of different systems for protection of the coast in place of the seawall which is constructed all along the Kerala coast.

In the ensuing technical session which was chaired by Prof. S. Narasimhan of IIT, Mumbai and co-chaired by Dr. K R S Krishnan, Director, KSCSTE, presentations were made by Dr. V Sundar and Prof. J S Mani of IIT, Chennai, Dr. Kudale of CWPRS, Pune, Dr. Nagendra Kumar of NIOT, Chennai, Dr. M. Prithviraj of Department of Science and Technology, Government of India and Dr. M. Baba of CESS, Trivandrum. Scientists and engineers from IIT, Mumbai, NIO, CWC, Irrigation Department, Harbour Engineering, IMD, Revenue, Planning Board, Army, Air force, Police, Kerala and Cochin Universities, CWRDM, NATPAC and several other institutions participated in the seminar. A total of 101 delegates attended the seminar.

On the basis of the presentations and discussion, the seminar came out with the following recommendations for adoption in Kerala:

i) The management and protection of the coast needs to be viewed in the background of the different types of hazards like monsoonal waves, cyclones, floods, sea level rise, earthquakes, etc. and not confined to the recent Tsunami event alone.

ii) The protection of the coastal areas need not always be by structural means such as seawalls, groins, offshore breakwaters. Soft methods like beach nourishment, bio-shield, buffer zones, sand dune, artificial reefs, etc. may be adopted wherever appropriate.

iii) The seminar recommended that in future the coastal protection using sea wall along the Kerala coast shall be only in essential situations where protection of vital installations are involved.

iv) The CRZ regulations may be implemented strictly for the safety of the people. The meeting appreciated the 'No Development Zone' concept of category III (CRZ III) of the CRZ notification which will protect the coastal areas from natural hazards. It was also felt that similar 'No Development Zone' provision may have to be thought of for urban and highly populated areas and at least the existing building line be frozen for this purpose.

v) Coastal vulnerability zone for the frequent hazards such as annual floods, coastal erosion, etc. may be identified for restricting developmental activities and another zone for long term hazards like tsunamis, storm surges, cyclones may be identified for restricting other major investments like power plants, highways, airports etc.

vi) Integrated Coastal Zone Management Plans may be prepared for the coastal areas taking into account both the sea and land part and also vulnerability to hazards, livelihood security of the people and other social, economic and infrastructural requirements of the population.

vii) Kerala should have additional monitoring infrastructure like seismic stations, tide gauges, wave and current monitoring systems along its coast for hazard preparedness and early warning.

viii) The seminar was unanimous in recommending co-ordination of various agencies and activities for hazard mitigation and suggested that it should be integrated with the newly established Department of Disaster Management.

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WORKSHOP ON TSUNAMI AND NATURAL DISASTER MITIGATION

A one day workshop on the above topic was conducted at Yavanika Seminar Hall, Bangalore on 19.3.2004 by the Disaster Management Centre (erstwhile Drought Monitoring Cell of the Karnataka Government) in the wake of the threat that looms large over India and many parts of the world due to natural calamities. As the human mind prides that it has understood many mysteries of the nature, the nature unfolds new challenges for man to comprehend and conquer. In his attempts to unravel the secrets of the natural events and to grapple with them, man is always innovative and inventive in following the maxim—necessity is the mother of invention. The need to organize disaster management/mitigation centers was felt by all the concerned especially after the devastation caused in the wake of the Boxing day Earthquake off Sumatra.

It was a well thought of and well organized workshop by the Government of Karnataka who have taken the task seriously although the threat perception due to any of the
six major natural hazards (drought, flood, cyclone, landslide, earthquake, Tsunami) is not so alarming and immediate in the state. The seriousness was reflected in the daylong presence of notes taking Minister for Science and Technology, Sri Basavaraj Horatti, Secretary for Science and Technology, Sri Shankaralinge Gowda and several secretaries, Commissioners, and Zilla Panchayat Members.

The workshop was inaugurated by Sri M.P. Prakash, Revenue Minister of Karnataka, who emphasized the helplessness of man before nature’s fury and the need to learn the lessons from tsunami. He inaugurated the automatic “Telemetric Rain Gauge System – Varsha” on this occasion. It will be installed initially in 5600 villages and later all the villages will be covered in due course. The data will be received at Bangalore on realtime basis which will go a long way in drought mitigation planning.

