concluding session on April 2. This session was presided over by Mr K. B. Saxena (India). It was assisted by experts who had participated in the earlier sessions to provide necessary inputs for framing the recommendations. After detailed discussions among the participating countries, the Workshop finalised the recommendations which are given in the next chapter.

Mr Babu Jacob thanked the delegates who participated in the Workshop. He hoped that it would augur a higher level of cooperation in the region for natural disaster reduction. He appreciated the personal contribution made by all the participants.

Mr K. B. Saxena, Central Relief Commissioner, observed that the workshop deliberations had considerably enriched the current level of understanding of the issues involved in natural disaster reduction in the

region. He expressed the hope that the recommendations of the workshop would considerably strengthen the already existing bonds of cooperation in the region and pave the way for wider international cooperation in disaster reduction.

Mr Ahmed Latheef, Director, SAARC Secretariat, thanked India for holding the Workshop and expressed satisfaction over the arrangements made for the Workshop as well as for the comfortable stay of the participants. He appreciated the high level of interest shown by all the SAARC countries.

On behalf of the participating countries, Mr Ghulam Murtaza thanked India for hosting the workshop. He observed that the Workshop had been a great success and the arrangements were excellent and he also felt that the input provided by the resources persons from India paved the way for full understanding of the impact of hazards and potential for disaster reduction efforts.

The workshop was declared closed by the Coordinator, Mr Babu Jacob, and the participants later posed for photograph.

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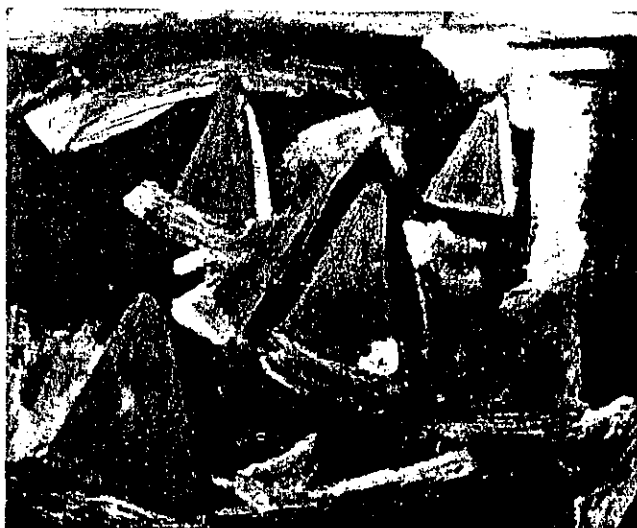
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RECOMMENDATIONS

I PREPAREDNESS:

Given the physical characteristics of the SAARC region, natural hazards are unavoidable though disasters can certainly be reduced, if not entirely prevented. Therefore, preparedness to face natural hazards holds the key to reducing the impact of natural disasters. The capability to cope with disasters, which is the essence of preparedness, has to be built at various levels from national to sub-national and down to the level of the community. Administrative arrangements, allocation of resources and operating environment are crucial aspects of preparedness which should be reflected in the institutional arrangements devised for this purpose. Viewed from this angle, the level of preparedness necessary to reduce the impact of natural disasters is generally inadequate in the region and intensified action assumes priority. It is, therefore, recommended that:

- i) A review of the existing legal and institutional arrangements for disaster management at national, sub national and community levels may be undertaken immediately;
- ii) An effective reorganisation of systems may be undertaken to overcome the inadequacies highlighted in the process of review;
- iii) Contingency action plans for disaster management may be prepared at national, sub-national and community levels, with separate action plans for critical infrastructures like hospitals, drinking water installations and power plants; the contingency action plan should be insisted upon as an integral part of any project having implications for natural disasters and mega cities near coastal areas may receive priority in these efforts;
- iv) The national capabilities for disaster reduction may provide for the following:
 - (a) strengthening the administrative set up at the local level where all emergency response to calamities takes place first;

- (b) making available adequate financial, material, and equipment support including stock-piling of essential articles in high risk disaster-prone areas;
- (c) decentralisation of authority, delegation of adequate powers to the lowest unit of administration and flexibility in operating procedures;
- (d) transparency of operating procedures and accountability of action;
- (e) laying down standards/guidelines for disaster resistant construction and other measures;
- v) The preparedness at the community level may be enhanced through awareness creation, support to its own mitigation efforts and involvement of the community in various disaster reduction and management measures;

The on-going technical and financial cooperation arrangements for disaster preparedness, such as the WMO/ESCAP Panel on Tropical Cyclones, should be continued and strengthened appropriately.

