

GEOMATICS IN TSUNAMI (Eds. SM Ramaswamy, C.J. Kumanan, R. Sivakumar and Booph Singh), New India Publishing Agency, New Delhi, 2006, 225p., Price: Rs 990

After the killer tsunami of 26th December 2004, there have been a spate of publications on its causes, damages caused and mitigation measures to be adopted and many conferences, seminars and symposia were held to discuss and deliberate related issues. The Centre for Remote Sensing, Bharathidasan University, Thiruchirappalli brought out a volume "Tsunami: The Indian Context" (Eds. SM Ramaswamy and C J Kumanan), encompassing the full papers presented in a 'brain storming session on tsunami' held at the Centre on 25-26 February 2005, and was perhaps the first book to be published on the subject. The volume under review - *Geomatics in Tsunami* is the second publication brought out by the Centre for Remote Sensing, Bharathidasan University, jointly with the Department of Science and Technology, Government of India, on the subject.

Soon after the tsunami, which literally sent shock waves amongst the technocrats, administrators and scientists of the country, the Department of Science and Technology through its Natural Resource Database Management System (NRDMS) Division has initiated and executed an all India co-ordinated programme on 'Tsunami Disaster Assessment and Mitigation' by assigning the project to six specialized centres in remote sensing and GIS of the country. The project envisaged the tsunami disaster assessment in terms of natural, physical and human resources and suggest mitigation measures using Geomatics Technology

(also called Geoinformation or Geospatial Technology)

The book contains the results of the studies carried out under the above project along the tsunami-hit coasts of Andhra Pradesh, Tamil Nadu and Pondicherry and Andaman and Nicobar Islands. In addition, the book contains articles which address on history and mechanism of tsunami generation, impact of tsunami on coastal ecosystem, tsunami generated societal issues, citizen's perspective, strategic roles played by Government and NGOs in tsunami Crisis management etc.

There are 20 papers contributed by 59 authors, which have been presented under five sections: (i) History, mechanisms and photogrammetry, (ii) Disaster assessment, (iii) Ecosystem, (iv) Relief and rehabilitation and (v) Fjord Provinces of Norway. The first paper titled 'History of Tsunami' by N. Rajendran after an introduction on causes and characteristics of tsunami, provides a detailed discussion on Kumari Kandam and Lemuria, and recent shore line changes along Tamil Nadu coasts under the heading

Tsunami: The historical record. These discussions unfortunately do not have any bearing on historical records of tsunami. Further, the author describes a few tsunamis that struck different parts of the world like the one in Portugal (1755), Krakatova (1883), Chili (1960) and Alaska (1964), but no mention has been made on tsunamis recorded in history that struck the Indian coasts. T. S. Murthy et al. in their paper on 'The role of Oscillations of the First and Second Class in Tsunami around Andaman and Nicobar Islands' show by theoretical arguments and analytical computations the reason for the persistent high water levels for several days around Andaman and Nicobar was due to the presence of gravoid and elastoid modes of oscillation with the tsunami, on the shelf surrounding the islands. The paper on 'Photogrammetry Applications for Tsunami Damage Assessment' by M. Dharmaraj gives an account of various issues related to the generation of ortho-rectified photographs using digital aerial stereo-images acquired immediately after the tsunami of 26 December 2004, which will be utilized by various organizations for tsunami damage assessment.

The first paper under the Section Disaster Assessment by Brig. R. Sivakumar and Bhoop Singh outlines the initiatives undertaken by NRDMS, Department of Science and Technology on tsunami disaster assessment. Soon after the 26th December tsunami, DST initiated an 'All India Co-ordinated Programme on Tsunami Disaster Assessment', funding specific projects to different institutions. The main objectives of the programme were to generate damage assessment maps on natural, physical and human resources, including determination of land use/land cover changes, coastal erosion and deposition, and assessment of contamination in portable ground water resources and preparation of risk zonation maps using pre- and post tsunami remote sensing data along with collateral attribute data in GIS platform. Parthasarathi Chakrabarty and others assess the damages caused by the recent earthquake and tsunami in parts of Andaman Islands. Pre-tsunami theme maps were prepared from remote sensing data from IRS P6-MX and LISS III and PAN merged (Feb, 2004) and post-tsunami maps from RS data of IRS P6 MX and LISS III/PAN merged data (Feb 2005) with ground verification. Damage assessment and mapping of tsunami affected areas in parts of Nellore coast is the subject matter of the paper by K. Mruthyunjaya Reddy and others. The authors have used IKONOS data of January 2000 for