The keynote address was delivered by Dr. H.K. Gupta, Secretary, Department of Ocean Development on “Early Warning System for Oceanographic systems in Indian Ocean – The Indian Initiative” involving Rs.125 cores and 50 countries around Indian ocean with a population of 1.56 billion. He said, India has self-reliability with a good seismic network, research vessels and bathymetric surveys. It is planned to deploy data buoys (each costing Rs.20 lakhs) in a 100x100 km grid pattern. In association with DST, DOS, S & T Departments, it is envisaged to be a comprehensive real time ocean observation system with dedicated tsunami warning system, developing numerical models for tsunami and storm surges, generating coastal inundation and vulnerability maps, educating masses, training volunteers etc. This programme is on a “high commitment* level by Government of India with international connectivity. The system will be in place by September 2007.

In this presidential address, Sri Basavaraj Horatti expressed the dire need for the Government to come to the rescue of the common man who is the first target in any disaster and his commitment to do something exemplary in this regard. He released an informative book on Tsunami and other natural disasters. He suggested to bring out simple booklets in Kannada about various aspects comprehensible by common man.

The first technical session was chaired by Prof K.S. Valdiya of the Jawharlal Nehru Centre for Advanced Scientific Research, Bangalore, assisted by Dr. M. Basappa Reddy, Director (Retd.), Mines and Geology, Government of Karnataka and with Dr. Imtiaz Ahmed Parwez as rapporteur. Dr. Vinod Kumar, CMMACS spoke on “NRSA’s activities in relation to disaster management” on high resolution satellites and data processing in GIS environment. Prof D.K. Pal, IIT, Roorkee spoke on “Retrofitting Technology in making the existing buildings earthquake resistant” in respect of rural and urban risk factors. Sri S.S. Momin, PWD, Government of Maharashtra spoke about a case study in reconstruction at Latur Earthquake area. He elaborated on the cost effective, quake proof structures and involvement of rural folk especially women in drawing plans of new settlements (Rs.1100 cores package).

Prof. K.S. Valdiya suggested to bring out item wise hazard zonation maps at the district level.

The second session was chaired by S.V.K. Gore, IAS, Principal Secretary (Retd.), Cochaired by Dr. H. Chandrasekhar, Director (Retd.), DMCC, Government of Karnataka and with Dr. T.N. Venugopal, Deputy Director, Dept. of Mines and Geology, Government of Karnataka as rapporteur. The first paper was presented by Sri S.N. Jamdar, IAS, Secretary (Revenue), Government of Karnataka on “Disaster Management in Karnataka”. He said that the official machinery is always geared to cope with any eventuality. Later, Sri M.N. Reddy, DGP (Fire Services) gave a lucid account on link up with national and local disaster management groups and about the preparedness of the police department in an emergency, Dr.V.S. Prakash, Director, Disaster Management Centre, Government of Karnataka, on deputation from CGWB, GOI, gave an account of various steps taken by his center to brace with any type of disaster. Dr. H. Chandrashekhar made a special mention of seismicity in and around Bangalore and the need to pay more attention to this aspect.

The next session was chaired by Prof R.S. Deshpande, ISEC, Bangalore with Dr. S.R. Hiremath, Samaja Parivartana Samudaya (NGO), Dharwar as rapporteur. This was a unique session with first hand experience presentations by NGO volunteers and coordinators. Sri T.Pradeep of Samuha (NGO) having worked in eight disasters, spoke about his experiences in meeting with the emergency. Mr.Stan Thakkekara, ACCORD (NGO) who was involved in coordinating 500 NGOs in Nagapattinam district hailed the tireless efforts and coordination of the Tamil Nadu government and its officials. He said the “disaster is not in the photos and maps; it is visible in the tears of the orphans, the homeless, the hopeless and the helpless”. He called upon the scientific community to rise to the occasion. Dr. Thelma Narayan, Community Health Cell, Government of Karnataka gave a lucid account of her teams (of doctors and nurses) relief work at Cuddalore and Nagapattinam in combating outbreak of epidemics and communicable diseases. She said the promised ‘shelters’ are not coming up in the affected areas.

