

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

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about the status and trends of climate change in the NER.

In the first technical session, Arup Kumar Sharma (IIT-Guwahati) highlighted the potential impacts of climate change in the form of food and water shortage, increased displacement of people, increased flooding, extreme weather events and increased poverty. He provided an overview of climate change modelling to identify disaster risk. Aditi Kapoor (Alternative Futures, New Delhi) deliberated on policy preparedness and reducing climate-induced vulnerabilities in the IHR, and the need for climate change and disaster risk reduction policies in the region. The technical session chaired by Pradeep Chaudhry (Addl. PCCF, Government of Arunachal Pradesh) and consisting of over 15 panelists recommended the development of climate-resilient policy for the NER, mainstreaming disaster management into development schemes for the NE states, establishment of community-based early warning system for flood-affected areas of the NER, creation of coherent and comprehensive NER CC and DRR plan, focus on trans-boundary aspects, planning with long-term perspective (15–35 years), women empowerment in the decision making process, etc.

In the second technical session, chaired by Jamir, over 18 panelists deliberated on tourism vis-à-vis climate change. Sarala Rai (Special Secretary, Tourism and Civil Aviation, Government of Sikkim) in her keynote address highlighted the initiatives of the Government of Sikkim to address CC impacts. Major initiatives included strengthening of rural water storage, rejuvenation of dried-up lakes, Sikkim Organic Mission, State Green Mission, Ten Minutes to Earth, protection of sanctity of natural heritage sites, ban on green felling, Green School Programme, and many others. A. K. Johari (Addl. PCCF, Government of Assam) highlighted the role of human activities in degradation and deterioration of environment, advocating to maintain the green cover to combat climate change and also for long-term sustainability of the Himalayan ecosystem. The major recommendations that emerged from

the session included development and popularization of alternative ecotourism destinations, proper ecotourism policies for the NE states, linking tourism with other livelihood options for sustaining income, skill development of the younger generation in tourism sector and need for a comprehensive study to assess the climate change impacts on tourism in the Himalayan region, particularly in the NER.

In the third technical session, chaired by R. S. C. Jayaraj (Director, Rain Forests Research Institute, Jorhat) over 20 panelists deliberated on environmental governance for effective CCA in the NER. S. K. Barik (North Eastern Hill University), in his keynote address, asserted that traditional institutions of the NER should play a pivotal role in CCA strategy. Superna Jain (Environment Law and Development Foundation, Noida), talked about key principles of environmental governance for climate change from international and national mountain perspectives, role of the judiciary, adaptation by communities, specific policy measures, etc. She mentioned that India has developed its first National Policy on Integrated Development of the Himalayas in 1992, through an expert group formulated by the then Planning Commission (now NITI Aayog). Also, India's neighbouring countries, viz. Bhutan and Nepal have already prepared their National Adaptation Programme of Action and submitted it to UNFCCC. The session provided a number of recommendations that included strengthening institutional and policy coordination for good environmental governance, making CCA an indicator of good governance, need for redefining roles of environmental institutions, judiciary and policy measures, long-term investment programme for CC monitoring, more focus on gender participation in CC decisions and gender-focused entrepreneurship, and integration of traditional knowledge innovation and practices with modern scientific practices.

H. N. Das (former Chief Secretary of Assam), who chaired the concluding session, stressed that apart from affecting

the fragile ecology of the Himalaya, climate change would also influence the livelihood of downstream-dependent communities. Dhyani mentioned that the outcome of this regional consultation would help in finalizing three policy documents, i.e. climate change and disaster risk reduction, tourism and climate change, and environmental governance for effective climate change adaptations, and also in updating the G-SHE document. Kireet Kumar, while presenting a summary, echoed that all the panelists agreed on the development of integrated policies for climate change adaptation, disaster management and eco-tourism for sustained development of the NER. In brief, the consultation served to share information and knowledge about climate change impacts and adaptation in NE India, explore operationalization of the HSDF, bring out a synthesized report on identified sectors, establish a knowledge network to support national and state action plans for climate change under the National Mission for Sustaining Himalayan Ecosystem and institutional framework for strategic adaptation plan.

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