

## National Technology Day 2008



*Sri. Mons Joseph, Minister for public works inaugurated the Technology Day observation. Dr. R.V.G. Menon, Dr. E. P. Yesodharan, Dr.M.Baba and Dr. Ajith Prabhu are also on the dias.*

CESS and NATPAC jointly organised the National Technology Day Celebrations on June 4, 2008. The Hon'able Minister for Public Works Sri. Mons Joseph inaugurated the

function, presided over by Dr. E. P. Yesodharan, Executive Vice President, KSCSTE. The theme of the Day was 'Technologies for Sustainable Development'. Dr. M. Baba, Director CESS, delivered the key-note address. Dr. R. V. G. Menon, a noted populist of science, was the Chief Guest of the function and he delivered an invited talk on the theme topic.

organised for school children invited from different schools in Thiruvananthapuram district. Sri. Mons Joseph gave away the prizes to the winners.

Quiz and painting competitions were

## Land degradation due to 'Piping'

A recently noticed phenomenon of land degradation in the highlands of Kerala is due to subsidence caused by tunnel erosion ('piping'). Till recently, the common belief was that tunnel erosion is associated with mass movements like landslides. Even though many incidences of land subsidence are occurring in the state, most of them go unreported. Piping is an insidious and enigmatic process involving the hydraulic removal of subsurface soil causing the formation of an underground passage in landscapes. Since it happens in the underground, in many cases, the phenomenon goes unnoticed. During the last decade many piping incidences were reported from different places of Kerala like Chattivayal (near Taliparamba, Kannur district), Palakkayam (Mannarkkad taluk, Palakkad district), Pasukkadavu (Vadakara taluk, Kozhikode district), Padinjareathara and Kunnamangalam Vayal (Vythiri taluk, Wayanad district), Valamthode (Mananthavady, Wayanad) and Venniyani mala (Thodupuzha taluk, Idukki district). Subsurface soil erosion due to piping

often results in land degradation. The cavities and pipes developed below the ground grow with respect to time and affect large extents of land in the form of subsidence thereby making it useless for cultivation and related activities.

Piping is the development of subsurface drainage conduits in non-lithified earth materials. This is a mechanical type of soil movement where by fine subsurface sediment moves via an underground channel through permeable materials. Piping can affect materials ranging from clay-size particles (less than

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## Training Programme on Coastal Zone Regulations

CESS and Local Administration department jointly conducted a one day training programme on the various aspects of rules related to Coastal Regulation Zone for more than 500 functionaries from the coastal panchayats of Kerala. The training programme was inaugurated at the head quarters of Thiruvananthapuram district panchayat by the Hon'able Minister for Local Administration, Sri. Paloli Muhammed Kutty, on April 9, 2008. Dr. M. Baba, Director CESS and Dr. K. V. Thomas, senior scientist of CESS, handled the classes and clarified the doubts of participants on the rules related to the implementation of Regulations in the Coastal Zone. The Director of Panchayats, Government Secretaries and other senior officials attended the function. A special issue of 'Vasudha', the Malayalam newsletter of CESS, on CRZ was distributed to the participants.



*Local Administration Minister Sri. Paloli Muhammed Kutty inaugurating the CRZ training programme. Sri. T.K. Jose, Secretary, LSGD and Dr. M. Baba were present.*

## Director Speaks



We have observed Earth Day, Technology Day and Environment Day during the April-June months of 2008.

During these observances there had been lot of concerns expressed on the various problems associated with climate change, environmental quality and sustainable development. The Central and State Governments had declared during this period several programs addressing these issues. The important among them were a national action plan on climate change, declaration of central incentives for solar power generation, establishment of a national earth science forum and banning of plastic bags of less than 50 microns by the State. All these are desirable actions in confronting the situations emanating from the above mentioned issues.

In addition, there are several other existing regulatory measures, which are equally competent to achieve the expected objectives if they are properly implemented. For example, we have vehicular pollution norms. If the present regulatory system is strengthened, there can be a definite control on the vehicular emissions. It has been reported that traffic congestion promotes emissions (and also accidents!). Timely completion of the proposed road developmental works for the smooth movement of vehicles thus becomes imperative. The rivers are being deprived of the last grain of sand, though we have a regulatory system. The coasts and forests are being encroached even when we have rules and machinery to regulate it. If we lax in implementing the already existing measures and plans, what are we going to achieve by newer policies and mechanisms?

Hence, our appeal during the observation of these Days had been to implement the existing controls and programmes efficiently in the first phase. Evolving newer systems and measures can definitely continue, but for implementation as a second phase. Let this be the common message for all to adhere.

