

management practices, a genetic-based understanding of communities and ecosystem is a prerequisite that provides sound information about specific plant genotypes and genetic-based interactions (e.g. mycorrhizae/plant), which can be potentially used in various restoration programmes⁸. T. G. Whitham (Northern Arizona University, USA) talked about restoration success stories and stressed the need to select the right plants in the restoration programme because a locally adapted plant may be maladapted tomorrow due to climate change. M. R. Maltz (University of California, USA) outlined the importance of mycorrhizal inocula sourced from reference ecosystems compared to commercial sources in restoration projects⁹. She was awarded the Mycorrhiza Prize for the best student poster.

M. K. Firestone (University of California, Berkeley, USA) emphasized the importance of integrating AMF with other members of the soil ecosystem, particularly bacteria and fungi, and showed that AMF influence microbial assemblages in the hyposphere.

The future of mankind depends on sustainable use of resources by the ever-burgeoning population which is expected to reach 9.6 billion by 2050. The use of

AMF can meet these challenges to a great extent, providing economic and environmental benefits in the future. A. Adholeya (The Energy and Resources Institute, New Delhi) found that seed priming and encapsulation can promote AMF colonization and increase nutrient acquisition by crops, thus, potentially improving the quality and quantity of the produce. Future research synthesizing these findings will help in better understanding the practical use of AMF in agriculture, forestry and restoration projects, which is fundamental for meeting future global food demands, mitigating climate change and developing conservation strategies. We hope that the theme of the next ICOM 'Mycorrhizal functioning: from wilderness to megacities', to be held in 2017 in Prague, Czech Republic, will provide the right platform and framework to discuss and find answers to human-induced environmental crises of the present time.

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ACKNOWLEDGEMENTS. We thank the Northern Arizona University, USA and the International Mycorrhiza Society for organizing ICOM8. D.S. thanks the University Grant Commission, New Delhi for providing the travel grant to attend the conference.

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MEETING REPORT

Earthquake hazard*

A one-week training programme was held recently to impart an understanding of earthquake science and of the methodologies to quantify earthquake hazard. The programme included lectures, tutorials with hands-on exercises and field studies. Eminent academicians and scientists from India and abroad mentored the participants from different parts of India who attended the programme.

The topics covered during the training programme included continental tectonics, seismology, GPS geodesy and its

application to the study of continental deformation, active tectonics of the Himalaya, earthquake hazard and its impact on society, and geopolitics. Special focus was given to the recent Nepal earthquake as a case study to understand the current state of knowledge. James Jackson summarized the training programme through his final lecture on 'Building resilience to earthquakes along the Alpine Himalayan Belt'.

Participants were given an opportunity to present their ongoing research in the form of oral and poster presentations. These encompassed a variety of topics which included Seismotectonics of the Eastern Himalayan and Indo-Burman Plate boundary systems; active deformation and crustal structure beneath the Sikkim Himalaya; uncertainty analysis of Shuttle Radar Topography Mission

(SRTM)-derived quantitative topographic profiles using Real Time Kinematic Global Navigation Satellite System data (RTK-GNSS); crustal and upper mantle studies in J&K Himalaya; the 2013 Minab earthquake, SE Iran; coupling of climate and tectonics for formation of Late Quaternary Ravi river terraces in Chamba region, NW Himalaya; geodynamics of the Andaman Sea with special reference to the Andaman Back Arc Basin inferred from the ocean bottom seismometer data and application of nonlinear techniques on geochemical data – a basic approach for earthquake precursor. The mentors were impressed by the quality and motivation of the students, and were pleased to mentor and interact with them.

The training programme highlighted the present state of earthquake science in

*A report on the SERB, DST-sponsored one-week training programme on 'Earthquake Hazard: Basic Approaches, Field Investigations and Modeling', jointly organized by Shri Mata Vaishno Devi University, Katra and Indian Institute of Science Education and Research, Kolkata during 10–16 November 2015.

the Indian region and worldwide, and emphasized a number of prominent themes: (1) Most of India is exposed to earthquake hazard and the associated secondary hazards such as landslides. (2) Many of the regions in which future earthquakes will occur have not been examined in detail using the modern techniques available to earthquake scientists. (3) The experiences of other countries (e.g. Chile, Japan, USA) demonstrate that the fatalities due to earthquakes can be greatly reduced. This aim can be

achieved by studying the causative geological structures in detail, and thus providing information about the approximate locations of future earthquakes and their likely size and characteristics. Such information can then form a basis for hazard mitigation procedures related to both community education and engineering projects.

