Introduction

A three-day International Conference on "Coastal Hazards", first time ever held on this theme in India during 9-11 February 2005 at Thanjavur, was organized jointly by the Department of Disaster Management, SASTRA Deemed University, Thanjavur, and the Indian Geological Congress (IGC). The Conference was attended by over 100 delegates, including one each from Sri Lanka and Bangladesh. Nearly 50 papers plus two poster presentations and ten keynote addresses were delivered. It was sponsored by 15 government and public and private sector industries, including DST, DOD, NGRI, GSI, and importantly by the ONGC.

Inaugural Function

Prof. G.V. Rajamanickam, Conference Convenor, welcomed the Chief Guest and the delegates. Prof. O.P. Varma, Chairman, Organizing Committee, introduced the Chief Guest S. Asokan, Chief, Titania Business, TATA Steel, highlighting his academic distinctions and contributions in the area of mineral exploration and development. Prof. R. Kandaswamy, Registrar, SASTRA in his Presidential Address, remarked that although this Conference had been planned with a foresight and vision about a year ago, it has found more relevance after tsunami hit the Eastern Indian Coast on 26th December 2004. Reference was also made about the M.Tech., programme on "Disaster Management", which the SASTRA has introduced, first time in India, from 2003-04 academic session under the overall charge of Prof. G.V. Rajamanickam with well equipped modern laboratories in geomagnetics and remote sensing.

Chief Guest Dr. S. Asokan underlined the stark reality of the helplessness of the scientists in preventing the natural hazards, and emphasized the need of installation of reliable forecasting and effective warning systems. Despite the enormity of damage caused by the tsunami, he pointed out the fortuitous outcome from the harbour waves by way of enrichment of black sands along the Indian coast. Dr. Asokan released the Abstracts volume of papers, containing 81 contributions. Dr. Bhoop Singh, another dignitary on the dias, released the volume on "Landslides" comprising the presented papers contributed to the National Seminar on "Landslides", held on March 1 & 2, 2004 at SASTRA. Dr. A. Hannah Rachel Vasanthi, presented a delightful vote of thanks.

Technical Encompassment

Technical programme began soon after the inauguration with a special session chaired by Prof. O.P. Varma with four keynote addresses. In the first keynote address, Dr. Bhoop Singh, Director, NRDMS Division, DST, New Delhi, enlightened the delegates on the initiatives and support of the DST to the coordinated research programmes on "Coastal zone resource management", and informed the participants that his division would welcome research proposals in the above area for favourable consideration.

Second keynote address was delivered by Dr. M. Baba, Director, Centre for Earth Science Studies, Trivandrum. He spoke eloquently on "Urbanisation, coastal hazards and coastal management" and emphasized the role of Vulnerability Indices Area Map, which could contribute immensely to save population from natural hazards and ensure safety of means of livelihood and the natural environment.

Dr. Prithiviraj, Director, Earth System Sciences, Department of Science and Technology (DST), presented the third keynote address on "Indian ocean tsunami of 26th December 2004" , gave a brief account of the efforts made by ESS Division, DST, in assessing the impact of tsunami on the different landforms and also the changes that have
taken place in the sediments and the mineralogy of beach placers.

Shri S. Sridharan, Deputy Director General, Meteorology, IMD, Chennai presented the fourth keynote address on “Tropical Cyclones: Role of India Meteorological Department in Distress Mitigation”. Sridharan stressed that meteorology plays a pivotal role in providing necessary inputs for disaster management by way of detection, tracking and advance warning.

The entire scientific and technical programme was then split into nine sessions. Technical Session - I on “Cyclone, hurricane and tornado” while Technical Session - II on “Sea-Level oscillation and tidal surge, harbour development and environment”. Proceedings of this session began with a keynote address by Dr. Manmohan Mohanty, Department of Geology, Utkal University, Bhubaneswar, who spoke on “Storm surge and its impact on Orissa coast, Eastern India: Supercyclone of October 1999”. Dr. Mohanty highlighted the severity of the cyclone that had enormously ravaged Orissa coast, camouflaged with geomorphological, environmental and ecological implications, and finally listing protective measures.

