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Ecological And Environmental Sciences Research In India

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Indian Academy of Social Sciences (ISSA), Allahabad in association with Andhra University, Visakhapatnam organized 38th session of Indian Social Science Congress (ISSC) between March 29 and April 02, 2015 at Andhra University, Visakhapatnam, under the focal theme **"Knowledge Systems, Scientific Temper and the Indian People**". Of the 19 Research Committees, representing 32 disciplines of science and 21 interdisciplinary Thematic Panels, Ecological and Environmental Sciences was a major Research Committee with a mandate of appraising and integrating current research and theory being pursued and utilized by the society, and also to improve the quality of research and teaching in the subject area. The Research Committee was thus focused on five key areas – access to knowledge, knowledge concepts, knowledge creation, knowledge application and better knowledge service for the welfare of society.

G.B. Pant Institute of Himalayan Environment and Development (GBPIHED), Kosi-Katarmal, Almora was entrusted by the ISSA to hold Ecological and Environmental Science Research Committee during the 38th ISSC. To begin the proceedings, Chairman of the Committee, P.P. Dhyani, Director, GBPIHED, in his keynote address, "Mountain Ecosystems under Changing Climate - Shifting Paradigms of Conservation and Development in the Himalaya", highlighted the importance of mountain ecosystems globally. He maintained that mountains are important in the context of: (i) conservation – due to biodiversity and natural capital, and (ii) sustainable development – on account of provisioning of indispensable goods and services. Among various mountains of the world, the Himalayan ecosystems assume special significance of being young, dynamic, most complex and highly variable. He presented few case studies thereby underlining that Himalayan region is vulnerable to climate change (CC). Subsequently, he made a mention of India's National Action Plan for Climate Change, which includes a comprehensive set of mitigation and adaptation measures, and aims to promote India's development objectives while yielding co-benefits for addressing CC effectively. Advocating a specific

development strategy for Himalayan states he emphasized upon need for recognizing niche and locational advantages and disadvantages, and look for approaches and technologies that minimize the damage to fragile ecology, environment and biodiversity.

To begin the **Session I** – "Science and society: Issues of ecological and environmental science research in India" Convener, G.C.S. Negi (GBPIHED) presented a brief overview of historical progression of ecological and environmental science research in India and observed that how the sectoral domains of research gradually got transformed to multidisciplinary research. Thus scientific community changed its role as a creator of text book knowledge to pursue stakeholders demand driven R&D that offers solutions to the environmental problems to ensure science-society interface. He felt that still there is a challenge to make the R&D work more utilizable by the society by infusion of the research results in policy.

In **Session-II**, "Ecological and environmental sciences research in the service of nation", E.U.B. Reddi (Andhra University) mentioned that global warming due to emission of GHGs is the biggest environmental challenge faced by the humanity today. He stressed for the need to chant the *Mantra* of green cover, green power and green technologies. J.C. Kuniyal (GBPIHED) spoke on municipal waste management in several townships of H.P. and emphasized on a low-cost biocomposting technology involving people's participation. Another case study on management of solid waste, P. Mukherjee (KKM College, Pakur) presented a success story of waste recycling for bio-fertilizer through GO-NGO collaboration in Ranchi (Jharkhand). Two presentations on water quality and soil quality degradation from coal mine affected areas in Jharia, Raniganj and West Bokaro coalfields of Damodar Basin were made by scientists of Central Institute of Mining and Fuel Research, Jharkhand. A.K. Singh reported concentration of heavy metals (Fe, Mn, Cr, and Pb) well above the prescribed levels for drinking water and presented a cost-effective method of water treatment. R. Ebhin Masto found that quality of soil was better for underground mine than the open cast mining sites. S.R. Rao (Andhra University) reported that assimilation capacity of atmosphere was high during the noon and poor at night and early morning at Gajuwaka industrial hub, Visakhapatnam. Ajay Bikkina (Andhra University) reported high contamination in water of sea coast of Visakhapatnam due to untreated sewage disposal. Gopal Krishna (ToxicsWatch, New Delhi) pointed out towards faulty clearance process of industries through a case study of Bhopal disaster in 1984. V.C. Goyal (National Institute of Hydrology, Roorkee) emphasized on the role of citizens in water resources research and mentioned that this approach needs to be pursued vigorously for large data collection.

