

## CESS SILVER JUBILEE CELEBRATIONS CONCLUDE

CESS Silver Jubilee Celebrations came to a close with the concluding function held on 30<sup>th</sup> March, 2005. Dr. A.E. Muthunayagam, Executive Vice President, Kerala State Council for Science, Technology and Environment, (KSCSTE) Govt. of Kerala presided over the function. The newly constructed Silver Jubilee block and Sophisticated Analytical Facility (SAF) were inaugurated by Hon'ble Minister for Education Sri. E.T. Mohammed Basheer. The Silver Jubilee block has added 600 sq. m of built up space to the existing laboratory complex to house



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*Sri. E.T. Mohammed Basheer, Hon'ble Minister for Education, Govt. of Kerala inaugurating the Silver Jubilee Block in the presence of (L.R) Prof. K.S. Valdiya, Chairman, CESS Research Council, Dr. A.E. Muthunayagam, Executive Vice President, KSCSTE and Dr. M. Baba, Director, CESS.*

## IMPACT OF TSUNAMI ON THE KERALA COAST

N.P. Kurian

The 26<sup>th</sup> December 2004 tsunami that unleashed havoc along the shores of many Indian Ocean countries, had a devastating impact on the Tamil Nadu and Kerala coast too. Though Kerala coast was in the shadow zone with respect to the direction of propagation of the tsunami waves, its destructive power left nearly 200 people killed and hundreds injured, in addition to destruction of houses and property worth several crores of rupees. Most of the human casualty and destruction occurred in sectors adjacent to the Kayamkulam inlet that separates Kollam and Alappuzha districts. As tsunami is a rare event, particularly for the west coast of India, and most of its signatures may disappear, it is important to carry out post-tsunami surveys to generate a data base for future studies. The survey included measurement of runup,

inundation limits, arrival time of waves, and assessment of its impact on coastal geomorphology, life and property, flora and fauna, etc. Thus, a comprehensive post-tsunami survey was initiated by CESS along the Kerala coast based on the *Post-Tsunami Survey Field Guide* published in the web site of International Tsunami Information Centre (ITIC). Runup was estimated as the elevation at the local maximum of the horizontal inundation, measured relative to the mean water level at each location (Page 13, ITIC Tsunami Glossary). Altogether, 83 locations spread over the entire Kerala coast, reported to have been affected by the tsunami, were visited. For those sectors which were not visited, information was collected by interviewing affected people. The runup levels and impact of the tsunami on different stretches along the Kerala coast

are presented in Figure.

Though, the runup level and inundation was low for Thiruvananthapuram coast, it picked up towards Kollam in the north. In the Pozhiyur - Vizhinjam sector, the runup level was in the range 1.0 –1.5 m, rising only up to the monsoonal berm. No damages have been caused in this area. In Vizhinjam – Thangasseri sector a run-up up to 2.5m was noticed. Tsunami caused considerable damage to protected Thangasseri harbour area, where the breakwater runup was up to 3m. Eventhough the area to the north of Thangasseri is protected by a sea wall, the tsunami caused widespread damages in that area also. In Maruthadi, south of Sakhikulangara, water entered through a fishing gap in the seawall and reached more than 100m landward

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## From the Director's Desk



Scientists, planners, administrators and the people are still debating all over the country on the mechanisms to protect the life and property of the coastal population from tsunami and other natural hazards. With the annual coastal erosional impact reaching hundreds of meters, tsunami impact extending to a couple of kilometers and the cyclone/storm surge reaching still further, the task of suggesting appropriate protective systems becomes highly arduous. The scientists are of the view that first the vulnerability analysis be done and based on this sufficient buffer space be provided, the settlements be on stilts, structural barriers be minimal, bioshields be created as speed breakers and sufficient communication systems be put in place. The people on the other hand, do not want to move away from their present dwelling places and want full structural protection of their areas without hindrance to their livelihood activities. The administrators have the twin task of relief/rescue operations on one side and implementation of the schemes proposed by the Departments/other governmental agencies, based mainly on conventional techniques, on the other, that too on a war-footing, without much concern on the long-term consequences of these interventions. With the differing views and conflicting demands the planners are really a confused lot!

