CESS NEWS

ISSN 0972-3633 CESS NEWS

Newsletter of the Centre for Earth Science Studies

Vol. 18 **September 2008** **No. 3**

Geodynamics and Evolution of Indian Shield - Through Time and Space

A National Symposium on 'Geodynamics and Evolution of Indian Shield - Through Time and Space' commemorating Golden Jubilee of the Geological Society of India was conducted at Centre for Earth Science Studies during 18-19 September 2008. CESS has been one among the leading earth science institutes in the country to associate with this important event of the Society. The symposium has received an enthusiastic response from active researchers belonging to various leading institutes and universities engaged in understanding diverse aspects of Indian Geology. The symposium was sponsored by the Department of Science and Technology, Government of India, Ministry of Earth Sciences, Kerala State Council for Science Technology and Environment (KSCSTE) and CESS.The meeting was inaugurated by Dr. Gangan Pratap, Vice Chancellor of the Cochin University of Science and Technology and the University of Kerala and presided over by Dr. Harsh K. Gupta, the president of the Geological Society of India. Dr. E. P. Yesodharan, the Executive Vice-President of KSCSTE gave felicitations and released the abstract volume. Dr. M. Baba, Director, CESS welcomed the delegates and Dr. Narayanasamy, Convener of the symposium proposed the vote of thanks.

The symposium has focused on the Indian geology spanning much of earth's 4.5 billion year history, revealing a variety of geodynamic, environmental and climatic variations. The broad areas of discussions included early Archaean-crustal evolution in relation to granite – greenstone cratonic elements and high-grade mobile belts, development of the Purana sedimentary rocks, early biological evolution and investigations of the sub continental lithosphere mantle, the early Palaeozoic evolution of the Indian shield, the Gondwana Formations in the eastern India in relation to development of large coal deposits, the rift-drift history of the latest supercontinent, Pangea manifested in the form of Mesozoic and Cenozoic sedimentary basins, large flood basalt sequence in the Indian subcontinent, Neogene-Quaternary record and the hydrocarbon formations and recent geological events in Indian shield such as earthquakes, landslides and flood hydrology.

The inaugural function of the Symposium. Dr. E. P. Yesodharan, Executive Vice President of KSCSTE, Dr. M. Baba, Director, CESS, Dr.Harsh K. Gupta, the President of the Geological Society of India and Dr. Gangan Pratap, Vice Chancellor of the Cochin University of Science and Technology and the University of Kerala are seen.

Selected review papers were brought out as Memoir 74 of the Geological Society of India and as one of the Golden Jubilee Volumes of the Society (Editors: T. Radhakrishna, M. Ramakrishnan and Narayanaswamy). The volume was released during the Golden Jubilee Celebration by Geological Society of India on 12th October 2008 at Bangalore. The Memoir can be obtained from the Geological Society of India, Gavipuram, Bangalore.

In this issue.....

Stream characteristics and water quality of a pristine watershed of *Kall Ar*

A small catchment in a forested pristine environment is the most ideal landscape unit for studying interrelationship between watershed characteristics and hydrogeochemistry. Since interdependence of morphogenetic features, vegetation types, weathering front, elemental mobilisation and the resultant water quality changes are easily discernible in small catchments; these are also excellent sites for long-term ecological observations and research. Such sensitive indicators of changes in ecosystems due to human activities are early warnings of ecological changes. Upper *Kall Ar* watershed of the Vamanapuram river with a catchment area

Continued in page 2

Director Speaks

Green house warming and climate change had been handled in these columns earlier. It is well known by now that carbon dioxide is among the major greenhouse gases contributing to global warming and associated impacts. Human activities have increased the atmospheric carbon dioxide through burning of fossil fuels, land use/land cover change and disturbances to the natural processes involved in the balanced cycling of carbon. Scientists all over the world are working to understand the global carbon pools and fluxes to identity sources and sinks to develop strategies for mitigating the risks of climate change. Such efforts are challenging, as the carbon pools and the flow of carbon among these pools vary widely across space and time. India constitutes an important part of the terrestrial biosphere with agriculture as the major economic activity. Therefore, it is essential to understand and quantify the terrestrial carbon balance of India. Regional level carbon cycles are valuable for assessing the cycle processes in a particular ecosystem and for addressing region-specific environmental and carbon trading policies. It is also important to estimate the anthropogenic influence and the effect of future climate change on carbon balance both in temporal and spatial scales. It is in this context a National Carbon Project was initiated under the aegis of the Department of Space. The project focuses on the carbon cycle and its relationship with forest, agriculture, land use change, hydro geochemistry and soils ultimately leading to the modeling of net carbon balance. CESS (along with KFRI and TBGRI) is a proud participant in this prestigious project by establishing an observational network and remote sensing-based spatial databases for modeling and periodic assessment of the carbon balance.

