tee. They have stated 'that the Institute ought always to be in a position to provide such opportunities as cannot be obtained anywhere else in India; that it should do what no other institution can do; that it should maintain a position of pre-eminence; that it should acquire even a world reputation and that it should become a place of reference'. The path to attaining this ideal is also indicated in the report, viz. the personnel of the directorate, professoriate and staff, to which we would add finance. These admirable sentiments, however, are not in consonance with the theory elaborated by the Committee regarding the sources of revenue to be explored by the Institute. It seems to us that the preservation of the All-India or international character of the Institute depends upon the regional origin of its finances, its staff and students; and any suggestion of contribution by the provinces in proportion to the benefits received by their scholars must militate against the All-Indian status of the institution. On the other hand, contributions based on the financial capacity of each province irrespective of other considerations will invest the policy and outlook of the Institute with a national character. Each British Province and each major Indian State might endow a chair and support the laboratory attached. The late Mr J. N. Tata never contemplated personal or communal benefit from the Institute which his munificence founded. The Institute is the cultural rallying point of the Indian Nation, and its structure is an indivisible unit. If the provinces, the Indian States and the industrial magnates consider it their patriotic duty, rendered in a spirit of pure altruism, to create and support associate professorships, readerships and lecturerships in appropriate branches of science, then, it may be possible to release the funds of the Institute more freely for developing its international reputation, by inviting scientists of outstanding eminence such as the Sewell Committee, contemplate to associate themselves with the life and work of the institution. If it were only possible to induce such men to come to India – and it may not be difficult provided we have the resources – the universities, the government scientific departments and the industries would be glad to secure their co-operation and only then would the Institute be in 'a position to do what no other Institution could do'. It is gratifying that, with the limited funds at his disposal, Sir Venkata Raman has already taken the first step in this direction by inducing the Council to invite Professor G. Hevesy and Dr Max Born to stimulate the work of the Institute; further development of this great institution must depend upon the financial support of provincial governments and of the Indian States.

MEETING REPORT

Natural hazards: Mitigation and management*

The international conference on natural hazards held at the Guru Nanak Dev University, Amritsar was followed by a two-day field trip to the Kangra valley, Himachal Pradesh and the site of the 1905 earthquake of magnitude 8.0 which killed about 20,000 people. This international conference was sponsored by Natural Disaster Management Division of Ministry of Agriculture and Department of Space, Govt. of India. The conference was significant and relevant in the context of the occurrence of Bhuj earthquake in Gujarat in January 2001.

The conference attracted 20 foreign and 70 Indian delegates from 12 countries. In all, 75 papers were presented in 10 technical sessions and one poster session. The main themes of the conference were earthquakes, landslides, cyclones, floods and natural radiation hazards. The maximum number of papers was presented on the topic of earthquakes and their hazards.

Roger Bilham (University of Colorado, USA) delivered the keynote address on the topic, 'Future great Himalayan earthquakes'. His conclusions were based on GPS studies carried out by him in the Himalayas during the last decade. According to Bilham, 60% of Himalayan arc has enough stored elastic energy to drive 5–8 great earthquakes of magnitude 7–8 or even more. He also analysed the aftershock data from the Bhuj quake and discussed the causes that were responsible for its occurrence. According to him, the region around Ahmedabad is in the zone of enhanced compressive stress. R. K. Bhandari (Natural Disaster Management Centre, Chennai) highlighted the need for a national natural disaster knowledge network (*Nanadisk-Net*) for India. The government has constituted a high-powered committee to address the multiple facets of natural disasters in India. Access to global databases and global early warning systems will also be facilitated in a big way, according to Bhandari.

Vinod K. Gaur (CMMACS, Bangalore) spoke about disaster mitigation through risk assessment. His paper stressed the dangers of increasing vulnerability of a fast-growing population in developing countries to natural hazards. Assessment of risk is a key element in disaster mitigation. It was argued that a Disaster Mitigation Act be legislated by the Parliament to provide a framework of policy and planning. Ramesh P. Singh (IIT, Kanpur) highlighted the role of remote sensing in mapping and monitoring of natural and man-made disasters. Thomas Streil (SARAD GmbH Co., Germany) presented the results obtained by Earthquake Precursor Observation System (EPOS)1-A multiparameter measuring system developed for earthquake prediction research. EPOS can monitor up to 17 precursory parameters at one spot in groundwater. It is being tested in Mexico and Germany.

*Report based on the 'International Conference on Natural Hazards: Mitigation and Management' organized by Guru Nanak Dev University, Amritsar from 12 to 15 March 2001.

Role of spatial technologies in natural disaster mitigation and management was the special theme of this conference. A paper of Madhav N. Kulkarni and V. S. Tomar (IIT, Mumbai) on application of GPS to natural hazards monitoring and mitigation was presented by G. K. Vikas, a graduate student from IIT, Mumbai. GPS technique has revolutionized the concept of digital maps and the GPS receivers can provide accurate coordinates in real-time.