It is in this context the provisions of the CRZ are to be seen. This notification clearly emphasizes the provision of a buffer zone of 200m on the sea front and 100m on the tidal water bodies. Having suggested that the new buildings be beyond this line, CRZ provides for the systematic reduction of the density of development near the shoreline, thus creating a buffer. Similarly, in the 200-500 zone of the sea coast the density of the development is to be limited to one third of the area and structures be of maximum nine metres height. Is it not a clear protection from hazards by exposing lesser number of people to coastal hazards and, for those who are left there, having the facility to climb up to save themselves from floods? Are these provisions not providing sufficient space for the fishermen to organize livelihood activities and to have a healthy uncongested living? By permitting the most essential infrastructure facilities within the CRZ, is it not helping in the smooth conduct of life and simultaneously easy escape facilities/space for rescue operations in the event of a hazard? With these and other attractive provisions in the CRZ what else is required for hazard management in the coastal areas. Why do the planners lose sight of these provisions of the CRZ (which are statutory and not to be violated) and ponder in the dark at least until a new system is in place?

**Dr. M. BABA**

*Continued from p. 1 CESS SILVER .....*



*Sri. E.T. Mohammed Basheer distributing Silver Jubilee memento to Sri. P. Ramachandran Nair of CESS*

the SAF, consisting of X-ray Fluorescence Spectrometer (XRF) lab, Paleomagnetic laboratory, Petrology lab and other modern laboratory facilities.

Sri. E.T. Mohammed Basheer released the Silver Jubilee Souvenir. The first copy was received by Dr. A.E. Muthunayagam. A Silver Jubilee Compendium entitled 'Earth System Science and Natural Resources Management' containing 28 research

articles, highlighting significant contributions made by CESS scientists, was released by Dr.A.E. Muthunayagam and was received by Prof. K.S. Valdiya, Chairman, CESS Research Council. Prof. K.S. Valdiya offered felicitations. The Hon'ble Minister also distributed Silver Jubilee mementos to two members of CESS community. Sri. G.K. Suchindan, Convener, CESS Silver Jubilee Celebrations proposed the vote of thanks.

*Continued from p. 1 IMPACT OF TSUNAMI .....*

causing widespread damages. Inside Sakthikulangara and Neendakara harbour, water level rose to more than 2m above the ground. Many country boats and other fishing vessels were damaged.

The Neendakara - Kovilthottam sector, further north, which is well protected by seawall had no hinterland inundation. North of Kovilthottam, there was a drastic increase in the runup level. A sector of about 1.5 km, north of Kovilthottam, evacuated by IREL and KMML for the mining did

not have any damage even though the runup was up to 3.5m. In Panikkarkadavu-Cheriyazhikkal area no damage was reported in spite of a run-up of 4.5m. The relatively lesser damages in this

## CORRIGENDUM

In the last issue of CESS News, the first three lines of the article 'Model Master Plan.....' be read as 'Ever since Mrs. Gro Harlem Brundtland, the former Norwegian Prime Minister, in her famous 1987 report on, "Our Common....."

area could be due to the better quality of house construction. Further north, towards Cheriazhikkal, water level raised to more than 2m and many houses were completely collapsed or partially damaged. In Parayakadavu area, further north, the severity of attack of tsunami was more and heavy casualties were reported. Many deep pits were seen on the eastern side of the coastal road. In Srayikad area, about 3 km south of the Kayamkulam inlet, 30 people were killed and many houses completely damaged. Majority of those killed were women and children, who were trapped inside collapsed houses. Water level rose up to 2-3 m along the coastal road. Another notable feature of the tsunami onslaught in the area was the heavy deposit of black sand in the sector north of Cheriazhikkal, up to the inlet. The coastal road which runs more or less parallel to the shore at a distance of roughly 50m, was covered with black sand deposits of thickness about 1m in the Cheriazhikkal-Azhikkal sector.