generation of pre-tsunami thematic maps. It is highly conjectural to attribute whatever changes have taken place in land use/land cover, geomorphology etc. within a period of 5 years (between January 2000 and January 2005) solely to the 26th December 2004 tsunami. The authors have given pre-and post-tsunami land use/land cover maps of Vagaru village (Figs.4 and 5 respectively) and also a table (2) for tsunami induced damages in land use/land cover of the village. The area of different units indicated in pre-tsunami land cover map, when added up is 755 Ha, whereas the cumulative area of different units in post-tsunami map is 803 Ha. Further, there are also discrepancies in the areas mentioned in Table 2 in comparison with what has been indicated in Figures 4 and 5.

M. Ramalingam et al. discuss the extent of tsunami inundation, loss of lives, property loss and damages to physical and natural resources in the Chennai region between Ennore and Mahabalipuram due to the 26th December 2004 tsunami. For mapping pre-tsunami geomorphology and land cover pattern, the authors have used LISS III PAN merged and IKONOS data, and to map post-tsunami terrain, including tsunami inundation, IRS-P6 PAN merged satellite data have been used. But, neither the post-tsunami geomorphological map, nor any description on the changes taken place as a result of the tsunami is given in the text. The damage assessment in the tsunami-affected region of Pondicherry-Cuddalore coasts was carried out by G.V. Rajamanickam and others. They have studied the structural damages, erosion/deposition along the coast, land use, soil salinity and hydrogeological changes taken place due to the tsunami, and prepared a tsunami risk map by evaluating the damage assessment. The pre-tsunami IRS-P6 LISS IV MONO + LISS III merged data) and post-tsunami (QUICKBIRD PAN 31 December 2004) satellite data were used for studying the land use changes. SM. Ramaswamy and others have carried out tsunami damage assessment for Nagapattinam coast for which, the pre-tsunami IRS-P6 Pan merged digital data (5th March and 21st May 2004) and post-tsunami ERS data (29th December 2004) have been utilized. They have carried out regional assessment of tsunami damages on 1:50,000 scale by studying the tsunami inundation, geomorphological and land use/land cover changes. The regional studies have shown that the coastal geomorphology has played a vital role in deciding the tsunami inundation and damages. Detailed studies carried out in Sirkali block show appreciable damage to aquifer in the form of salt water mixing/intrusion. Detailed geospatial data bases have also been generated village-wise, and on the basis of inundation, the geomorphic features of the area have been classified as most, moderately and least

vulnerable category. Geospatial assessment of the tsunami damages along Kanyakumari coast is described by N. Chandrasekar et al. They provide run-up level and the inundation limit in different areas and also estimate the overall changes in beach volume based on the amount of accretion/erosion due to the tsunami. Based on damages assessed for natural, physical, biological, hydrological and economic aspects, integrated damage assessment map has been prepared for the area demarcating three different zones of vulnerability.

The third Section of the book deals with Ecosystem in relation to tsunami, in which five papers have been included. The first paper in this Section 'Physico-chemical Perturbation in Coastal Systems' by A. Rajendran and R. Arthur James is a very generalized paper describing the characteristics of tsunami waves, past tsunami records in India, impact of tsunami on surface and subsurface waters, coastal environment etc. The second paper in this section deals with the 26th December 2004 tsunami's characteristics and coastal responses in Car Nicobar Island, authored by Arunkumar et al. The authors provide information on tsunami wave heights, run-up elevation, inundation, tsunami flow direction, sediment deposition/erosion and coastal subsidence. In this study to assess the changes taken place in the coastal environment in Car Nicobar Island due to the tsunami, the pre-tsunami satellite data utilized is of IRS-IC LISS III of 24th February 1999, obtained about six years prior to the tsunami. The digital analysis of the satellite data was done using the image processing software (ERDAS IMAGINE 8.4) and DTM to quantify tsunami height, run up, inundation and coastal responses.