Dr. M. Baba

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0.002 mm) to gravels (several centimeters), but is most common in fine-grained soils such as fine sand, silt, and coarse clay. During rain, percolating waters carries finer silt and clay particles and forms subsurface channels. The size of the resulting "pipes" (Fig. 1) vary from few



*Fig. 1. Opening of the tunnel due to subsidence.*

millimeters to centimeters, but can grow to a meter or more in diameter in the course of their movement. They may lie very close to the ground surface or extend several meters below ground. Once initiated they become cumulative with time, the conduits expand due to subsurface erosion leading to roof collapse and subsidence on surface. The hydraulic head existing in the area encourage subsurface channeling with entrainment of water and finer sediments to flow out at the down gradient site. This type of entrainment piping rarely produces open subsurface conduits but may transport sufficient volume of material to cause collapse of overlying sediment and superjacent structures.

In cohesive soils this erosion can create an extensive tunnel effect in which the cohesive strata support the remainder of the soil mass across crack opening. Closure of this cavity due to stress loss will result in a rapid ground surface subsidence.

Tunnel erosion is a complex land management problem owing to difficulties in locating the site of tunnel initiation and the variety of initiation mechanisms. These channels frequently form in non-saline, sodic and highly erodible B horizon clays. The study conducted by CESS in Chattivayal locality revealed that there are a number of depressions due to subsidence indicating that the area is prone to such incidences. This indicates that there are underground pipes present in this locality. Quick

draining of water through these depressions proves the presence of the pipes. The dug wells found in the area do not to sustain water even during the times of high rainfall, such as monsoons. The locals complain that water level never gains after a certain level even during rains. This indicates that considerable loss or leakage is occurring in the wells.

Investigations carried out by CESS at many locations in Wayanad (Kunnamangalam Vayal) and Palakkad (Agali) indicated that piping was associated with large scale land creeping. Pipes were located at the failed scarp areas of debris flow sites at Pasukkadavu in the Kozhikode district and Valamthode (Fig. 2) in the Wayanad district indicating that pipe flow could be one of the reasons for the failure. Piping incidences are also observed near Banasurasagar dam site where

subsidence occurred in a residential area when water started overflowing, creating a situation of panic among locals.

The first step in the mitigation of soil erosion by piping is to determine the extent of subsurface pipes in the affected area. The underground extent of tunnel-like cavities formed due to subsurface soil erosion should be determined by geophysical methods like EM conductivity, shallow seismic surveys or surveys using Ground Penetrating Radar (GPR). After determining the extent, suitable site specific earth filling should be made in the pipes to arrest further soil erosion and subsidence. Filters can also be introduced in the pipes to arrest soil transport. In short,



*Fig. 2. Water discharge point of a subsurface tunnel at a landslide scar (Valamthode, Wayanad).*

erosion due to piping in an area is like cancer in a human body. If left unattended, it will spread and destroy vast amounts of valuable arable land in Kerala.

(G.Sankar)



## Swedish Scientists in CESS



*Dr. M. Baba, Director CESS briefs the delegates.*

A team of Swedish scientists led by Prof. Ramon Alexander Wyss of the Royal Institute of Technology, Sweden visited CESS as part of its mission to conduct mobile workshops on 'Sustainable Urban Development' organized by the Centre for Indian-Swedish Cooperation on Technical Research and Education (INSTEC), KTH, Valhallavägen 79, Stockholm, Sweden. The other members of the team included Prof. Baboo M. Nair, Professor Emeritus at the Dept of Food Engineering, Technology & Applied Nutrition, Lund University, Dr. Göran Baurne of KTH, Prof. Lars-Christer Lundin of Uppsala University, Lars Öberg of Umeå University and Björn Karlsson of LTH, Lund University. The members also held discussions with KSCSTE and Government of Kerala to assess the feasibility for initiation of collaborative projects. Dr.M.Baba, Director, CESS briefed the visiting delegation on the genesis, vision, mission and activities of the centre. All senior scientists of CESS participated in the discussions with the Swedish team.



*Swedish scientists visiting the laboratories.*

## Ramanujam Fellowship

Dr. C. P. Rajendran, Senior Scientist has been awarded Ramanujam Fellowship by the Ministry of Science and Technology, Government of India. This fellowship extending for five years is for the studies on palaeoseismology / seismology in the Indian Institute of Science, Bangalore.

## New Project

### Geospatial survey of Munnar and adjoining panchayats

This inter-institutional project is aimed to create spatial/non-spatial digital database for an area of about 600 km<sup>2</sup> consisting of Munnar, Devikulam, Mankulam, Chinnakkal and Pallivasal Panchayats using cadastral/village maps, CARTOSAT I and II and QuickBird satellite data with 0.60 metre spatial resolution PAN and 2.5 metre MSS in conjunction with Global positioning system. The final output of the project will be spatial and non-spatial information integrated with cadastre in 1:3960/1:5000 scale for local level application and a customized user-friendly software for data management. The participating institutions of this project sponsored by the Government of Kerala are Centre for Earth Science Studies, Kerala State Council for Science, Technology and Environment, Kerala Forest Research Institute and National Transportation Planning and Research Centre.