II DISASTER AND DEVELOPMENT:

The linkages between natural disasters and development are often overlooked. Development programmes are at times designed, ignoring the impact of hazards. This has accentuated the vulnerability of the areas and the people to natural disasters. As the region is being exposed to repeated disasters, often in the same locality, there is an urgent need for dovetailing disaster reduction concerns in the national plans and for taking up specific projects focussing on disaster reduction. It is, therefore, recommended that:

- Effective institutional mechanisms may be evolved for integrating concerns of disaster reduction in the process of planning at the national and sub national levels;
- ii) Development programmes, which have a bearing on natural disasters, should be required to incorporate disaster reduction components, with adequate care being taken to ensure that they do not contribute to making the concerned area disaster prone and increase the vulnerability of the poor and the disadvantaged groups to natural

disasters;

- iii) Specific projects, aiming at disaster reduction and preparedness, may be taken up for implementation on a priority basis in the most vulnerable areas;
- iv) Proper land use planning, which is the key to disaster reduction, should be incorporated in development planning backed by appropriate legal and administrative measures for effective enforcement.

III APPLICATION OF SCIENCE & TECHNOLOGY:

The region has developed science and technology capabilities for disaster reduction, particularly in the area of forecasting and warning in respect of floods, cyclones and drought and some of the valuable information gathered through these technologies is shared by member countries for preventive action. A number of institutions are engaged in research and development of appropriate disaster reduction technologies, besides activities relating to training and education. The application of science and technology to reduction and management of disasters needs to be considerably stepped up through measures aimed at promoting research and strengthening institutional capabilities for technology development, education and training. It is, therefore, recommended that

- i) Available scientific and technological knowledge may be optimally used for vulnerability analysis, hazard evaluation, risk mapping and preparation of disaster reduction projects, with some demonstration projects being taken up using these inputs which would serve as model for suitable replication /adaptation;
- ii) Institutional capabilities for research in science and technology aspects of disaster reduction may be expanded and the facilities in respect of forecasting and warning systems may be upgraded;
- iii) Research experience relevant to this field may be exchanged among the countries in the region and specific projects for transfer of technology within SAARC region may be implemented through bilateral/multilateral agreements;
- iv) The essential scientific value of traditional disaster reduction techniques practised by communities may be brought out so that these low cost techniques may be adopted for wider application.

IV COMMUNITY PARTICIPATION:

In disaster situations it is the community which responds first before other agencies, including the Government, are able to reach. Inadequate infrastructure of transport and communication makes immediate intervention by Government and other agencies difficult. Over the years, the communities have evolved their own coping mechanisms to manage disaster situations. The accumulated experience of the community and the resilience built by it are valuable assets in disaster reduction and management which need to be effectively made use of, shared and suitably strengthened by supportive and empowering measures. To achieve this objective, it is recommended that :

- i) The local communities may be assisted in coping with disaster situations by such measures as dissemination of information and knowledge, development of skills, provision of material support etc.;
- ii) The capabilities of local self government institutions, elected bodies and cooperative organisations to effectively discharge their responsibilities in disaster reduction and management may be enhanced by allocation of resources, equipment support and extension of technology;
- iii) Community leaders, activists and social workers with potential for mobilising community efforts and resources may be identified and appropriately involved in various activities relating to disaster reduction and management;
- iv) Institutional arrangements may be made for involvement of the community in decision making in matters pertaining to development and disaster reduction and the community may be supported with access to information and facilities for skill development to make their participation effective.

V AWARENESS PROMOTION:

There is insufficient awareness among decision makers policy planners , administrators and professionals in the region about the potential benefits of disaster reduction. This is a major constraint in integrating these aspects with development. Even though the IDNDR activities have helped to stimulate some awareness, the message of disaster reduction is yet to percolate to various levels in the Government. During the remaining part of the Decade, efforts would

have to be concentrated on widening awareness to ensure a stronger commitment to disaster reduction within the governmental and professional structures. It is, therefore, recommended that :

- i) The level of awareness about the importance of disaster reduction among policy makers, disaster managers and professionals may be enhanced through seminars, workshops, demonstration projects, exposure to real life situations and exchange of experience;
- ii) Widespread campaigns may be undertaken, through mass media as well as traditional and rural art forms to improve awareness about disaster reduction measures at national, sub national and community levels;
- iii) An autonomous body may be set up and supported with necessary resources to assume the leadership role and serve as an umbrella organisation for institutions engaged in awareness creation.