Tsunami caused extensive damage to Azhikkal, which is 2km south of the Kayamkulam inlet. In Alappad Panchayat, 132 people were reported dead, more than 1250 people injured, and more than 2400 houses completely damaged. The floodwater that inundated the whole barrier beach flowed towards TS canal, running parallel to the shore. Water rushed through Kayamkulam inlet and the overflow from the barrier beach caused severe damage to adjoining areas of Kayamkulam backwaters where the water level rose up to 4.5m.

In the sector to the north of Kayamkulam inlet, the runup level was up to 5.0 m. Accordingly, the devastation also was quite extensive, but casualties were not high like Alappad, probably due to low population density. North of Kayamkulam inlet, deep pits were seen adjacent to the road. Extensive deposition of black sands was observed in this area also. Maximum damage due

## INTERNATIONAL TSUNAMI EXPERT VISITS KERALA



*Dr. Tad Murty, indicating the tsunami inundation level from signatures on a coconut trunk in Colachel, Tamil Nadu.*

Dr. Tad Murty, Dept. of Civil Engineering, University of Ottawa,

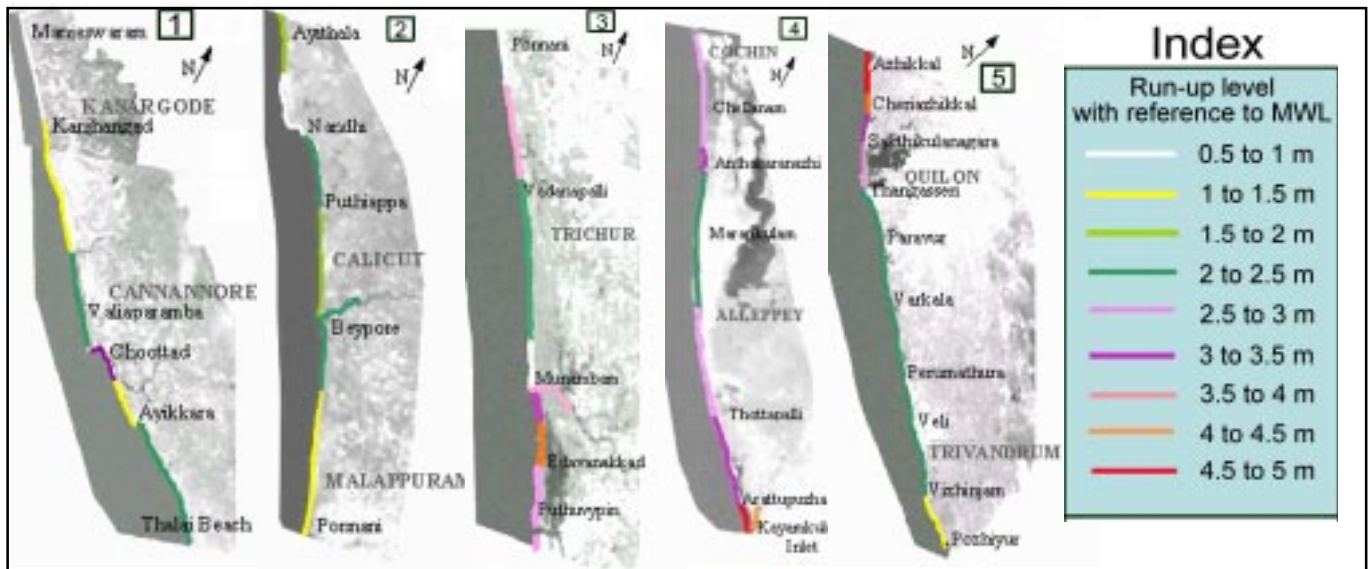
Canada, an international expert in tsunami visited Trivandrum during 10-13 February, 2005 on an invitation from Government of Kerala. He delivered the key note address at the seminar on 'Tsunami and Coastal Protection' on 11<sup>th</sup> February at Trivandrum. He had a discussion with Hon'ble Chief Minister, Sri. Oommen Chandy on tsunami preparedness for the state. He also addressed a press conference and visited some Tsunami affected areas between Kanyakumari to Kayamkulam along with CESS scientists.