Dr. M. Baba

Continued from page 1

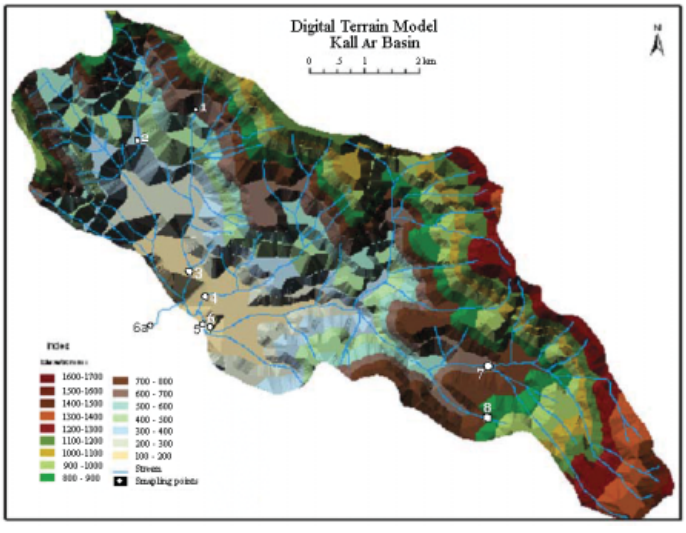
Stream Characteristics and .....

of 46 km^2 is a VI order stream. The major rock type in *Kall Ar* basin is khondalite, and it appears to offer uniform resisting environment resulting in dendritic drainage pattern. The average drainage density of the basin is 3.66 km/km^2, whereas in the provenance area of Chemmunji Mottai drainage density is 4.66 km/km^2. Kallar region has a tropical humid climate with an annual rainfall of 2650 mm.

The study has addressed the issues related to morphogenesis and interrelated aspects like terrain pattern, geo-ecology and environmental aspects. In order to accomplish the task, data both from primary and secondary sources have been collected / generated. Field mapping, map analysis with topographic sheets of 1:50,000 scale and interpretation of PAN image data in 1:25,000 scale were major work components. Water quality analysis has been conducted through systematic sampling. Phytoplankton analysis has been done to assess the water quality.

A generalised terrain map has been prepared in 1:50,000 scale considering slope factor. Entire basin area is rugged in nature and denudational processes along with fluvial process are responsible for carving out the landscape. Gentle undulations are noticeable along Kall Ar and the downstream locations of the tributary streams. Steep slope areas occupy an area of 22.33 km^2 (48.16%) of the basin area whereas gentle to moderately undulated area occupy an area of 1.88 km^2 in combination. Current landuse map (2004) has been prepared mainly through interpretations of imagery (IRS 1C PAN 1999) and field check in selected sectors in 1:25,000 scale. Forest predominates in the area and types of forest cover have been detected through image analysis. Thick dense forest occupies 10.98 km^2 (24%) of the total area and are mainly observed in narrow linear patches, which occupy the deep valleys of youthful streams originating from Chemmunji Mottai (1717m), Kalakal Mottai (1530 m) and Ponmudi peak (1073 m). Nearly 14% of the total area comes under degraded forest. Occurrence of cardamom plantation in the provenance area has been reported. Area under Merchiston Tea Estate near Ponmudi shows decrease of 1.02 km^2 over 1968 data which can be explained through occurrences of several grassland and sparely dense forest patches within the estate area. Grassland has increased by 0.98 km^2 over 1968 data. Grassland has extended to the eastern and western periphery of watershed zones with smaller patches in interior section within the dense forest area.

