BOOK REVIEW


The 26th January, 2001 Bhuj earthquake is the deadliest earthquake to have struck India since the great Assam earthquake of August 15,1950. The human lives lost are estimated to be in the vicinity of about 20,000 and the estimated loss to property is around 50,000 crores. The officers of Geological Survey of India (GSI) have carried out a detailed study of this earthquake which is reported in Special Publication No. 76 of GSI. The same is being reviewed here. There are in all 13 chapters in this report. The lengthiest and the most detailed chapter is on Macroseismic Survey. It must be remembered that in the past, the officers of Geological Survey of India have done a commendable job in investigating earthquakes. The great 1897 Shillong earthquake was investigated in detail by Oldham (1899) and it has become a masterpiece of what one could infer from field observations. Even today it is referred as a standard text for students to learn what needs to be done while carrying out field investigations of earthquakes. Similarly, the Kutch earthquake was revisited by Oldham (1928) and there are interesting reports on Kangra earthquake of 1905, Bihar-Nepal earthquake of 1934 and the earlier mentioned earthquake of 1950. In the recent past, the officers of Geological Survey of India have brought out a good report on the December 1996 Koyna earthquake.

In the report under review, the 1st chapter by Pande gives the parameters of the Kutch earthquake of 2001, an overview of the lives lost and damages in various districts and a broad map showing the distribution of intensities. The great 1897 Shillong earthquake was investigated in detail by Oldham (1899) and it has become a masterpiece of what one could infer from field observations. Even today it is referred as a standard text for students to learn what needs to be done while carrying out field investigations of earthquakes. Similarly, the Kutch earthquake was revisited by Oldham (1928) and there are interesting reports on Kangra earthquake of 1905, Bihar-Nepal earthquake of 1934 and the earlier mentioned earthquake of 1950. In the recent past, the officers of Geological Survey of India have brought out a good report on the December 1996 Koyna earthquake.

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inadequacy of seismic designing. The most common forms of damage to the bridges involved crushing of the bearings, tilting of piers and development of low amplitude wavy manifestations on the deck portion. As far as the water resource projects are concerned, there are 20 medium and 165 minor irrigation schemes in Kutch district and in the coastal parts of northern Saurashtra region.

Chapter 8 by Pande and others deals with Coseismic Structural Ground Deformation. The deformations are in the form of lateral displacements, linear subsidence, upheaval, pronounced liquefaction etc. Interesting findings include co-seismic deformation of ground near Bodhormora Village in intensity X zone, an E-W trending bump extending to 350 m in length with a maximum height of 80 cm. Several ground fractures were observed with lengths up to 8 -10 km and having openings of up to 10 cm.

In Chapter 9 Secondary Effects of the Earthquake are dealt by Prabhas Pande and others. The authors note that the 26th January, 2001 earthquake caused large scale liquefaction which was seen in an area of about 50,000 sq km. The extensive plains of Rann of Kutch, the marshy tracts of Little Rann and the shallow groundwater zones of Ranni Land provide a very conducive environment for development of liquefaction. Most of the liquefaction was observed within intensity X and IX, widespread in intensity VII and VI. At several places, lurching of ground due to lateral spreading was observed. A very interesting observation was made of a circular subsidence zone of about 5 m diameter which became better defined after a month of the occurrence of the earthquake. Mud craters were also seen at various areas. In Table 9 1, the authors have described liquefaction and landslides as observed in areas covered by intensity V to intensity X.

Kayal and others have investigated aftershocks of Bhuj earthquake in Chapter 10. Soon after the earthquake, a seismograph station was established at the Geological Survey of India office complex in Gandhinagar on January 28, 2001 and a three station network was set up in the epicentral area by midnight of 29th January, 2001. Within a few days time, this was increased to a network of 12 stations including several digital data acquisition devices. The authors have made use of the large amount of aftershock data to estimate hypocentral parameters and present diagrams showing their distribution for various magnitude ranges at various depths. A look at the depth distribution shows that maximum number of aftershocks were estimated in the depth range of 15-20 km and very few occurred at depths deeper than 40 km. The focal mechanism of the aftershock were also determined and a schematic model of the mainshock, occurring at a depth of 25 km, by reverse faulting, has been developed.

Chapter 11 deals with the post earthquake geophysical studies by Mukherjee, Lai and Singh. The investigations included gravity and magnetic profiling, levelling and induced polarization (IP) studies. Interesting structural features have been delineated through these studies.

Chapter 12 by Prabhas Pande addresses Seismotectonic Framework of the Region and source Mechanism of Bhuj earthquake. A model of the Kutch Rift Basin has been developed. The causative fault along with the rupture was initiated at a depth of 20 km, is inferred to be a Precambrian structural discontinuity following the Delhi-Aravalli trend.

In the last chapter, Prabhas Pande and Jaya Singh addresses the Societal Issues and Course for Future Studies. Many of the conclusions are interesting and important. The e is a combined bibliography for all the 13 chapters. Annexure I gives Newspaper Reports, Annexure II is a Locality Index, Annexure III is a description of Medvedev-Sponheuer Karnik (MSK) Intensity Scale while Annexure IV is a list of Aftershock and their Hypocentral Parameters.

I find the Special Publication No 76 of the Geological Survey of India very informative. The section on macroseismic investigations is indeed very comprehensive. A 4-5 page summary integrating the entire work in a nutshell would have been useful. The officers of Geological Survey of India need to be complimented for putting together a good report within a short span of time after the Bhuj earthquake. This report would be of interest to researchers, students, and other responsible for earthquake disaster management.

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