In the **Session-III** on "Biodiversity conservation and societal welfare – promoting trans-boundary cooperation", R.S. Rawal (GBPIHED) presented findings of a field session held with a multidisciplinary group drawn from the ISSC participants, which interacted with tribal communities of Arraku valley. The experiences of group called for innovative livelihood approaches by way of adding value to local produce/art and

craft, etc., assuring markets through certification and building entrepreneurship skills of indigenous communities. Also, it was highlighted that the transboundary concept of conservation and development needs to be taken up amongst neighbouring states as it is being promoted amongst regional countries in Himalaya.

Bhawana Pathak (Central University, Gujarat) emphasized upon the need for strengthening Himalayan forest database by focusing on non dominant species (e.g., *Myrica esculenta*, a key stone tree species) for conservation and management. Ms. Amrita (WII, Dehradun) stressed upon bridging the gap between conservation and development through a case study of Askot landscape, Uttarakhand. N. Vijaya Kumari (CMR Institute of Technology, Hyderabad) listed the ill-effects of shifting cultivation and presented a framework for eco-rehabilitation of tribal communities. P.S. Raja Sekhar (Andhra University) connected mangrove biodiversity of Godavari river basin with sustainable livelihood. P. B. Rao (Acharya Nagarjun University, AP) felt the environmental movements in India are expression of the socio-ecological effects. M.J.K. Jacob (Chirala Engineering College, AP) presented socio-ecological studies on selected marine fishing villages in Andhra coast. Ms. R. Gayatri presented a paper on digital divide technologies.

In the **Session – IV** on "Geo-spatial technologies and natural hazards", Subrat Sharma (GBPIHED) dwelt with paradigm shift in use of space technology in assessment of vegetation and cited few examples where use of RS & GIS has increased the efficiency and precision of studies in making inventories for natural resources and offering management strategies. Kishor Kumar (Central Road Research Institute, New Delhi) gave an overview of 25 chronic landslide zones of Uttarakhand and various control measures, suggesting that in the geotectonically fragile mountains site selection, construction, operation, and maintenance practices should be in harmony with nature. Varun Joshi (Indraprastha University, New Delhi) emphasized on usefulness of bioengineering measures using horticultural plants, large cardamom, and broom grass through a case study of landslide control in Sikkim.

Thematic Panel on "Natural Resources, Biodiversity & GIS" presented three expert talks. P.K. Sivanandan (Institute for Social Advancement, Thiruvanthapuram) presented a case study on greening the hills and empowering the poor in Attappady tribal area of Tamilnadu. Padmashri P. Pushpangadan (Former Director of NBRI, Lucknow) dwelt upon traditional knowledge, IPR and access and benefit sharing citing the famous example of *Kani* tribe of Kerala. P.M. Alex (Institute for Social Advancement, Thiruvanthapuram) was concerned about over exploitation of river sand in Kerala and its impacts on riverine ecology.

An overview of the above discourse points out that various disciplines of ecological and environmental sciences are gaining importance in the R&D pursuits of the scientific community of India to cater to the immediate societal needs. Prominent among these are climate change research and mitigation measures, air, soil and water pollution and remedial measures, environmental hazards, landslides and control

measures, management of municipal waste for bio-compost and bio-gas, greening of wastelands to cater to the biomass need of tribal, base line data collection on forests and other natural resources using advanced technologies such as RS and GIS, documentation of traditional knowledge of natural resources management and IPR issues, environmental movements for policy change and participatory research involving stakeholders, also known as citizens' science. New thinking of transboundary landscape conservation and development is emerging as a strong approach. Following recommendations / key messages were drawn by Committee:

(i) The rates at which the environmental problems are growing in our country are not being handled adequately despite of available R&D based solutions brought out by scientific community;

(ii) Strengthen R&D efforts to understand the consequences of environmental problems and devise their remedial measures to ensure well-being of people and ecosystems;

(iii) Make best efforts to safeguard the welfare of society by way of promoting "Citizens' Science" concept to generate base line data and spread awareness and instill a sense of ownership and empowerment among the stakeholders; and

(iv) Improve quality of ecological and environmental sciences research through multidisciplinary research addressing issues of mentorship support, funds, instrumentation and infrastructure facilities. This, among others can be achieved through creation and strengthening of ecology and environmental sciences departments in Universities. For example, in our country out of 314 Universities, environmental sciences department exists only in 35 Universities. The ISSC thus has been successful in mobilizing a number of scholars across the country to deliberate upon the current happenings in Ecological and Environmental Sciences Research in India with particular focus on its societal relevance.