## Publications

Mallia R.J., Shiny S. T., Anitha M., Rejnish K., Paul S., Jayaprakash M., Subhash N. (2008) Oxygenated haemoglobin diffuse reflectance ratio for in vivo detection of oral pre-cancer, *J. Biomedical Optics*, 13(4), 041306 (July/August issue).

Shiny S.T., Mallia R.J., Mini J., Subhash N. (2008) Investigation of in vitro dental erosion by optical techniques, *J. Lasers Med. Sci.*, 23: pp. 319-329.

Mallia R.J., Shiny S.T., Anitha M., Rejnish K. R., Paul S., Jayaprakash M., and Subhash N., (2008) Laser-induced autofluorescence spectral ratio reference standard for early discrimination of oral cancer, *Cancer*, 112(7), pp.1503-1512.

Nazeema Beegum S., Krishnamoorthy K., Sureshbabu S., Mohankumar G., Sampath S. and Aneesh V. R. (2008) Impact of a mountain grassland fire on the concentration of aerosol black carbon and carbon monoxide near the surface at a remote coastal location, *Atmos. Res.*, 88, pp. 46-55.

Mohankumar G., Sampath. S, Jeena V. S. and Anjali. R: (2008) Carbon Monoxide pollution levels at environmentally different sites, *J. Ind. Geophys. Union*, 12(1), pp. 31-39.

Singh H. N., Shanker D., Neelakandan V. N., Mathai J., Singh V. P and Banerjee M.,(2008), 'Spurt of geosignatures signifying possible precursors to a major earthquake in southwestern Indian peninsula', *ICFAI J. Earth Sci.*, 2 (2), pp. 7-40

Sukumar B. and Ahalya S. (2007) Mapping Agriculturally Drought prone areas using satellite imagery in GIS environment: A study in the Kasaragod district of Kerala, *Ind. Cartographer*, 27, pp.184-188.

Ahalya S. and Sukumar B. (2007) Occupational structure of Female population in Tamil Nadu, *Ind. Cartographer*, 27, pp.294-298.

Rajith K., Kurian N.P., Thomas K.V., Prakash T. N and Hameed T. S. S., (2008). Erosion and accretion of a placer mining beach of South West Indian coast, *Marine Geodesy*, 31(2), 128-142.

## Invited Talks

Dr.N.P.Kurian delivered a talk 'Coastal Engineering Problems of the West Coast and need for Shoreline Management Plan' in the training programme organised by ICMAM PD at Chennai on June 2, 2008.

Sri. B. Sukumar gave a talk on 'Panchayat level Resource Mapping with People's participation in Kerala and Spatial analysis modeling through GIS' in the workshop on Emerging trends in Geo-spatial analysis and modeling at the University of Madras, Chennai on March 1, 2008.

## Seminar / Meeting / Workshop

Dr.M.Baba and Dr. Srikumar Chattopadhyay attended a meeting on Coastal Sediment Cells organized by the Institute of Wetland on behalf of Ministry of Environment and Forests and World Bank at Kolkata and Digha (W.B) during May 26-27, 2008.

Sri. B. Sukumar attended the National Seminar on Geoinformatics for Natural Resources Management during 28-29 February, 2008 organised by the Department of Geography, University of Madras, Chennai and presented two papers titled 'Identification of areas vulnerable for natural hazards through geomatic studies in Kasaragod district, Kerala using Satellite Remote Sensing and GIS' and 'Integration of data at Panchayat level for spatial analysis using GIS: A case study of Vadakarapathy Panchayat in Palakkad district of Kerala'.

## Ph D Awarded



Sri. Anil Earnest was awarded Ph.D by the CUSAT for his work 'Constraining the active tectonic deformation of the Andaman-Nicobar Arc in the background of December 26, 2004 the great Sumatra-Andaman earthquake' carried out under the supervision of Dr. C. P. Rajendran, Scientist, CESS.