to tsunami was observed in the Tharayilkadavu area, which is 4 km north of the inlet. Runup level reached about 4.5m here. Thirty people died, more than 800 houses were completely damaged and about 1500 houses were partially damaged in this area. The incidents at Tharayilkadavu and Alappad show that the breakwater constructed for the fishing harbour interfered with the tsunami waves. There was a reduction in the runup level to 2.5 - 3.0 m in the Arattupuzha - Thottappally sector. Tsunami didn't cause any damage to this area. Water level in the Thottappally spillway area increased considerably and caused damages to the shutters of the spillway. No serious damage was reported along Thottappally-Purakkad-Ambalapuzha area. But to the north of Ambalapuzha, water entered the land and caused some damage. From Thottappally to Alappuzha, the runup was around 2.0 - 2.5 m.

In the sector from Alappuzha to the south of Anthakaranazhi inlet, the runup was in the range of 1.5 - 2.0 m. Further north, in the zone around Anthakaranazhi inlet, there was an increase in the runup level to 2.5 - 3.0 m. Three deaths were reported in

addition to washing away of fishing gadgets and other damages. In the zone north of Andhakaranazhi up to Cochin inlet, runup level decreased to 2.5 m. At Puthuvype, north of the Cochin inlet, the runup level remained up to 2.5 m and the flooding damaged many shops built for a beach carnival. Flooding was also observed further north at Malipuram and Elamkunnappuzha. However, further north, in the Edavanakkad region, the runup level was more, rising up to 4 m, causing widespread damage. Many houses were completely damaged and there were only five casualties, as this area was not thickly populated like Alappad. Deep pits were formed along the eastern side of the coastal road. Seawall boulders were thrown around by the tsunami waves. There was a reduction in the runup level up to 3.5 m south of the Munambam inlet. The tsunami waves entered 500m upstream through the inlet and flooded up to a height of 2.5m in the eastern parts and caused heavy damage to houses. It is interesting to note that the runup level drastically reduced to 0.5 - 1.0 m at the northern area of Munambam inlet.

In the zone north of Vadanapalli, the runup level was 1.5-2.0m. But in the



*Runup level along Kerala coast due to the 26 December 2004 Tsunami*

sector south of the Ponnani inlet there was no appreciable runup. In the area north of Ponnani inlet no damages were reported, although the level increased up to 2m causing flooding of the Bharathapuzha river. An appreciable increase in the runup level was found as we approached Beypore inlet, south of Kozhikode.

In the Beypore-Puthiappa sector, the runup level was in the range of 1.5 – 2.0 m. At Kadalore point (Nandhi) the run-up was up to 2.5 m. The runup again decreased to 0.5m and then increased up to 2m in the Ayithala region. North of Ayithala in the Thalai- Ayikkara

sector, the runup level was 2.5 m. Towards north of Ayikkara and up to south of Choottad, the level was 1.0-1.5m. Further north, in the Choottad region there was a sudden increase in runup level to 3 – 3.5 m which is the highest reported in the northern sector. In the Valiaparamba sector, north of Chootad, runup levels of 2.5 m were observed. Further north, up to Kanjthagad the runup level decreased to 1.5m. Towards north of Kanjthagad and all along the rest of the Kerala coastline upto Manjeswaram, the runup was only in the 0.5 – 1.0 m range .

He explained how the warning system in the Indian Ocean had to be different from the Pacific warning system, taking into consideration the peculiarities of the Indian Ocean. He underlined the need for modelling of Tsunami impacts on the coastal ecosystems and gave details of the various parameters and aspects to be considered for this purpose. Dr. Murty advocated a combination of different systems for protection of the coast in place of seawalls, which is the only shore protection strategy currently adopted along the Kerala coast.

