

was established at the Indian Institute of Public Administration (IIPA) at New Delhi and 15 States of India set up Faculties in disaster management in different institutions of the States.

A National Advisory Group is initiated by leading organisations to establish the agenda for measuring and managing vulnerability and taking up policy issues. The output may be integrated into curriculum of the ATIs.

In addition investments are being made to build capacity of NGOs and CBOs for working with the community as well as with the government.

The research and development work, education and training in the institutes of higher learning like Earthquake Engg., Earth Sciences, Hydrology Deptt. of University of Roorkee, the Central Building Research Institute, Jadavpur University, IITs at Kanpur and Bombay and SERC, Chennai, have been further expanded and developed and good number of M.E. and Ph.D thesis written during the Decade on the topics related to earthquakes, floods and cyclone disasters. The research work also continued at CBRI, CRRI and University of Roorkee on landslide hazard zoning and mapping etc.

#### 4.7 Upgrading and strengthening of seismological instrumentation network

The Department of Science and Technology, Government of India coordinated a World bank assisted project through which the seismological observatories in the peninsular shield region have been strengthened. Under this programme

20 existing observatories of IMD in full operation (10 GSN Stations, 10 stand-alone Broad Band Digital Stations) have been strengthened and 10 new observatories have been built. These will provide a state-of-the-art station network. Besides, Telemeter clusters at Koyna, Khandwa and Latur have been installed which will provide information from three important locations in the shield region. The on-going Strong Motion Accelerograph arrays and network program through DEQ-UOR has been expanded and strengthened.

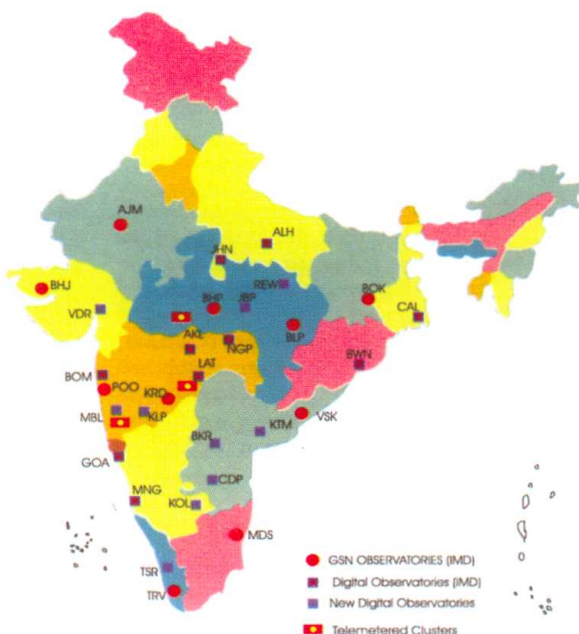
DST has also launched a nationally coordinated project on the study of seismicity and seismotectonic in the Himalayan region involving several research organisations. The strong motion data collection programme is being expanded and a number of tall buildings and other structures are being instrumented to study their behaviour during future earthquakes including soil structure interaction effects. GPS aided geodetic studies are being initiated with DST support and a national GPS programme has been evolved and planned for monitoring the seismotectonic provinces in the country. DST has initiated a number of projects in various parts of the country involving paleoseismology as a tool to date pre-historic earthquakes.

#### 4.8 Disaster warning system (DWS)

Department of Telecommunications' (DoT) telecommunication systems such as telegram, telex and telephones are often among the first casualty during a cyclone situation and warning messages get delayed. To overcome this difficulty, a very dependable and unique communication system known as

##### Upgraded seismological instrumentation network in the peninsular shield region

Source: Earthquake Research in India, Earth System Science Division, Department of Science and Technology, Government of India, 1999



##### Proposed permanent GPS stations

Source: Earthquake Research in India, Earth System Science Division, Department of Science and Technology, Government of India, 1999



Disaster Warning System (DWS) has been developed in India. Through this system, rapid and direct dissemination of cyclone warnings are made through INSAT satellite to designated addresses at isolated places in local languages. The Disaster Warning System is working along the coastal areas where 250 DWS sets have been installed in small administrative units like Block Development Offices and Police Stations. Disaster warning sets are also located in the State and District level headquarters in the above areas. The DWS has been successfully operated on occasions of cyclone during the past few years and has been found to be very effective.

Recently increased involvement of the vulnerable communities in disaster warning system is being worked out in India where rural groups will increasingly play a key role in early warning dissemination and execution.

#### **4.9 Role of Voluntary Sector**

The Decade has been of great stimulation to the Voluntary sector and NGOs in India. A number of NGOs and private industrial houses has initiated various activities. Some of the leading NGOs like OXFAM (India) Trust, CASA, CARE- India, Ramakrishna Mission, DMI, Dasholi Gram Swarajya Mandal etc. have been active in responding to almost every disaster with timely and effective relief operations.

CARE-India, CASA, DMI etc. have developed an extensive network of the community amateurs for disaster preparedness programmes. DMI is promoting building food, water, shelter and work security with the local community through action planning and participatory methods. The OXFAM (India) Trust with its partners have initiated activities of relief that can be achieved by the agencies over the years. Dasholi Gram Swarajya Mandal has integrated the natural forest resource management with disaster mitigation in the hill areas of U.P. The JAC has organised eight annual conventions on Disaster Management in different parts of the country. JAC was also instrumental in the development of Global Forum for NGOs. CAPART has started playing an important role in supporting the NGO activities in post-disaster rehabilitation activities.

#### **4.10 Conferences, Symposia and Workshops**

A large number of national and international conferences, symposia and workshops were organised and proceedings published by number of institutions and learned societies and organisations on various subjects related with disaster mitigation, prevention and management. Some of the important proceedings brought out are listed at *Annexure*.

Indian Society for Wind Engineering established in 1993 had the distinction of hosting the 9th International Conference on Wind Engineering in New Delhi in Jan. 1995. It has also sponsored several conferences on the subject in India and the Pacific region.