To successfully identify and mitigate earthquake hazards requires the work of highly skilled earthquake scientists, along with educators, policy makers and engi-

neers. The training programme has been a step towards preparing the next generation of Indian earthquake scientists towards this goal.

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MEETING REPORT

Climate change adaptation in the north eastern region of India: issues and options*

India's North Eastern Region (NER), containing more than one-third of its biodiversity and representing the Himalayan and the Indo-Burma global biodiversity hotspots¹, is also rich in cultural diversity. Both biodiversity and culture offer enormous opportunities for ecotourism in the NER, which could be a climate change-resilient economic avenue, apart from culture itself being an avenue for climate change adaptation (CCA). The high degree of climatic vulnerability in the region² is likely to adversely affect its developmental pace and stability unless necessary mechanisms are in place to equalize vulnerability³. The core issues related to Climate Change in the NER include threats and opportunities, adaptation strategy defining strengths and weaknesses, role of different stakeholders – Government agencies, communities, scientific and academic institutions, NGOs/civil societies, etc.

In order to address some of the core issues a consultation meeting of Multi-

stakeholders Himalayan Sustainable Development Forum (HSDF) was organized. HSDF is an offshoot of the Conclave of the Chief Ministers of the Indian Himalayan states held during the Shimla Declaration on Sustainable Himalayan Development (30 October 2009). Over 50 resource persons including decision makers, administrators, scientists, academicians, Government officials, civil societies and community representatives from all the eight NE states and also from other parts of the country shared knowledge and exchanged ideas on frameworks to foster cooperation on sustainable development across the NER to promote science-policy-practice connect, identify priority sectors and needs for adaptation, facilitate dialogue among stakeholders to develop policies for climate change adaptation, build a knowledge network to support national and state action plans for climate change, and suggest institutional framework for implementation of strategic adaptation plans.

The workshop was divided into three technical sessions: (i) climate change (CC) and disaster risk reduction (DRR), (ii) tourism and climate change, and (iii) environmental governance for effective climate change adaptation, excluding inaugural and concluding sessions. Each technical session comprised key presentations followed by panel discussions. In the inaugural session, Alemtemshi Jamir (former Chief Secretary of Nagaland)

stressed on scientific approach in adapting to the changing climate scenario, highlighting that although NE states have prepared State Action Plans on Climate Change (SAPCC), mechanism of implementation of SAPCC needs to be properly developed for the entire NER. P. P. Dhyani (Director, G.B. Pant Institute of Himalayan Environment and Development (GBPIHED)) provided an overview on the role of the Institute, responsibilities and new initiatives in the conservation of rich biological and cultural diversity, and development of the Indian Himalayan Region (IHR). Highlighting the scientific excellence in R&D, he informed that the Institute is second in the world for R&D publications on the Himalaya spanning over the period 1989–2015. He also highlighted the contributions of the institute to major missions at the national level, particularly the National Action Plan on Climate Change and developing guidelines and action plans such as Governance for Sustaining Himalayan Ecosystem (G-SHE). R. M. Pant (Director, National Institute of Rural Development and Panchayati Raj) stressed on the deteriorated environmental situation in the NER, suggesting the hand-holding of diverse stakeholders for the development and conservation of the region. While Kireet Kumar (GBPIHED) appraised the participants on the objectives and deliverables of consultation, P. K. Samal (GBPIHED) spoke

*A report on the Second Regional Consultation of Multi-stakeholders Himalayan Sustainable Development Forum organized by G.B. Pant Institute of Himalayan Environment and Development on 5 October 2015 with financial support from Indian Himalayas Climate Adaptation Programme of the Swiss Agency for Development and Cooperation at National Institute of Rural Development and Panchayati Raj–North Eastern Regional Centre, Guwahati.