## 'Bala Sastra Congress'

CESS hosted the 'Bala Sastra Congress - 2008, organized by the Kerala Sastra Sahitya Parishad during 3-4 May 2008. Nearly 150 School children learning in upper primary, high school and higher secondary classes selected from among 25000 students participated. The theme of the Congress was 'Landuse changes and its impact on the environment'. The projects presented by the children were evaluated by experts from CESS, which was followed by group discussions and comments for



Student delegates of the 'Bala Sastra Congress' during a presentation and group discussion.

improvement. The students were also given a chance to visit the laboratories of CESS. The second day of the Congress was dedicated for field study by students to identify the landuse changes in CESS campus. There was an open forum moderated by Prof. M. K. Prasad, Executive Director, Information Kerala Mission, Prof. Subramania Iyer, Kerala Agricultural University, Dr. M. Baba, Director, CESS, Dr. M. Samsuddin, Dr. C. N. Mohanan, Sri. V. N. Neelakandan, Sri. G. Sankar and Sri. B. K. Jayaprasad, Scientists from CESS. The functionaries of KSSP and the ward councillor of Thiruvananthapuram Corporation participated actively for the success of the event. Dr. K. Raju, Scientist, CESS was the convener of the congress.

## A lecture on blogging

Sri. S. Chandrasekharan Nair, a farmer turned blogger delivered an interesting lecture on blogging in CESS. The programme was organized by CESS Recreation Club.



## Talk by Dr. Justine Padamadan



Dr. Justine Padamadan renowned clinical psychologist, delivered a talk on 'Family Enrichment' for the benefit of all members of the CESS family. This inspiring talk was aimed at bettering inter-personal relationships was organised by the CESS Recreation Club.

## National Symposium on Geodynamics and Evolution of Indian Shield through Time and Space

CESS is conducting a National Symposium during September 18-19, 2008 to commemorate the Golden Jubilee of the Geological Society of India.

For more details please contact the Convener, Golden Jubilee Symposium, Centre for Earth Science Studies, Trivandrum 695 031. E-mail: [goldjubilee@gmail.com](mailto:goldjubilee@gmail.com) Ph: 0471-2511619 (O); 9447019416 (M); Fax: 0471-2442280 or visit the website: <http://www.cessind.org>

## PG Studentship Nominations Invited

CESS invited nominations for the Post-Graduate Studentship programme for the academic year 2008-09. Eight final year PG students from different Universities/Colleges completed the programme at CESS during 2007-08. Under this programme, meritorious final year **PG students nominated by the Heads of Departments or Principals of Colleges** (along with copies of marklists of the university examinations) to the Director, CESS will be considered. A monthly studentship of Rs.2000/- will be given to selected students for a period of 3-5 months to complete their final year dissertation work under the guidance of CESS Scientists. Final year PG students studying in Kerala in geology, marine geology, oceanography, geography, environmental sciences, geophysics, chemistry, physics, atmospheric sciences, geoinformatics, computer science and computer applications are eligible for consideration under this scheme. The selection will be based on the merit and interview.

## New arrivals in CESS Library

Schubert, Gerald. **Treatise on geophysics**:. Vol. I to XI Elsevier, Netherlands, 2007. Chesworth, Ward. **Encyclopedia of soil science**. Springer, Netherlands, 2008. Kretz, Ralph. **Metamorphic crystallization**. John Wiley and Sons, New York, 1994. Klein, Cornells. **Minerals and rocks**. 3rd ed. John Wiley and Sons, New York, 2007. Deell, Jennifer and Peter, Toivonen. **Practi-**

cal applications of chlorophyll fluorescence in plant biology, Kluwer Academic Publishers, Boston, 2003.

Muttiah, Ranjan S. **From laboratory spectroscopy to remotely sensed spectra of terrestrial ecosystem**, Kluwer Academic Publishers, Boston, 2002.

Pophare, A M and Malpe, D B. **Recent developments in groundwater resources of central India**: special vol. no. 11, 2007, Cambridge. New York. 2007.

Sarolkar, P B and Shivkumar K. **Energy scenario in 2020**: special vol. no. 9, 2002, Gondwana Geological Society, Nagpur. 2007.

Brown, Michael and Rushmer, Tracy. **Evolution and differentiation of the continental crust**, Cambridge. New York, 2006.

Stull, Roland B. **Meteorology for scientists and engineers**, 2nd ed. Brooks/Cole, Australia, 2000.

Albarede, Francis. **Introduction to geochemical modeling**, Cambridge University Press, New York, 1995.

Kornprobst, Jacques. **Metamorphic rocks and their geodynamic significance: a petrological handbook**, Kluwer Academic Publishers, London, 2002.

## Elected



Sri. P. Sudeep, Registrar, CESS has been elected as the Sothern Regional Vice President of the National Council of the National Institute of Personnel Management (NIPM), the professional body of practicing HR professionals in the country. Sri. Sudeep was the Chairman of the Trivandrum Chapter of the NIPM during 2006-08.

## Retirements



Sri. K. Gopi,  
Skilled Assistant



Smt. K. G. Omana Amma  
Typist



Smt. A. Balkeez  
Typist



Sri. P. Ramachandran Nair  
Driver