Technical Session - III on “Coastal erosion and protection, naval warfare, nuclear disposal and environment”, made the beginning with the keynote address on “Coastal Zone Management Strategies to Protect the Tamil Nadu Coastal aquifers from sea-water ingress” by P.M. Natarajan. It was followed by Technical Session - IV, relating to “Cliff slumping & prevention; Coastal aquifers and sea-water ingress; Sewage and coastal environment Urbanization and coastal environment”. Maiden contribution to this session came from Dr. R. Anbalagan on “Sea Cliff Slumping and Protection Measures” in a keynote address.

For the Technical Session - V on “Industrial effluents and coastal environment”, we had an invited keynote address by Prof. D.D. Misra titled “Mining Disasters and Mitigation: Some thoughts on Mine Inundation”. The subsequent Technical Session – VI was on Coastal Non-Living Resources, Minerals and Mines: Their Protection Against Hazards and Technical Session -VII was on “Coastal Regulations and Coastal Zone Management”.

Special Session - VIII was fully devoted to “Tsunamis along with the Nagapatnam Coast” and subsequent Session - IX to “Tsunamis along the Cuddalore and Kanyakumari Coast”. In Session - VIII, Prof. O.P. Varma delivered keynote address on “Unpredictable Tsunamis and Tsunami Earthquakes” and in Technical Session - IX, keynote address was given by Prof. T. Sivaramakrishnan, Dean (Research), SASTRA on “Cyclones of Indian Sea".

The scientific programme on tsunamis stole the show by having nearly twenty-five papers, including two keynote addresses, one documentary film, and analytical results, having been, first time, brought out at the Conference.

Plenary Session after the tsunamis session was held with Panel Members; including Dr. Athiyaman, Dr. Antonio Mascarenhas, Dr. A. Wijetunge and Mr. V. Krishnan. Proceedings were coordinated by Prof. O.P. Varma, having been supported by the Co-Chairman Prof. G.V. Rajamanickam along with other four Panel Members, named above. The session adopted a set of recommendations with a strong note from the assembly that follow-up action on them be the foremost and most essential step by the organizers.

(1) Collection of pre-tsunami base-line data to create data-bank in different disciplines should be the immediate concern of the scientists and funds be generously allotted by the Government on related projects. It was noted that tsunami basically constitutes inter-disciplinary area of research and education. (2) Earth science-related knowledge and R&D are pre-requisite to the understanding of coastal hazards - their genesis, occurrence, mitigation and efficient management are based on this knowledge. Coastal hazards management should be introduced as a post-graduate courses in some South Indian universities. (3) Disaster management centers have to be established at the Taluk level and they have to be maintained by a staff having qualified Post Graduate level degree in Disaster Management to look after the respective Taluk, both in preventive and mitigation measures. (4) It was also unanimously agreed that R&D results ought to be better shared among the neighbouring countries. In this connection, the conference desired that awareness and training be considered as essential areas of research. (5) Preparation of Atlas of coastal landforms, showing areas likely to be inundated, on at least 1:25,000 scale should be prepared and made available freely. (6) The Survey of India and Ministry of Defence should seriously consider removing restrictions on the supply of toposheets of coastal areas for research and scientific studies. (7) Restore the normal vegetative cover in the coastal zone and enforce strict implementation of CRZ Act. (8) Seismology should be delinked with atmospheric science. Earthquake and tsunamis should be handled by seismologists and a scientific analysis and requisite feedback data should come from earth scientists. (9) Coastal aquifer being vital source of freshwater in the tract, should be conserved and protected by all means against over exploitation and seawater ingress or from any other source of pollution. (10) Over exploited aquifers should be artificially recharged.