The paper by L. Kannan and others describes the impact of the recent tsunami in the coral reef ecosystem of India. The studies indicate that apart from physical damage, the coral reefs of Andaman and Nicobar region have suffered heavily by the earthquake by both the subsidence of the southern group of islands and uplift of the northern group of islands. The authors report that there were no significant damages to the coral reefs of the Gulf of Mannar and Palk Bay. Impact of the recent tsunami on mangrove ecosystem of Cuddalore coast is dealt in a paper by V. Selvam. Studies indicated that the loss of lives and damages to houses were much less in villages surrounded by the Pichavaram mangroves. The author stresses the need of strengthening the ecological foundation of the coastal zones with mangroves and other vegetation as one of the strategies for mitigating the impacts of natural disasters in coastal areas. The paper by Usha Natesan and S. Kalaivani discusses the tsunami-induced water quality changes in Buckingham

canal, Chennai region. The water was rich in nutrients before tsunami, whereas due to invasion of sea water, dilution had occurred after tsunami.

The next Section in the volume - Relief and Rehabilitation includes four articles. C. Venkatachalam in his paper 'Syndrome of the Tsunami (2004) Ravaged Society - A Microscopic View of Nagapattinam, India' discusses about societal issues that have come up due to the tsunami, like loss of leadership, widowhood, debt grip, psychological depression etc., which warrant deeper look to bring them back to normalcy. A citizen's perspective on 26th December 2004 tsunami is presented by T. Dhanapal, documenting the issues like coastal vulnerability, mitigation strategies, media exposition, communication networking and education facilities that a citizen would like to ponder over so as to understand the dimensions of post-tsunami activities and draw lessons that the tragedy had taught us. The paper - 'Partners in action: NGOs in tsunami relief and rehab' by Annie George deals with the roles played by NGOs in relief and rescue operations in response to the tsunami and the effective role played by NCRC-NGO Co-ordination and Research Centre in rehabilitation phase along Nagapattinam coast by creating successful partnership with the government and the public. The paper titled 'The Tsunami Disaster and Tamil Nadu's Response, India' by R. Santhanam narrates the immediate measures taken in search, rescue and relief operations and the rehabilitation programmes and the steps adopted for prevention of epidemics by the Government of Tamil Nadu.

A paper on 'Landslide Triggered Tsunami in Norway' by SM. Ramaswamy and others is the lone paper in the last Section: Tsunami - Fjord Province of Norway. The authors of this paper visited institutions connected with geohazards and tsunami in Norway to learn more about geohazards. In

western Norway, tsunami triggered by landslides occur frequently, and a brief description of the studies being done by institutions like the Norway Geotechnical Institute (N.G.I), International Geohazards Centre (I.G.C) and Norway Geological Survey, for evolving protective, preventive and prediction models is outlined in this short paper.

Interestingly, the volume has two Forewords, one by Kapil Sibal, Minister for Science, Technology and Ocean Development, Government of India and the other by Dr. C. Thangamuthu, Vice-Chancellor, Bharathidasan University, Tiruchirapalli. The volume has been brought out in well designed hard cover and good quality glossy paper, but the editorial quality leaves a lot to be desired. More attention in editorial work should have enhanced the quality of the papers. It is frustrating in many cases to match the symbols/colour codes in the index with those in the poorly produced maps. Typographic and grammatical errors mar the text, probably a price paid for speedy publication. Another drawback of this volume is that there is no paper dealing with tsunami studies in Kerala coast, though the coast, particularly between Kollam and Alapuzha was severely struck by the 26th December 2004 tsunami. With all the above shortcomings, this multi-disciplinary book may be beneficial to students, researchers, professionals and administrators in the field of coastal environment and disaster management. For speedy publication of this volume, the Department of Science and Technology and the Centre for Remote Sensing, Bharathidasan University, Tiruchirapalli are to be congratulated.

Prashanthi
Devan Road, Kanhangad,
Kerala - 671 315
Email: nambiar_ar@yahoo.co.in

A. RAGHAVAN NAMBIAR

HIMALAYA (Geological Aspects), 2006, Vol.4, 355p (ISBN 81-89304). Edited by Prof. P.S.Saklani, Satish Serial Publishing House, 403, Express Tower, Commercial Complex, Azadpur, Delhi -110 033, Price: Rs.1995; US\$ 115.

This book has 19 contributions. In the first paper Jean-Pierre Burg synthesizes sections across the Central Himalaya and the 'Western Himalaya' in Pakistan and concludes that first- order units and second order structures in these sections are different and developed at different time and rates. He further suggests that Karakoram Fault has propagated from transfer/transform fault between an

island arc preserved orogen in the west and an island-arc-subducted orogen further east. In Fig. 2, which shows main structural features of the Himalaya, two symbols given in the map do not tally with those shown in the explanation. The paper omits references to publications of S.V.Srikantia and his associates, which are based on detailed mapping of a vast terrain.