The ensuing technical session was chaired by Prof. S. Narasimhan of IIT, Mumbai and co-chaired by Dr. K R S Krishnan, Director, KSCSTE. Lead presentations were made by Dr. V Sundar and Prof. J. S Mani of IIT, Chennai, Dr. Kudale of CWPRS, Pune, Dr. Nagendra Kumar of

## **Dr. TAD MURTY ADDRESSES SEMINAR ON TSUNAMI AND COASTAL PROTECTION**

A seminar on Tsunami and Coastal Protection was held at Thiruvananthapuram on 11<sup>th</sup> February 2005 under the auspices of Kerala State Council for Science, Technology & Environment (KSCSTE) in association with Centre for Earth Science Studies. The aim of the seminar was to have a re-look at the coastal engineering strategies followed for the Kerala coast. The inaugural session was chaired by Dr. A.E. Muthunayagam, Executive Vice President, KSCSTE. Papers were

presented by scientists /engineers from Central Water and Power Research Station (CWPRS), National Institute of Ocean Technology (NIOT), Ocean Engineering Department, IIT Chennai and Centre for Earth Science Studies. The keynote address by renowned Tsunami expert Dr. Tad Murty was note worthy.

Dr. Murty described the existing Pacific Tsunami warning system and suggested a similar scheme for the Indian Ocean.



*The constituent boulders thrown inland by the tsunami after shattering a well-built seawall. A scene from Edavanakkad, north of Kochi.*

## CESS SCIENTIST STUDIES PALAEO TSUNAMIS AT CHILE

Dr. C.P. Rajendran, Scientist of CESS was in Chile on the invitation of the U.S. Geological Survey and Pontificia Universidad Catolica De Valparaiso as part of an international study team (from USA, Indonesia and Chile) to study the coastal geology and the palaeo-tsunamis that affected the Chilean coast. The main focus of the study was to identify previous episodes of tsunamis using geological techniques. Dr. Rajendran and his team at CESS are engaged in earthquake studies in Andaman & Nicobar Islands for the last few years. Like the Andaman-Nicobar Islands, Chile had been affected by the impacts of giant tsunamis in the past; the last one



*The international study team at Puerto Varas on their way to the work site; the volcano "Osorno" giving a spectacular background.*

occurred following the 1960 earthquake, the largest in the 20<sup>th</sup> century. The international team visited portions of the Chilean coast that were part of the rupture zone of 1960 earthquake. The team explored the low-lying marshy lands for ancient tsunami deposits and

for the morphological signatures of subsidence related to the previous giant earthquakes. At specially conducted town meetings, the scientists also met the local population to sensitize them about the tsunami hazard in the light of recent Asian tsunami of December 26, 2004. They were also invited to attend a Government-sponsored meeting on emergency preparedness at the province capital of Puerto Montt. The results from the study conducted by the team are now consolidated into a research paper. The studies in Chile are also expected to provide a template for efforts to understand the recurrence pattern of giant earthquakes along the Andaman-Nicobar archipelago.

NIOT, Chennai, Dr. M. Prithviraj of DST, Government of India and Dr. M. Baba, Director, CESS. About 101 delegates including scientists and engineers from IIT, Mumbai, NIO, CWC, Cochin University, CWRDM, NATPAC, Irrigation Department, Harbour Engineering, IMD, officials from Revenue, Planning Board, Army, Air force, Kerala Police and several other institutions participated in the seminar.

On the basis of the presentations and discussion, the seminar came out with the following observations and recommendations.

- The management and protection of the Kerala coast need to be reviewed in the background of the different types of hazards like monsoonal waves, cyclones, floods, sea level rise, earthquakes, etc and not confined alone to the recent Tsunami event.
- The protection of the coastal areas need not be always by structural means such as seawalls, groins and offshore break waters. Soft methods like beach nourishment, bio-shield, buffer zones, sand dune, artificial reefs, etc may be adopted wherever appropriate.

- 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.
- 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 aims to 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 the existing "building line" be frozen for this purpose.
- Coastal vulnerability zone for frequent hazards such as annual floods, coastal erosion, etc. may be identified for restricting developmental activities. Another zone for long term hazards like tsunamis, storm surges, cyclones may be identified for restricting major investments like power plants, highways, airports etc.
- Integrated Coastal Zone Management Plans may be prepared for the coastal

areas taking into account both the sea and land proximities and their vulnerability to hazards, livelihood security of the people and other social, economic and infrastructural requirements of the population.

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



### RESEARCH COUNCIL MEETING

Biannual meeting of CESS Research Council was held from 29 -31 March 2005. Prof. Victor Rajamanickam, Member, Research Council delivered a talk on 'Coastal Mineral Exploration' on March 30, 2005.

