

EARTH SCIENCES FOR SCHOOL CHILDREN

OUR PLANET EARTH: UNDER PRESSURE?

Earth Science education in India has taken a nose dive in recent years and it is becoming critical to revive this science through sustained efforts. One of the most effective means of doing this is to catch the young minds and inform them about the earth's resources, processes, and environmental change which are so critical to understand for the very survival of this planet. The unmindful mining of earth's resources, utter negligence of earth's processes including natural hazards and their long-term impact on earth's environment is so much prevalent today and our mother earth seems to be under enormous pressure for its survival. Although the need for a better earth science education has increased manifold in recent years, the number of students opting for earth science and the quality of research has deteriorated dramatically in this country. This has happened because our educationists and researchers have not kept pace with the recent developments in earth sciences and its technological applications across the globe. The participation of earth scientists in any major project related to earth resources development, natural hazards management and global climate related issues is almost non-existent in this country.

We made a small effort to remedy this situation by popularizing the earth sciences education among the young school children. A day-long workshop titled "Our Planet Earth: Under Pressure?" was organized at IIT Kanpur by Prof. Rajiv Sinha under the aegis of the North India Chapter of the Geological Society of India which involved about 60 children from 12 schools across Kanpur. The central themes selected for this workshop were earth's resources (specifically water), natural hazard (specifically earthquakes) and climate change (specifically global warming).

The workshop was inaugurated by Prof. Kripa Shanker, Deputy Director of IIT Kanpur who greatly appreciated this effort of inviting children to this premier institute for this science workshop and engaging them into serious scientific discussion, many of them socially relevant too. Prof. Bithin Datta, Head, Civil Engineering Department emphasized the importance of earth science education at school level as many of the earth's processes such as hydrological cycle control the earth's climate in a major way.

The inaugural lecture on 'Earth and Water' was delivered

by Prof. V. Rajamani from School of Environmental Sciences, Jawaharlal Nehru University, New Delhi. Prof. Rajamani very powerfully illustrated the earth's processes responsible for generation and circulation of water in the system and its role in sustaining the life on this planet. He emphasized that the usage of water must be rational and both quantity and quality of water are important to be maintained. He also discussed as to how the surface and ground water systems interact with each other in earth system and how the human interference has altered the hydrologic regime of many of the river systems. He opined that the preservation and conservation of groundwater is extremely essential for the sustainability of life systems. He appealed that separate institutes on 'Water' should be established across the country for in-depth study of water related problems and sustainable water management.

Prof. C.V. R. Murty from IIT Kanpur talked on earthquakes and explained to the children as to how the earthquakes are generated within the earth. He lamented on the poor quality of buildings in India and demonstrated how unsafe they are in most big cities. He called upon the young minds to take up the challenge of understanding the geological processes responsible for earthquakes and to develop 'earthquake-resistant' buildings so as to save the loss of life and property. He showed some moving clippings of the recent Kashmir earthquake and the havoc created due to poor quality of houses in the region. He emphasized on 'ductile' design of buildings and impressed upon the need to be aware of the earthquake-related precautions. He apprised the children on the safety measures to be taken in the event of an earthquake.

Prof. Rajiv Sinha touched upon the hotly debated topic of 'global warming' and highlighted the various forcing mechanisms for climate change. He explained that although the greenhouse gases such as carbon dioxide in the atmosphere are crucial to keep the earth habitable, any excess of these gases is also harmful. There is a direct relationship between atmospheric CO₂ concentration and global temperature. Since the year 1900, the CO₂ concentration in the atmosphere has increased from 270 ppm to 360 ppm and it is likely to be double of the pre-industrial level (~600 ppm) by the year 2100. Very definite steps have to be taken to reduce the level of CO₂ in the atmosphere which may include afforestation, reduction in energy

consumption, use of mass transit systems, developing alternative energy systems such as air, solar and wind and most importantly improvements in fossil fuel burning technology. The important impacts of global warming include, increase in sea level, melting of glaciers, destruction of the ozone layer in the atmosphere, all of which will have significant impact on earth processes and would severely affect the human population.

The children also participated in the poster presentations which were adjudged by a panel of experts. Many of these posters were on the greenhouse effect and global warming. All posters were of very good quality and the experts appreciated the efforts of the students and teachers involved. The workshop was concluded with an interactive session which was extremely successful. The children raised several questions on the talks delivered and also on related aspects. The response of the children was very good and the enthusiasm shown was truly appreciated.

A survey was conducted at the end of the workshop and it was generally felt that the school curriculum should include the earth science as an essential course at

an early stage. The coverage of earth science in school education is very poor and classical at this stage and the modern concepts such as resource management, climate systems, natural hazards etc. are not integrated in the curriculum. In essence an 'Earth System Science' education is desperately needed at school level to generate a high degree of awareness on earth processes and their relationship with man and environment. Apart from classroom teaching, the audio-visual aids help enormously to understand the earth's processes and to think positively as to how to save the earth and its environment from degradation. This is not just a scientific need but a social responsibility. All of them welcomed future workshops like this and some of the suggested themes include river pollution, multi-purpose projects, resource management, oceans, earth movement etc. It was also felt that a larger number of children should be given an opportunity, particularly from rural areas, to participate in such workshops.

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THE 2nd UNESCO INTERNATIONAL CONFERENCE ON GEOPARKS

A five-day international conference on the above topic was organized during 17-21 September 2006, by UNESCO in association with the Geological Survey of Northern Ireland and several other agencies, at the Waterfront Hall in Belfast. Participants from 40 countries attended the conference, wherein 90 papers were orally presented, apart from 28 poster presentations. Both the oral and poster presentations were made under ten sub-themes viz. *geoparks-the economic benefits; geoparks and their role in the protection of geological heritage; marketing geological heritage to the public; how to make a successful geopark; geoparks and tourism; geoparks and geosites-a twin-tracked approach to geological heritage; geoparks and public outreach; presentation of new and aspiring geoparks; integrating geodiversity into protected landscape conservation policy; and geoparks-future direction and vision.* Apart from these sessions, a total of eight workshops ran simultaneously across two afternoons on eight themes viz. *geoparks-the economic benefits; geoparks and geological heritage-sustainable site management; marketing geological heritage to the public; building a strong Global Geoparks Network; how to achieve*

membership of the European and Global Geoparks Network; visitor guide services within geoparks; geological heritage-an example from Great Britain (RIGS); and geoparks & World Heritage.

The presentations were of three different categories viz. successful stories of geoparks around the globe, which are currently either members of a national network or the European Geoparks Network (EGN) or the Global Geoparks Network (GGN); geoparks which are currently in the preparation stage of applying for membership of either EGN or GGN; and certain localities which have the potential of being converted into successful geoparks. The author has presented two papers in the said conference, one paper on the prospective World Heritage Site Majuli (the world's largest inhabited river island) and the other on a conceptual 'Energy Heritage Geopark' in the Tinsukia district, both the localities being from Assam.

The 'geopark' concept, which has its origins in the year 2000 in Europe, is a rapidly growing concept, due to a growing consciousness among humankind worldwide for protecting nature, especially georesources. But geoparks are not just about conservation of landscapes and