VI EDUCATION AND TRAINING :

Facilities for education and training in disaster reduction and management are not adequately developed in the region. The extent of mobilisation of human resources would be considerably enhanced if a well designed education and training programme is put in place. This would require technical training, skill development and attitudinal changes. It is, therefore, recommended that :

- i) Appropriate programmes may be designed to impart training, keeping in view the requirements of functionaries at various levels and training materials relevant to local conditions may be prepared in local languages;
- ii) National and sub-national training institutes may set up separate centres for training in disaster management on a continuous basis;
- iii) A disaster management institute for the SAARC region may be set up for training of trainers and policy makers, supported by adequate funding;
- iv) Skills for disaster resistant construction may be widely imparted/upgraded by expanding the network of institutions training artisans,craftsmen etc.
- v) Text books at school levels may incorporate information about the disaster causing phenomena and the precautionary steps to be taken to reduce

their impact in order to generate awareness among children.

VII ROLE OF NGOS:

There are obvious limitations to a Government taking up activities for mobilisation of community efforts, awareness creation, extension of technologies etc. Non-governmental organisations, with skill and experience, can discharge this role more effectively. The NGOs can provide the needed linkages between the people and the Government and help reach the benefits of disaster mitigation programmes to the targeted groups. They can also mobilise local skills and resources for disaster reduction and development. The NGOs have already been playing an increasing role in development activities in the region. However, the NGO activities in disaster management are generally confined to emergency response, administration of relief and, to some extent, reconstruction work. There is, therefore, scope for expanding the role of the NGOs in disaster reduction and management programmes. It is, therefore, recommended that:

The NGOs may be increasingly involved in

- (a) building up awareness among the people about the impact of natural disasters, possibilities of disaster reduction, needed response to warnings and in strengthening the coping mechanisms of the community;
- (b) dealing with instances of trauma cases and in providing counselling to those emotionally disturbed by the impact of disasters;
- (c) reaching relief and development assistance to the people and ensuring an equitable share of this to the most vulnerable sections;
- (d) dissemination of disaster reduction technologies, particularly in the area of house construction;
- (e) facilitating people's participation and mobilising community efforts in the planning and implementation of disaster reduction and management programmes;
- (f) preparing local communities for management of common property resources, such as grazing grounds and traditional water harvesting systems; and
- (g) promoting thrift groups for self help.

ii) The NGOs, who have varied skills and experience in dealing with disasters, may network among themselves and with the Government, thereby creating a forum of interaction for effective sharing of their resources and experience;

iii) With a view to bringing about a greater transparency in their operations, the international donor agencies, funding the NGOs, may intimate to the concerned Governments the details of their contributions to enable all concerned to appreciate their activities;

iv) The NGOs, who do not receive any international assistance or other donor assistance and face constraints in organising their activities may be assisted to establish the required essential facilities.

VIII ROLE OF PRIVATE BUSINESS SECTOR:

Natural disasters cause damage to infrastructure and disrupts economic activities. On the other hand, considerable opportunities are thrown up in manufacturing, trade and services sectors for catering to various needs of disaster prone areas. Hence, the business sector has a stake in reducing the impact of disasters. But, this aspect has not received adequate recognition. The business sector should, therefore, be encouraged to invest in wide-ranging disaster reduction activities including research and development components. It is, therefore, recommended that:

- i) Business sector should take steps to commercialise technologies which have a bearing on disaster reduction, create awareness about their benefits and promote research and development in this field;
- ii) Financial institutions should promote investment in business activities related to disaster reduction;
- iii) Banks and other financial institutions should provide credit to the families affected by natural calamities for repair and reconstruction, acquisition of productive assets for restarting economic activities and also consumption credit to cover periods of distress due to loss of income;
- iv) Insurance enterprises should expand the scope of their schemes to cover risks due to natural disasters;
- v) National Governments may initiate suitable

schemes to share risk premium of insurance policies and interest burden of bank loans in respect of the poor and the disadvantaged groups.

