

mentioned above, probably due to its proximity to the Himalaya.

5. The time gap of 3.66 years could become a magic figure if an earthquake of magnitude ≥ 6.0 actually occurs by rupturing the eastern segment of the Son-Narmada fault or the Dauki fault through reverse slip mechanism.

Therefore, September 2004 could turn out to be ominous.

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INDO-ITALIAN WORKSHOP ON SEISMIC RISK EVALUATION

Seismic risk evaluation is being considered as one of the fields of collaborative research programmes under the Protocol of Cooperation between the Governments of India and Italy. As a first step, an Indo-Italian Workshop on Seismic Risk Evaluation was organized from March 3 to 9, 2001. The workshop was sponsored by the Department of Science and Technology (DST) of Government of India, and the Ministry of Foreign Affairs of Government of Italy. This workshop was planned as a forum for deliberations amongst a close group of scientists directly involved in this field, with a test area for microzonation and seismic risk evaluation as the core topic of discussion. The Committee for the Indo-Italian Workshop on Seismic Risk Evaluation, set up by the Department of Science and Technology of Government of India, selected Jabalpur as the test area and formed a working group for carrying out the test exercise. Intensive preparatory work was carried out by Geological Survey of India (GSI) and National Geophysical Research Institute (NGRI), Hyderabad in the Jabalpur area. A reference document detailing the geological, geotechnical and geophysical information was prepared for presentation and discussions during the technical sessions. The workshop had two components (1) A field visit to Jabalpur from March 3 to 5, 2001 and (2) Technical sessions at NGRI, Hyderabad from March 6 to 9, 2001. The field visit to Jabalpur during March 3-5, 2001 was organized by GSI. The visiting group comprised 8 members of the Italian delegation, members of NGRI, and the working group and scientists of GSI and Jabalpur Engineering College. The field programme included visits to a number of type areas to give exposure to regional geological and tectonic settings, as well as visits to specific geotectonic and lithological type areas in the Jabalpur city and its close vicinity, which had experienced different scales of damage during the 1997 earthquake of Mw 5.8.

The technical sessions at NGRI were attended by about

45 participants comprising 8 members of Italian delegation and representatives of DST, Italian Embassy in India, NGRI, GSI, IMD, IITs, WIHG, CBRI, CMMACS, Kurukshetra University, Jabalpur Engineering College and others. The deliberations essentially included about 20 oral presentations on the approaches for seismic hazard assessment and risk evaluation as well as presentation of case studies from Italy and India. The presentations broadly covered the three important themes which are the essential components of seismic risk evaluation viz. seismic hazard assessment, microzonation and vulnerability studies. The Indian and the Italian scientists also reviewed the status of the seismological networks, the geological, geophysical and tectonic data for hazard analysis and microzonation. It was opined that although the seismological network in India now enables detection of earthquakes of Magnitude 4 and above, it is important to fill the gaps with installation of new observatories so that the detection level may be brought down to Magnitude 3. Also, the need for a network of strong motion accelerographs was emphasized, to enable realistic estimates of seismic hazard.

It was felt that the approaches for detailed microzonation of urban areas must be based on a deterministic approach. In these, theoretical computations of synthetic seismograms can be used to estimate the expected ground motion for a set of possible scenario of earthquakes, using different fault geometries, source complexities like rupture dynamics, propagation characteristics of media and site effects. Such numerical modelling of ground motion, coupled with the geotechnical data generated from soil penetration techniques (for N values) and directional dependence of attenuation would thus lead to a pre-disaster microzonation. In cases where strong motion records are available, the synthetic ground motion can be compared to the observed ones, to include more complex source models and 2D site amplification effects. Concern was raised about appropriate

consideration of the following issues regarding computation of seismic hazard assessment:

- Probabilistic or deterministic approach for seismic hazard assessment.
- Maximum credible earthquake or most probable maximum magnitude earthquake.
- Area or linear or point source zone.
- Well-constrained source zone depth or a generalized shallow/deeper depth.
- Directional dependence of earthquake attenuation.

The workshop concluded with a recommendation for

three Indo-Italian collaborative projects, under the umbrella theme of 'Seismic Hazard Assessment, Microzonation and Risk Evaluation' of mega cities of India. The details of project programme for the duration of 3 years are to be planned in due course. NGRI, GSI and BMTPC (Ministry of Urban Development, Government of India) from the Indian side, and University of Trietse (Department of Earth Science), and University of Rome "La Sapienza", from the Italian side, will function as coordinators.

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CORRESPONDENCE

NON-PUBLICATION OF GEOLOGICAL MAPS – A FORCED POLICY OR INDIFFERENT ATTITUDE?

Government of India's policy in imposing restrictions on the publication of geological maps is lacking in logic, as elaborated by Srikantia (1995, 1999). Besides denying the basic geological information to various user agencies, this restriction has also caused a steep fall in the standard of geological mapping. The Geological Survey of India (GSI), which in the pre-Independence period brought out excellent maps, can no longer boast of producing reliable geological maps. It is natural that the lack of public gaze and peer scrutiny, make a mapper so complacent that he no longer feels accountable. Effort of Srikantia (1999) which was followed by a group discussion at the Indian Academy of Sciences (Srikantia, 2000), elicited no response from the Government. What I narrate here further exposes the futility of this illogical policy, which is detrimental to good science.

In the early eighties, when I was mapping in the Spiti Valley, access to toposheets No.52L/12.16 and 53I/13 covering Sumdo, Kaurik, Chango areas was denied to the GSI by the Survey of India (SOI) with the comment that these sheets have not been printed for civilians' use. Consequently, the mapping had to be carried out on enlargement of old and inaccurate hachured degree sheets. Even now these topographical sheets are not available for public use. During the summer of 2000, I had an opportunity to revisit the Spiti Valley, which has of late been opened to the foreign tourists. I met several foreigners who possessed detailed topographical maps of all the areas, including the

Kaurik-Chango stretch. There are at least three agencies, which have published these maps based on satellite data, viz. U.S. Navy (Fig.1), Russia (Fig.2) and Switzerland. These maps are as accurate and detailed if not more, than those of the SOI. Is there any logic in denying maps to our own geologists and also suppressing their publication when detailed maps of these areas are freely available to those outside India? But it is not always that the SOI or the Ministry of Defence (MOD) stands in the way of publication of geological maps. For example, the geological maps of Spiti-Kinnaur areas, published in the GSI Memoir 124, were cleared by the SOI and the MOD, though after deletion of the names of localities, rivers etc. No doubt, it required a tenacious pursuance by a committed person like A.K. Raina, who at that time headed the Delhi Office of the GSI. If the maps of strategic areas of Spiti and Kinnaur could be cleared by the MOD, there is no reason why other maps cannot be cleared for publication. Most of the time it is the lack of will and commitment due to which the maps remain unpublished. The best examples are the geological maps on 1:50000 scale of the Jutogh Group, extending from the outermost klippe to its root zone and of the Tal Group (Nigali Dhar and Korgai Synclines) on 1:125000 scale. These maps were cleared for publication by the SOI and MOD on 14th December, 1990, but still remain unpublished. In this case the SOI and MOD are not to be blamed for the non-publication of maps, and the