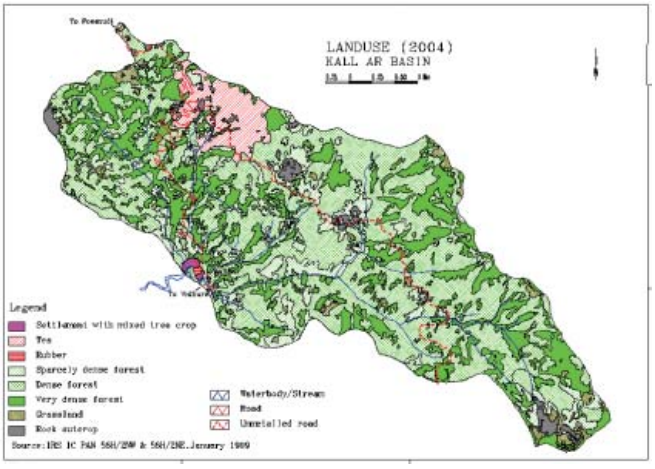
Water samples collected from the stream in the deep forest



Digital Terrain Model showing drainage drape and sampling points

Delegates of the National Symposium on 'Geodynamics and Evolution of Indian Shield - Through Time and Space'

As part of the study water temperature pH, Dissolved Oxygen, Biochemical Oxygen Demand, Nitrite-Nitrogen and Total Suspended Solids were monitored.



Landuse map of the Kall Ar Basin

Based on the investigations carried out, covering aspects of morphology, landuse and hydrogeochemistry the salient findings can be briefly stated as follows:

Various terrain units have been marked based on the extent and steepness of slope and it was evident that the denudational and fluvial processes are mainly responsible for carving out the landscape. The river shows youthful behaviour, particularly in its upstream portions.

The major landuse category observed in the basin is dense forests, occupying 41 km^2 (89%) of the total basinal area.

The analysis of physico-chemical data for the period 2003 to 2005, noticed no significant temporal (monthly) or spatial variation (across stations). Average nitrate concentrations varied significantly across stations.

Although, no previous systematic water quality assays exist, Kall Ar basin is considered to be a pristine catchment with no point sources of pollution with high levels of nutrients or other pollutants. However, there are a few patches showing contamination. High-levels of recreational activity around Kall Ar are some of the many negative aspects impacting the Kall Ar catchment environment.

The analytical data from Kall Ar catchment indicate presence of 'A Use Class' water resource (drinking water source without any conventional treatment but after disinfection) as per the classification of KSPCB, 2000. This in turn calls for conservation of the forested catchment of *Kall Ar* and continued systematic monitoring to ensure good water quality standards.

Hydrological investigation carried out within the basin indicates positive correlation with the amount of discharge and forested cover.

From the phytoplankton analysis, it has emerged that maximum phytoplankton density and high species diversity were observed in location 6A, which is located in the mainstream in the lower reaches of the study area. The lowest phytoplankton population was noted in location 7 and 8, which are within the deep-forested area.

From physico-chemical data and the planktonic assemblage, Kall Ar basin can be accurately classified as generally pristine. Periodic monitoring and evaluation of data in long-term basis will enable to bring out the existing interrelationships between hydrological parameters and catchment characteri-stics more effectively.

-Mahamaya Chattopadhyay

Dr. E. P. Yesodharan, Executive Vice-President of KSCSTE releasing the abstract volume by giving a copy to Dr. D. N. Avasthi, Former Member (Personnel), ONGC

International Seminar

Sri. R. Harikumar, Research Fellow, Atmospheric Sciences Division participated and presented four papers in the 37th Committee on Space Research (COSPAR) Scientific Assembly held at Montreal, Canada during 13 – 20 July, 2008.

Publications

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 SW Indian Coast, Marine Geodesy, 31: 128-142.

Rupananda Mallia, Shiny Sara Thomas, Anitha Mathews, Rejnish Kumar, Paul Sebastian, Jayaprakash Madhavan, Narayanan Subhash (2008) Oxygenated hemoglobin diffuse reflectance ration for in vivo detection of oral pre-cancer, Journal of Biomedical Optics 13(4), 1-10.