## VISITORS TO CESS

A two-member delegation from University of Bremen, Germany, Ms. Christine Rodewald from the International Department and Ms. Silvia Kurzeja from the Goethe Institute, visited CESS on March 5, 2005.

## PUBLICATIONS

Joji, V.S. and Nair, A.S.K. (2004) Sustainability of Land Resources of Vamanapuram River basin, Southern Kerala, India. *Geographical Review of India*, Vol.66, No.2, pp.153-162.

Soman, K. and Mahamaya Chattopadhyay (2004) Catchment Conservaton Plan for the fresh water lakes of south Kerala. In: *water Resource Development through Rainwater harvesting*, published by Western Ghat Cell, Planning and Economic Affairs Dept., Govt. of Kerala, pp.229-244.

Chattopadhyay, S. and Mahamaya Chattopadhyay (2004) Geomorphic evolution of Ponmudi scarpland: some observations. *Geographical Review of India*, Vol.66, No.3, pp.243-253.

Ajaykumar Varma, R. and Abin Philip. (2005) "A model Catchment Area Treatmet Plan for sustaining land environment in a typical high range watershed". *Proc. National Workshop on Managing Land quality for Sustainable Agriculture*. Thiruvananthapuram, pp. 141-153.

Nair, A.S.K. (2005) Critical issues on land resources in the light of the National Landuse Policy, *Proc. of the National Workshop on Managing land quality for sustainable agriculture*, pp. 116-121.

Joji, V.S. and Nair, A.S.K. (2005) Land use and land cover characteristics from

selected profiles of Vamanapuram River Basin, South Kerala, India, *Proc. of the 17<sup>th</sup> Kerala Science Congress*, Peechi, pp. 137-138.

Soman, K. (2005) Landforms and land quality: An overview in the context of Kerala. *Proc. National Workshop on Managing land quality for sustainable agriculture'* Thiruvananthapuram, 24 - 26 January 2005, pp. 121 - 125.

Chattopadhyay, S. (2005) Integrated coastal zone management - A conceptual framework. In: *Urban and Regional Development in India* (Eds. B. Thankur & others), Concept Publ. Co. New Delhi pp. 658- 675.

Mahamaya Chattopadhyay and Chattopadhyay, S. (2005) Terrain analysis for Soil Survey in Kerala. *Proc. National Workshop on "Managing land quality for sustainable agriculture"*, Thiruvananthapuram, pp.154-160.

Terry Machado, Arun, M. and Sajith, V.K. (2005) A Free-GIS based DSS for water and soil conservation for Panchayat Raj Institution, *Proc. of the 17<sup>th</sup> Kerala Science Congress*, Peechi, pp.158-160.

Nair, A.S.K. (2005) Cliff slumping of permeable cliffed shorelines, in: "Landslides", (Ed.) Dr. G. Victor Rajamanickam, SASTRA, Thanjavur , pp. 81-88.

## INVITED TALKS

Dr. T. Radhakrishna presented an invited paper "Precambrian mafic dyke intrusions in south India: implications for the paleoproterozoic to Neoproterozoic continental reconstructions and continental assembly" at Bundelkhand University, Jhansi at the International conference on Precambrian crustal growth and tectonics on 22-24 February, 2005.

Dr. N.P. Kurian attended the Brain storming Session on Tsunami Mitigation Strategies, held at Bharathiar University, Thiruchirapalli during 25-26 February 2005 and presented an invited paper "December 2004 tsunami; Runup and impact along the Kerala coast".

Dr. N.P. Kurian delivered an invited talk "Tsunami and its environmental implications" at the seminar on "Co-existence of industry and environment" organised by KMML and KMDEL at Kovalam on 10 January 2005.

Mr. B. Sukumar delivered the Sathu T. Ramaswamy Naicker endowment lectures on "Application of Remote Sensing in Agricultural Geography" and "Application of GIS in landuse /land cover studies" at the Dept. of Geography, Madurai Kamaraj University, on 23 March 2005.

Dr. M. Baba delivered the key note address on 'Conservation and Mangement of Natural Resources' at the National Seminar on Conservation and Management of Natural Resources organized by the Catholicate College, Pathanamthitta on 1 February 2005.

