Tropical Ecology **51**(1): 1-2, 2010 ISSN 0564-3295

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Remote sensing of tropical ecosystems

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Guest Editors

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Explosive growth in the human population has exerted tremendous pressure on ecological systems throughout the world. From being just one species in any ecosystem, humans today dominate natural and man-made ecosystems due to their technological supremacy. They have altered their habitats to the brink of unprecedented ecological crisis. The consequences include an impoverished world with high environmental degradation and a declining quality of life. The greenhouse effect and global climate destabilization haunt the human society at large today. Meanwhile the world is debating to reduce the carbon emissions and adopt a low carbon economy for sustainable future.

The advent of satellite remote sensing, more than four decades ago, provided immense capability for monitoring the land surface and studying various features at different spatial and temporal scales. The synoptic, repetitive and multiple scale coverage provided by satellite images has added a new dimension to the monitoring and management of ecosystems, landscapes and the biosphere. Over 20 years ago, David H. Greegor Jr. (1986), the Contributing Editor of *BioScience*, introduced ecologists to the basic concepts of remote sensing, including sensor systems and the data analysis. Greegor challenged researchers to use remote sensing technology to measure and understand global ecological changes. Today, we have plenty of case studies using the twin technologies of remote sensing (RS) and geographic information system (GIS) that have changed ecologists' perceptions of ecosystem structure and function. As ecologists have become more familiar with the power and capability of remote sensing, research has been used in novel applications that were unforeseen in 1986. The collaboration between remote sensing scientists and ecologists has, therefore, been very fruitful.

Increasingly, RS and GIS together provide a crucial tool for the effective collection of explicit spatial information needed to understand landscape-level ecological processes, evaluate human impacts on ecosystems and develop integrated land and water resources development and conservation plans (Kushwaha *et al.* 1996). Recent developments in technology and modeling mean that remote sensing is in a stronger position than ever before to improve our understanding of the ecosystems. Global climate change studies, disaster risk assessment and emergency management, environmental impact assessment, wildlife habitat modeling, biodiversity inventory, crop yield forecasting and decision support system for development planning and management are some of the finest examples of the applications of RS and GIS.

This special issue of *Tropical Ecology* comprises selected papers presented in a special session "*Remote Sensing of Tropical Ecosystems"* organized by the Indian Institute of Remote Sensing (NRSC), Indian Space Research Organization, Dehradun, during the Tropical Ecology Congress, 2-5 December, 2007 at Dehradun. The Congress was jointly sponsored by the International Society for Tropical Ecology and H.N.B. Garhwal University. The themes, recommendations and the broad outcome of the Congress are included in Singh *et al.* (2009).

A total of 23 papers were received for the special session "*Remote Sensing of Tropical Ecosystems"*, of which 12 were oral presentations

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and the remaining were presented as posters. The session was chaired by Dr. George Joseph, Director, U.N. Centre for Space Science and Technology Education for Asia and the Pacific (CSSTEAP), Dehradun. Prof. Dr. Steffen Kuntz, Senior Advisor, Geoinformation Services, Infoterra Gmbh, Friedrichshafen and Professor of Remote Sensing and Geoinformation, Alberts - Ludwigs University, Freiburg, Germany delivered the keynote address on "Potentials of Synthetic Aperture Radar (SAR) for monitoring the tropical environment". The selected articles cover a wide range of topics highlighting applications of RS and GIS in natural resources assessment, monitoring, development planning and management. The specific areas addressed are forest type and invasive species mapping, biomass and non-timber produce assessment, agro-ecosystem productivity and carbon pools, soil resource mapping and crop planning and ecotourism development. The paper entitled "Assessment of agricultural crop and soil carbon pools in Madhya Pradesh, India" by Nisha Wani *et al.* was awarded the Alice J. Murphy Award for outstanding poster presented by a young scientist.

The Guest Editors express their gratitude to the Organizers of the Tropical Ecology Congress for the financial support to organize the session and to the *International Society for Tropical Ecology* for publishing this issue.

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