IX DIFFERENTIAL VULNERABILITY:

The poor people are the most affected by natural disasters. Their incapacity to stand up to the impacts of disasters arises from several factors. The poor often occupy disaster-prone marginal lands, have diminishing access to productive assets and are least equipped with resources to build up necessary mechanisms to resist disaster impacts. The social disabilities, which affect them in addition to poverty, further compound their vulnerability. The socially backward, the handicapped, the aged, the women and the children suffer from greater vulnerability than other sections of the affected population. The existence of differential vulnerability needs to be recognised in disaster reduction and mitigation planning. The potential to reduce the incidence of this vulnerability lies in empowering them by undertaking programmes aimed at alleviation of poverty and neutralisation of disabilities. It is, therefore, recommended that:

- i) The heightened vulnerability of the poor, the socially disadvantaged, the disabled, the aged, the women and the children must be specially taken into account in disaster mitigation planning, with special components reflecting their concerns and arrangements for protecting their interests built into the plans and information on the disadvantaged sections may be made an essential part of risk mapping;
- ii) The development strategy should specifically focus on improving the social and economic status of these groups as a necessary condition for disaster reduction;
- iii) Disaster reduction projects should necessarily incorporate components to reduce incidence of poverty and disabilities.

X DISASTER REDUCTION AND SUSTAINABLE DEVELOPMENT:

Environmental degradation also heightens the potential for natural disasters. Environmental improvement and natural disaster reduction measures often place disproportionate burden on the poor which further aggravates their vulnerability. It is, therefore, recommended that:

- i) Sustainable development, with poverty alleviation

as an integral part, may be promoted as a strategy for natural disaster reduction;

- ii) Development efforts may be suitably supplemented by regulatory measures to ensure equitable distribution of resources and benefits;
- iii) Prescriptions for natural disaster reduction should accommodate the needs of the poor and the disadvantaged groups for survival as dignified members of the society and should not in the least compromise on their existing access to productive resources.

XI RISK ASSESSMENT AND VULNERABILITY ANALYSIS:

The effectiveness of disaster reduction measures is dependent to a large extent on the depth of analysis about the probability and nature of disasters and the degree of loss of elements at risk. It, therefore, becomes necessary to undertake risk assessment with a reasonable degree of accuracy. Science and technology inputs have not always been fully used in hazard evaluation in the region. In vulnerability analysis also, there is inadequate appreciation of socio-economic factors relevant to the understanding of various groups within the society and the potential already existing for application of traditional practices in coping with natural disasters. It is, therefore, recommended that:

- i) The standards of risk assessment and vulnerability analysis be upgraded by fully applying the existing knowledge in the physical and social sciences and some pilot projects may be taken up in the region to demonstrate the utility of these techniques;
- ii) The disaster reduction measures adopted on the basis of this assessment should adequately reflect the efficacy of low cost traditional technologies and the action needed for their wider sharing and reinforcement.

XII DOCUMENTATION, EVALUATION AND RESEARCH:

This region is lacking in efforts relating to documentation of natural disasters, research into their socio-economic dimensions and evaluation of mitigation efforts. Detailed documentation of natural disasters, highlighting their physical characteristics, impact and the response of the Government and other agencies would serve as institutional memory, providing

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useful lessons for managing future hazards. Evaluation of disaster mitigation efforts would bring out their strengths and weaknesses, which could improve the quality of management. The research on socio-economic aspects of such events would help reorient public policies and initiate appropriate disaster reduction programmes. Training and education efforts would greatly benefit from these inputs. It is, therefore, recommended that:

Countries in the region may utilise and support institutions at national and sub-national levels for undertaking documentation, evaluation, and research activities. The work of these institutions may be coordinated by the autonomous umbrella type of body, recommended to be set up for awareness creation, education and training in para V (iii) above.