Dr. M. Baba delivered the Inaugural address at the "Prof. K.V. Thomas Endowment National Seminar 2005" organized by the Sacred Heart College, Kochi on 21 February 2005.

Dr. M. Baba delivered a lecture on "Natural Disasters & Management" at the PRITHVI 2005 Global EcoMeet held at Thiruvananthapuram on 22 February 2005.

Dr. M. Baba delivered a lecture on "Coastal Environment" at the National Workshop on 'Environmental Concerns: Canada and India'

organized by the Centre for Canadian Studies, University of Kerala at Thiruvananthapuram on 22 March 2005.

## EXHIBITION

CESS participated in the exhibitions organized in connection with the Kerala Science Congress at KFRI, Trichur on 29-31 January 2005 and PRITHVI – 2005 – Global Eco Meet from 19-28 February 2005 at Trivandrum.

## PARTICIPATION IN TRAINING PROGRAMMES

Dr. A.S.K. Nair attended Short Term Course on “Coastal Engineering” organized by the International Ocean Institute (India) and Department of Ocean Engineering, IIT Madras from 31<sup>st</sup> January to 2<sup>nd</sup> February, 2005.

Mr. John Paul and Mr. M. Ramesh Kumar attended a training programme on Satellite Oceanography conducted by ICMAM Directorate, Chennai from 7 - 18 February 2005.

## CONFERENCE/SEMINAR/WORKSHOP

Dr. R. Ajaykumar Varma presented following papers in the Indian Environmental Congress – 2004 organized by Centre for Environment and Development at Trivandrum during 16 – 18 December 2004.

- “Clean Kerala Mission – A movement towards Zero waste Kerala.
- “Environmental pollution and pollution control measures”.

Dr. Narayanaswamy presented a paper “Laterite gold deposits in Nilambur Valley and its economic potential” at

## PUBLICATION OF SILVER JUBILEE COMPENDIUM

Coinciding with the Silver Jubilee Year a compendium entitled “Earth System Science and Natural Resources Management” documenting the contributions of the Institute since its inception was brought out. This 453 + XV page volume contains 28 articles arranged under four major themes: a) Earth System Science, b) Natural Hazards, c) Natural Resources Management and d) Earth Science Application to Societal Needs. Articles present a synthesis of CESS contributions in earth system science and natural resources management and reflect on the wide range of CESS contributions in thrust areas of science and environmental applications. The



book was edited by Dr. G.R. Ravindra kumar and Dr. N. Subhash.

the workshop on Mineral Resources of Kerala conducted by Department of Mining and Geology during 19-20 February 2005.

Dr. Ansom Sebastian presented a paper “Assessment of ground water quality in and around Alleppey Town, Kerala with special thrust on its high fluoride concentration” at the National Seminar on Resource Conserving Technologies for Social Upliftment during 7 - 9 December 2004 held at NASC, New Delhi.

Dr. A.S.K. Nair delivered a keynote address on “Natural Disaster Management & Mitigation Measures – An Overview” in the one-day Workshop on “Natural Disaster Management – The Policy Framework” organized by the CUSAT and KSSP at School of Marine Sciences, CUSAT on 26 February 2005.

Dr. Ansom Sebastian presented a paper “Investigations of Cordierite – Epoxy Composites” at the International Conference on polymers for

Advanced Technologies organized by society for polymer Science, India, Trivandrum Chapter during 14-17 December 2004.

Smt. Sobhana Teresa presented a paper “Distribution of solar erythemal radiation over India as derived from satellite data” by Teresa, G. Mohan Kumar, and S. Sampath in the 41<sup>st</sup> Annual convention of Indian Geophysical Union held at Hyderabad during 29-31 December 2004.

Sri. V.N. Neelakandan presented a paper “Development of Biogeographical Information System for Conservation Monitoring of Biodiversity of Kerala” at the Indo-US Workshop on Biodiversity Informatics held at National Chemical Laboratory, Pune during 7-9 December 2004.