The plenary session was chaired by Sri Basavaraj Horatti, Minister for Science and Technology. Four representative
Zilla Panchayath members from four types of disaster prone districts spoke about their expectations and responsibilities. Sri Venkat Rao from Bellary (drought), Smt. Menakshi Prabhu (Earthquake - Chincoli, Gulbarga district), Sri Nazeer Ahmed (Chamarajanagar, Flood and Forest Fire) and Sri Bhujanga Setty, Uduipi (Tsunami) gave their accounts of the situation.

Shri Basavaraj Horatti announced that all the recommendations of the workshop will be implemented fully and the proceedings will be published in Kannada. The Secretary, S & T, Sri Shankaralinge Gowda announced that the next workshops will be held at Udupi District (on Tsunami), Gulbarga district (on Earthquake) and Dharwar district (Drought) to spread the message of awareness and preparedness to larger masses.

Thus, this unique workshop was a useful exercise in bringing on to a common platform the politicians, scientists, bureaucrats, NGOs and the citizens. Such interaction between the people of knowledge and the people of power are definitely going to be of advantage to the man-out there in the field, who bears the brunt of any such disaster.

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NATIONAL WORKSHOP ON RECENT ADVANCES IN GROUNDWATER:
EXPLORATION, MANAGEMENT AND UTILIZATION

The above national workshop organized by the Department of Geology, N.E.S. Science college Nanded, Maharashtra (India) and sponsored by U.G.C., New Delhi was held during 20th to 25th January, 2005. The 40 participants included teachers of Geology, civil engineers and research scholars from various universities and institutes. A brief report of the proceedings follows:

Day 1 (20/1/2005): Dr. R.K. Suryawanshi, Director, National Water Academy, Khadakwasala, Pune inaugurated the Workshop. He delivered the keynote address on “Present water scenario in India”. The need for proper planning, development and management of water resources was emphasized by him. He lamented that India in spite of having adequate water resources is facing scarcity as well as floods regularly. Even though considerable development has taken place during the post-independence period, it is not adequate for the growing water demands from every sector. Augmentation of water by developing all supply sources and minimizing the demands by innovative technology as well as mass awareness with proper institutional arrangement for holistic and integrated management of water resources on a basin scale was stressed by him as the need of the hour to take care of the future.

Prof. N.J. Pawar (Dept. of Geology, Pune University, Pune) gave a lecture on “Geochemical Processes and Mechanism of Groundwater pollution” and also conducted a practical class on environmental geology.

Day 2 (21/1/2005): First lecture of the day was given by Dr. V.K Saxena (Dy. Director NGRI Hyderabad) on “Delineation of fresh groundwater potential zones in coastal aquifers”. Groundwater in coastal regions is usually deteriorating by seawater incursion. The towns and villages of Krishna-delta are facing fresh groundwater problems because of transformation of fresh groundwater to brackish/saline water. This also degrades the soils of the area, reducing the fertility and in turn affecting the crop yield. Failure of crops has been indicated in some parts of Krishna delta where the sea water intrusion has been very fast.

Second lecture was given by Dr. Ramesh Chand (Dy. Director, NGRI, Hyderabad) on “Estimation of Ground-water recharge by using soil moisture data”. Soil moisture studies provide potential information in the field of hydrology, meteorology and agriculture. In the field of hydrology, such a study is important in understanding the recharge process and component of infiltration due to precipitation and irrigation. The moisture content of the surface layers control the upward and downward flow and storage of water in the unsaturated zone. In the field of agriculture, information on soil moisture is needed for crop yield forecasting and irrigation scheduling, while in the field of meteorology the knowledge of soil moisture is required to estimate radiation component. There are direct and indirect methods for measurement soil moisture.

Mr. N.C. Mondal (NGRI, Hyderabad) delivered a lecture on “Groundwater Modeling”. He explained MOD FLOW, a three-dimensional finite difference groundwater flow model. It simulates steady and nonsteady flow in three dimensions for an irregularly shaped flow system in which aquifer layer can be confined, unconfined or a combination of both and