This conference had the advantage of participation of delegates from China and Iran who have first-hand experience of working in earthquake-prone areas. Zhao Zhonghe (Beijing) stressed the technique for rapid assessment of aftershock activity which can help in predicting strong aftershocks to reduce the risk of earthquake hazards. Hu Hui (China) discussed the commensurability of earthquakes of Hualian area in Taiwan. Wang Rui (China) presented his research work on correlation of tide-generating forces of celestial objects with earthquakes. M. M. Khatib (Birjand University, Iran) discussed the seismicity hazard on Nehbandan fault zone in Iran. Noorbaksh Mirzaei (Institute of Geophysics, Tehran) presented data collected on the recent fault system of Zagros mountains.

Vlaidimir Alekseev, Yuri Ruznin and Kh D Kanonidi represented IZMIRAN Institute, Troitsk in the Moscow region. IZMIRAN scientists have developed a technique to use 'space plasma anomalies' as earthquake precursors. They have initiated studies in electromagnetic field anomalies before the advent of earthquakes. V. Alekseev correlated electromagnetic anomalies recorded over Kangra and Hindukush using COSMOS satellite data with the radon anomalies recorded by Virk and co-workers in the Kangra valley during the 1990s. A. N. Sultankhodgaev (Institute of Seismology, Tashkent, Uzbekistan) discussed the efficacy of geochemical precursors as a tool for prediction of earthquakes in Central Asia. 'Status of earthquake monitoring and forecasting studies in N–W Himalaya' was discussed by H. S. Virk (Guru Nanak Dev University, Amritsar). This work has established that radon and helium anomalies are precursory to major earthquakes in the Himalayan belt, but prediction is not possible unless there is a strong network of stations supported by seismic and GIS techniques. It was proposed to install an EPOS station using multi-sensor probes in the Kangra valley.

P. Banerjee (Wadia Institute of Himalayan Geology (WIHG), Dehradun) presented the results of GPS studies on the Indian plate convergence process based on two permanent and about 50 mobile stations. Data presented confirmed the crustal shortening at the rate of 15–20 mm/year within a narrow zone of 100–150 km north of Himalayan frontal fault. A. K. Mahajan (WIHG) traced the history of Himalayan seismic activity during the last 500 years and related it to regional seismo-tectonics. Sushil Kumar and S. K. Chabak (WIHG) presented earthquake tomography of Garhwal Himalaya and Chamoli aftershock behaviour and its relation to seismic risk in the region. S. S. Randhawa (Himachal Remote Sensing Cell, Shimla) discussed the earthquake epicentre distribution and its relation to lineaments and faults as deciphered from satellite imagery of N–W Himalaya.

A special session was devoted to landslide hazards in the Himalaya. W. Mitchell (Luton University, UK) discussed his preliminary results on rock avalanches in the Indian Himalaya. Alexander Ström (Russia) presented his investigations on natural blockages of rivers in Russia after the rock slides. Sudesh Chopra (Geological Survey of India, NER, Shillong) discussed the landslide hazards in Assam and disaster management. M. S. Rao (Ministry of Information and Technology, Govt. of India) gave information about 'Alert System for Flood and Cyclone Hazards Mitigation and Management' set-up as a part of Natural Hazards Management Information System (NHMIS). The main aim of the NHMIS division is to provide IT-based solutions for disaster management by utilizing the communication network, NICNET.

Natural radiation hazards were discussed in a separate session on the last day. Venkat Raj (Health, Safety and Environment Group of BARC, Trombay) gave a detailed review of Indian reactors and their safety aspects, so far as risk of radiation hazards is concerned. Ester Toth (Rad Lauder Laboratory, Budapest) was the keynote speaker. She had collected indoor radon data in 5500 houses of Hungary and established a correlation between radon dose and cancer risk to inhabitants. K. Kant (Kurukshetra University) presented similar results from the state of Haryana in India. M. S. Negi discussed radon and thoron levels in Kumaon dwellings and Giridhar Jha elaborated his findings on radon profile inside and outside a uranium mineralized zone. Safety aspects for miners were also discussed. George Marx (Roland Eotvos University, Budapest) gave a detailed analysis of evolution of life on the earth and the role of radioactivity in plate tectonics and creation of species.

D. Haldar (GSI, Kolkata) presented the only paper on volcanic hazards. He discussed the current eruption of the Barren Island Volcano in the Andaman Sea and its future prospects of eruption. Shailesh K. Aggarwal (CBRI, Roorkee) presented strong motion records and earthquake source model to study the response of structures to earthquakes. S. S. Behl (Guru Nanak Dev University, Amritsar) elaborated novel architectural and engineering solutions for the design and safety of buildings in earthquake-prone areas. G. S. Gill (Punjab University, Chandigarh) presented a report on the neo-tectonic activity around Chandigarh.

During the two-day field trip, the delegates visited the Kangra Fort, a remnant of the great Kangra earthquake of 1905, a conjunction of MBT and MCT, and the Jwalamukhi temple on a fault line in the N–W Himalayas. The recommendations of this conference were formulated by a panel of international experts to be submitted to Natural Disaster Management Division, Ministry of Agriculture, Govt. of India, the main sponsor of this conference.

H. S. Virk, Department of Physics, Guru Nanak Dev University, Amritsar 143 005, India. e-mail: virkhs@yahoo.com