Shiny S.Thomas, Rupananda J Mallia, Mini Jose, Narayanan Subhash (2008) Investigation of in vitro dental erosion by optical techniques, Journal of Lasers Med Sci (2008) 23:319-329 DOI 10.1007/s 10103-007-0489-z ,1-9

Tim Jennerjahn and K. Soman (2008) Effects of landuse on the biochemistry of dissolved nutrients, suspended and sedimentary organic matter in the tropical Kallada river and Ashtamudi Estuary, Kerala, India, Journal of Biogeochemistry, 90, 29-47

Santhosh Kumar, E. S., Radhakrishnan, K., Kunhiraman, C., Veldkamp, J. F. and Mohanan, C. N. (2008) Rediscovery of Maesa velutina Mez (Maesaceae/ Myrsinaceae): An Endemic and Endangered species of the Western Ghats, India, Rheedea, 18(1), 39-42.

Radio Talk

Dr. N. P. Kurian gave a talk in the All India Radio on 'Coastal erosion and tsunami' on 29 July, 2008

Invited lectures

Dr. M. Baba delivered the Key Note Address on 'Climate Change- Issues and Challenges' in OISCA Global Meet 2008 on the theme 'Human Activities and Climate Change' organized by OISCA International South India Chapter on 28 September, 2008 at Thiruvananthapuram.

Dr. M. Baba delivered the forty first Engineers Day Address organised by the Institution of Engineers (India), Kerala Centre on 17 September, 2008 at Thiruvananthapuram.

Dr. Srikumar Chattopadhyay delivered a talk on 'Tools and Techniques in PRA' for the participants of the training programme on 'Horticulture Extension' organized by MANAGE, Hyderabad and SAMETI, Department of Agriculture, Government of Kerala on 27August, 2008 at Thiruvananthapuram.

Dr. Srikumar Chattopadhyay delivered a lecture on ' Micro planning, Panchayat Raj and Participatory Natural Resource Management' on 9 August, 2008 at Thiruvananthapuram

Nominations

Dr. M. Baba has been nominated as member of the State Level Nodal Agency of XI Plan National Watershed Development Project for Rainfed Areas.

Dr. K. V. Thomas has been nominated as member of the GIDA Committee on Vypene-Munambam coastal road.

Dr. C. N. Mohanan and Dr. A. S. K. Nair were nominated as members of the State Wetland Technical Unit (WTU), KSCSTE.

Report Published

Rapid EIA study for the proposed Vallarpadom Container Terminal Road at Moolampilly to Chathanad (Dr. R. Ajayakumar Varma, Dr. C. N. Mohanan, Dr. M. N. M. Nair, Dr. K. V. Thomas, Dr. S. Muralidas, Sri. K. R. Unnikrishnan and Dr. P. V. S. S. K. Vinayak) Final Report submitted to GIDA, Kochi, 2008, 150p.

New DST Project

The Department of Science and Technology, Government of India has sanctioned CESS a new project on ' Spatial temporal shore changes during Holocene and tracing the evolutionary history of Ashtamudi estuary, Southern India. The total outlay of the project is 35 lakhs and will be executed in collaboration with Anna University, Chennai

Exhibition

CESS participated in the Technical Fest and exhibition called 'Vastheya' organized by the Rajiv Gandhi Institute of Technology Kottayam during 25-26 September, 2008.

New arrivals in CESS Library

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

Jayachandran, D N. *Keralam 2000*. The State Institute of Languages, Thiruvanan thapuram, 2000

Rajendran, C P. *Bhookambam*. The State Institute of Languages, Thiruvanan-thapuram, 2002

Naduvattam Gopalakrishnan. *Gaveshanareethi sasthram*. The State Institute of Languages. Thiruvanan thapuram, 2002

Karunakaran, C. K. *Vanasamrakshanam*. 4th ed. The State Institute of Languages. Thiruvananthapuram, 2002

George, T .V. and Vappicha, V. N. *Survey*. 5th ed. The State Institute of Languages. Thiruvananthapuram, 2004

Retirement

Sri. T. K. Krishnachandran Nair, Technical Officer, Atmospheric Sciences Division retired on 31 August, 2008

Edited by the Publication Committee & Published by the Director, Centre for Earth Science Studies, P.B. No. 7250, Thiruvananthapuram 695 031, India. Phone: 0471-2511500 Fax: 0471-2442280, E-mail: cess@nic.in, Website: http://www.cessind.org
Printed at SB Press, Thiruvananthapuram