(11) Pertaining to protection of coastal zones against coastal
hazards the Conference advised that no damage to mangroves and coral reefs be allowed, and there should be strict implementation of 500 m zone free of human habitation and construction. Moreover, plantation of casuarinas and coconut trees be entertained. (12) As mining of coastal placers is indispensable in national interest, sustainable mining with due regard to natural eco-systems and restoration of ecology, landscapes, etc., be considered favourably in the grant of exploration and mining leases. (13) As already emphasized, there will ever be need for installing forecasting and warning systems, as also proposed by the Government to minimize the losses due to seismogenic tsunamis.

The marathon deliberations of the Conference came to end after the Valedictory Function with Prof. D. Jayakumar, Former Vice-Chancellor, Periyar University as Chief Guest. The function was also graced by Prof. S. Vaidyasubramanian, Dean (Planning and Development) of SASTRA, who presided over the function. The Conference came to a close after expressing copious thanks by Dr. Eugene Wilson.

TSUNAMI AND THE COASTAL REGULATION ZONE (CRZ)

The March 2005 issue of the *JGS* carried some interesting items relating to Tsunami. Most of the authors unequivocally advocated strict implementation of the Coastal Regulation Zone (CRZ) norms as one of the remedies for future disasters. Even in the recently held (9th to 11th February, 2005) 'International Conference on Coastal Hazards' at Thanjavur, one of the recommendations pertains to CRZ.

The CRZ notification (dated 19.2.1991 and subsequent amendments) was issued by the Ministry of Environment & Forests, (Department of Environment, Forests and Wildlife), Government of India. Development activities in the coastal region have to adhere to the norms laid out in the CRZ notification which has four categories namely CRZ I, CRZ II, CRZ III and CRZ IV. The notification imposes restrictions on certain activities in the coastal regions lying between High Tide Line (HTL) and Low Tide Line (LTL) and between HTL and 500 m landward of HTL and the CRZ I encompasses areas which are ecologically sensitive (already identified and as may be declared as such by the Government from time to time) and the contiguous area between HTL and LTL. No new construction is permitted within 500 m of the HTL. The CRZ II includes areas which are already developed close to the shoreline, as is the case with coastal cities and towns. In this zone, construction of buildings can be taken up only on the landward side of the existing road. The areas covered under CRZ III include stretches that are relatively undisturbed (urban areas which are not substantially built-up and rural areas). The land here up to 200 m from the HTL is to be declared as "No Development Zone". Designated authorities can permit construction of hotels, beach resorts, dwelling units in the area lying between 200 m and 500 m (from the HTL). Andaman, Nicobar, Lakshadweep archipelago and other offshore islands come under the CRZ IV. The restriction on developmental activities is similar to that in the CRZ III.

The recent tsunami has demonstrated that the CRZ rules even if implemented rigorously, will be of little help in saving life and property in terrains which are flat and featureless. Fixing a horizontal distance of 200 m or 500 m from the HTL makes little sense when the (storm, cyclonic and tsunami) waves can travel far inland and cause extensive damage. To take care of such an eventuality, it is desirable to insert another clause which accommodates altitude as an additional criterion for demarcating set back line. The modification to the CRZ (I, III & IV) notification can be "200 m (or 500 m as the case may be) from the HTL or +3 m contour, whichever is farther from the HTL."

In the case of developed (cities and towns) areas, for which there is practically no set back line (CRZ II), it is imperative to have other protective measures like preserving the existing mangroves and sand dunes, planting casuarina trees, etc. Emplacement of hard structures like sea walls can be the last option, that too in places where it is absolutely necessary to save some important structures, at any cost. This may be even at the cost of loosing the adjacent beaches/structures.

NOTES

Indian Geological Congress
P.B. No.114, 35A, Civil Lines
Roorkee – 247 667
Email: Indiangeocong@sancharnet.in

K. R. SUBRAHMANYA
Kengeri Satellite Town
Bangalore - 560 060
Email:krsabrahmanya@rediffmail.com