XIII REGIONAL COOPERATION:

The SAARC region, with a major share of natural disasters in the world, is endowed with rich experience in managing disaster threats for centuries and has over the years developed scientific and technological capabilities in the area of disaster reduction and management. While cooperative arrangements exist in the field of forecasting and warning, the countries in the region could also benefit from cooperation in the areas of disaster reduction and management. The existing institutional arrangements under SAARC are not considered adequate to address the need for enhancing collective capabilities of the region. It is, therefore, recommended that:

- i) Institutional arrangements under SAARC exclusively focussing on natural disasters may be established;
- ii) Networking of research institutions for sharing fruits of research and undertaking of joint research projects may be promoted;
- iii) The SAARC Chairs, Fellowships and Scholarships Scheme may be utilised in the area of disaster reduction;
- iv) Countries in the region may undertake demonstration projects through bilateral and multilateral arrangements;
- v) The knowledge about traditional practices in disaster reduction and management with potential for replication may be shared;
- vi) Institutions having facilities for training in various aspects of disaster reduction management may

provide increasing opportunities for its utilisation by countries of the region;

XIV INTERNATIONAL COOPERATION:

While the responsibility for disaster reduction and management essentially lies with national governments, international cooperation is vital for building up national capabilities, particularly in respect of low income economies with high exposure to natural hazards. International cooperation is crucial for transfer of technology and for promoting multilateral projects and research efforts in disaster reduction. It is therefore recommended that:

- i) International cooperation may specifically focus on strengthening national capabilities, creating/strengthening institutional infrastructure for training and education, facilitating transfer of technology and promoting bilateral/multilateral projects for disaster reduction and management;
- ii) A Global Fund may also be set up under the UN system as an additionality to the bilateral and multilateral cooperation arrangements for taking up these activities.

XV MEDIA SUPPORT:

Media has an important role to play in taking the message of disaster reduction to the people. It should take care that to avoid spread of misinformation. Its approach should be unbiased and constructive. Media should give due publicity to people's efforts in disaster reduction. It is therefore recommended that:

- i) Media should highlight accurate information about disaster events and their impact;
- ii) Media should particularly highlight the community's efforts in disaster reduction, besides covering the activities of the Government and the NGOs;
- iii) Media should effectively spread the message about the significance of preparedness in disaster reduction;
- iv) Media may assist Governments in mobilising resources for disaster reduction programmes, besides making its own contributions to the mitigation efforts in the event of major natural disasters;
- v) Media may undertake comprehensive documentation of natural disasters in view of its wide access to information and intimate knowledge of ground level situation.

ACTION PLAN

While the preceding recommendations lay down a strategy for disaster reduction by national governments and the international community, the countries in the region feel that in view of paucity of resources and the need for demonstrable achievements within the remaining period of the IDNDR, a sharply focussed Action Plan with a time-bound commitment may be drawn up. This would help in spreading the message of disaster reduction and pave the way for taking up more ambitious programmes with regional and international assistance. The countries in the region could also draw lessons from their experience to improve the planning and implementation of future disaster reduction programmes. Accordingly, the following programme of action is agreed upon with the objective of convincing decision makers and development planners about the need for prioritising the concerns of disaster reduction in the programmes of development:

- i) A restructuring of institutional arrangements at national, sub-national and community levels shall be made after carrying out a thorough review of the existing set-up;
- ii) A Contingency Action Plan for disaster management shall be prepared at the national, sub-national and local levels, with separate contingency plans for critical infrastructures like hospitals, drinking water installations and for mega-cities near coasts;
- iii) Detailed risk mapping in vulnerable areas shall be carried out in respect of selected areas which are most disaster prone, highlighting the differential vulnerability of the disadvantaged groups;
- iv) A few disaster reduction projects shall be formulated and taken up for implementation to demonstrate the benefits of disaster reduction strategy;
- v) Forecasting and warning systems shall be suitably upgraded with regional and international assistance where necessary;
- vi) Institutional arrangements with built-in autonomy shall be put in place for carrying out programmes of education, training, research and documentation;
- vii) Bilateral and multilateral arrangements for exchange of expertise, information and research shall be initiated;
- viii) Traditional practices of communities in disaster reduction and management shall be documented, shared and propagated;
- ix) A suitable institution shall be set up for catering to the training of professionals/disaster managers in the SAARC region and the facilities for providing training to candidates sponsored by the member countries in various institutions of science and technology shall be increased;
- x) Documentation of major natural disasters shall be undertaken;
- xi) Community leaders, activists, social workers and NGOs with potential for mobilising community efforts and resources shall be identified and involved in disaster reduction programmes;
- xii) Specific arrangements for promoting effective community participation in disaster reduction shall be established.