Dr. Ansom Sebastian presented a paper entitled “Mineral characterization studies of Trivandrum Cordierites: Structural, Mineralogical & Chemical Aspects” at the International Seminar

on Mineral processing Technology (CMPT- 2005) held at Indian School of Mines, Dhanbad during 6-8 January 2005.

Dr. R. Ajaykumar Varma presented a discussion paper 'Environmental and Natural Resources Management' in the Workshop on "Forging Strategy Linkages between Local Governments and R&D Institutions" during 1 - 2 March 2005 at Trivandrum and

Dr. C.N. Mohanan presented a paper on 'Mangroves for Disaster Management along the Kerala Coast' at the Workshop on "Forestry for Disaster Management" held on March 2, 2005 at Trivandrum.

Dr. Srikumar Chattopadhyay presented a paper on "Disaster Management: Lessons from recent tsunami" at the National Seminar on "Vulnerable cities; Hazards, risks and preparedness" organized by the Dept. of Geography, Delhi School of Economics during 18 - 19 March 2005.

### GUEST LECTURE

Dr. R. Ajaykumar Varma delivered lectures on the topic "Solid Waste Management, concept and practice" on 13 December 2004 at Kerala Institute of Local Administration, Trichur and on 29 December 2004 at Extension Training Centre, Dept. of Rural Development, Kottarakkara.

Dr. S. Suresh Babu delivered lectures on "Submarine Groundwater Discharge Studies at Adroth island, Lakshadweep and along Coastal Zone of South West India" on 6 and 7 December 2004 at the short term training course on "Mathematical

modelling of Groundwater flow and mass transport through theory and hand on training" sponsored by DST, Govt. of India and held at JNU, New Delhi during 12 November - 9 December 2004.

Dr. Ajaykumar Varma delivered a lecture on 'Land and Water Conservation' in the training programme for Forest Protection Officers organised by Department of Forest and Wild Life, Government of Kerala on 5 March, 2005 at Trivandrum.

### NOMINATIONS

Dr. G.R. Ravindra Kumar has been nominated by CSIR, New Delhi as a member of two CSIR Network project-monitoring committees (SMM 04 and CMM 07)

Dr. R. Ajaykumar Varma has been nominated as a member of 'Working Group on Sanitation by the Kerala State Planning Board.

Dr. M. Baba and Dr. C.P. Rajendran have been nominated as members of the Committee for the preparation of Natural Disaster Management Plan for Kerala constituted by the Science, Technology & Environment Department, Govt. of Kerala.

Dr. M. Baba has been nominated as a member of the 'Expert Committee for selection of scientists in the Delegation for the second meeting of the AOGS in Singapore', constituted by the Department of Science and Technology, Govt. of India.

Dr. M. Baba has been nominated as a member of the 'Selection Committee for selection of the expert agency for preparation of five year Perspective Plan for the District under National Food for Work' constituted by the Govt. of Kerala.

### PROJECT REPORT

- Dr. D. Padmalal, Smt. K. Maya and S. Sreebha prepared a report on "Biomass Resource Assessment study of Kunnathunad and Parur Taluks, Ernakulam District, Kerala" for ANERT with financial assistance from Ministry of Non-conventional Energy Sources, Government of India under National Biomass Resource Assessment Programme.

### CONSULTANCY REPORTS

- Ajaykumar Varma, R., Mohanan, C.N., Nair M.N.M., Muralidas, S., Muraleedharan, V., Thomas, A.P., Satheesh, R., and Abin Philip, 2004. "Comprehensive EIA and monitoring of Pallivasal Extension Scheme". Report submitted to Kerala State Electricity Board, Trivandrum. 178p.
- Ajaykumar Varma, R., Mohanan, C.N., Nair M.N.M., Muralidas, S., Muraleedharan, V., Satheesh, R., Abin Philip and Jeevan, P.S. 2005. "Comprehensive EIA of Mankulam Hydroelectric Project". Report submitted to Kerala State Electricity Board. Trivandrum. 238p.

### NEW PROJECTS UNDER CHIEF MINISTERS ONE YEAR PROGRAMME

1. Panchayat Resource Information Centre (CESS- PRINCE)
2. River Sand Mining and Management
3. ICZMP for Alappad and Arattupuzha

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