

Earthquake hazard: Creating public awareness in Bangladesh

DR. AFTAB ALAM KHAN and MD. ABDUL HOQUE

EARTHQUAKES are caused by the explosion or the release of accumulated strain due to various stress-fields in the earth's materials. Earthquakes have been a source of terror and wonder for as long as people have inhabited the earth. Terror stands for unexpected, sudden-onset of earthquake events those are capable of producing many casualties among the local population and massive destruction of property, while it is a wonder because people are awe-struck by the forces of nature that suddenly disrupt the environment and alter the surface of the planet. Earthquakes are one of the major natural hazards threatening life, property, and economic well being in many nations. Death tolls from major events can be sighted as 255,000 in Tangshan, China in 1976 and 10,000 in Mexico City in 1985. The economic loss in the 1995 Kobe, Japan, earthquake was more than U.S.\$100 billion. Nations striving for full economic development may find the investments and progress of decades wiped out in a few minutes. Vis-a-vis the devastation or the loss of lives and economy due to an earthquake in developed countries like China and Japan where the advancement of earthquake research is quite appreciable, it is needless to say that a catastrophic condition will emerge if a large magnitude earthquake occurs in an earthquake prone country like Bangladesh. Inquiring minds have long sought to understand the processes responsible for this violent activity. The reasons for the unawareness about potential earthquakes are the lack of systematic monitoring and follow up of trends of seismicity and micro-seismic events. An overall scenario of earthquake events in and around Bangladesh lends support to a vulnerable situation and it is recommended that some relevant steps must be taken to ameliorate the public awareness.

Earthquakes are related to faulting and tectonic instability of an area. Signifying the movement along a fault, it is written in the Bible-Zechariah 14:4, "The Mount of Olives shall cleave in the midst thereof toward east and toward the west, and there shall be a very great valley; and half of the mountain shall remove toward the north and half of it toward the south". It is very clear from this statement that an impending devastation would occur along an active fault movement. The overall tectonics and the nature of fault movement within Bangladesh and the adjoining region are con-

Bangladesh is extremely vulnerable to earthquake activities. An extensive seismological observatory network must be set-up in Bangladesh equipped with the modern and sensitive earthquake monitoring facilities. This includes strainmeters, accelerometers, velocity and displacement seismographs. Monitoring facilities of micro-seismicity and on-line real-time seismological facilities must be introduced. Highly sensitive seismographs with all components of recording system must be installed for continuous monitoring and for valid prediction.

cive for the frequent and recurring earthquakes. Threatened earthquake disaster inside Bangladesh may also be expected from active fault zones outside the national boundary. Tsunami is the terrific tidal wave caused by the underwater earthquakes, which usually strikes the Pacific and Atlantic coasts. Bay of Bengal including Java trench in the southeast of Bay of Bengal have also such seismogenic potentiality because more than twenty earthquake events have so far been recorded in the Bay of Bengal in recent years. Hence, the possibilities of tsunami in the Bay of Bengal cannot be ruled out.

A good background of historical earthquake information is essential to evaluate the seismicity. Information on earthquake events in and around Bangladesh is available for the last 250 years. The earthquakes those affected Bangladesh and its surroundings including the historical earthquakes are in records from 1664 till today. The earthquake record suggests that more than 100 moderate to large earthquakes occurred inside Bangladesh since 1900, out of which more than 65 events occurred after 1960. More than 125 earthquake events have occurred in and around Bangladesh

since the beginning of the new millennium. Of which about 27 events of magnitude ranging 4 to 5 have occurred inside Bangladesh. Fifteen new epicentres have been identified inside Bangladesh since January 2001. This clearly indicates an increased frequency of earthquakes in Bangladesh. The increase in earthquake activity in Bangladesh is an indication of fresh tectonic activity or the propagation of fractures from the adjacent seismic zones. Although Bangladesh is extremely vulnerable to seismic activity, the nature and the level of this activity is very poorly defined. The main constraint is the earthquake observational and monitoring facilities, which is totally absent in Bangladesh.

A quantitative assessment of earthquake events in Bangladesh reveals that the annual rate of strain (4.5×10^{21} ergs) accumulation corresponds to $M = 6.5$ and enough strain to the tune of 2.5×10^{23} ergs is already accumulated for an earthquake of magnitude $M > 7.5$. The study further suggests that the present accumulated strain to the tune of 2.5×10^{23} ergs is likely to precipitate an earthquake greater than magnitude 7.5 should a single event occurs with plausible time forecast of between years 1993 and

2005. The probability of occurrence and the return period calculations of the major earthquakes in Bangladesh suggest that the probability of occurrence of 6.8 and 7.4 magnitude earthquakes are 98 and 99 percent respectively with return periods 50 and 100 years respectively. The ground surface acceleration (g) in the various seismic zones of Bangladesh has been calculated and it ranges from 0.15g to as high as 0.6g in the epicentral region of a recurrent earthquake located in that zone. All these findings lend support to conclude that all the earthquake source parameters are vulnerable to severe earthquake in Bangladesh.

The recurrence of earthquakes in an earthquake prone region cannot be prevented. Rather, what could be done is only to make a prediction and issue warning to minimise loss of lives and property. Although precise prediction is not always possible, an acceptable valid prediction of an earthquake will certainly minimise the loss of lives and property. A valid prediction depends on four essential elements. Earthquake disaster mitigation approach involves a) pre-disaster planning, b) building measures, and c) management. Pre-disaster planning involves measures at physical

planning level, assessment of potential risk zones, assessment of potential man-made risk zones, land-use pattern, infrastructural network, safety standards and norms, building shape, height, and group, and evacuation and emergency preparedness. Building measures involve damage rating, building code, and a seismic design and practice. The management involves both pre-disaster and post-disaster administrative principles, implementation of building code, relocation, and mass awareness both for pre-disaster preparedness and post-disaster management.

Bangladesh is extremely vulnerable to earthquake activities. Four zones have been identified as the severest zones in Bangladesh in terms of maximum ground surface acceleration and the probable movements of the deep-seated

crustal faults and lineaments. The severest zones include northern part of Dinajpur, Rangpur, Mymensingh, Sylhet, Tangail, northern part of Dhaka, Khulna, Jessore, Kushtia, and Chittagong. 1885 earthquake of Manikganj, 1897 earthquake of Great Assam, 1918 earthquake of Srimangal, 1930 earthquake of Dhubri, and 1950 earthquake of Assam all are quite matured to recur any time and may create devastation in Bangladesh. An extensive seismological observatory network must be set-up in Bangladesh equipped with the modern and sensitive earthquake monitoring facilities. This includes strainmeters, accelerometers, velocity and displacement seismographs. Monitoring facilities of micro-seismicity and on-line real-time seismological facilities must be introduced. Highly sensitive seismographs with all components of recording system must be installed for continuous monitoring and for valid prediction.

Dr Aftab Alam Khan is Associate Professor and Convener, Geohazard Research Group and Md Abdul Hoque is a Bose Fellow, Department of Geology, University of Dhaka.



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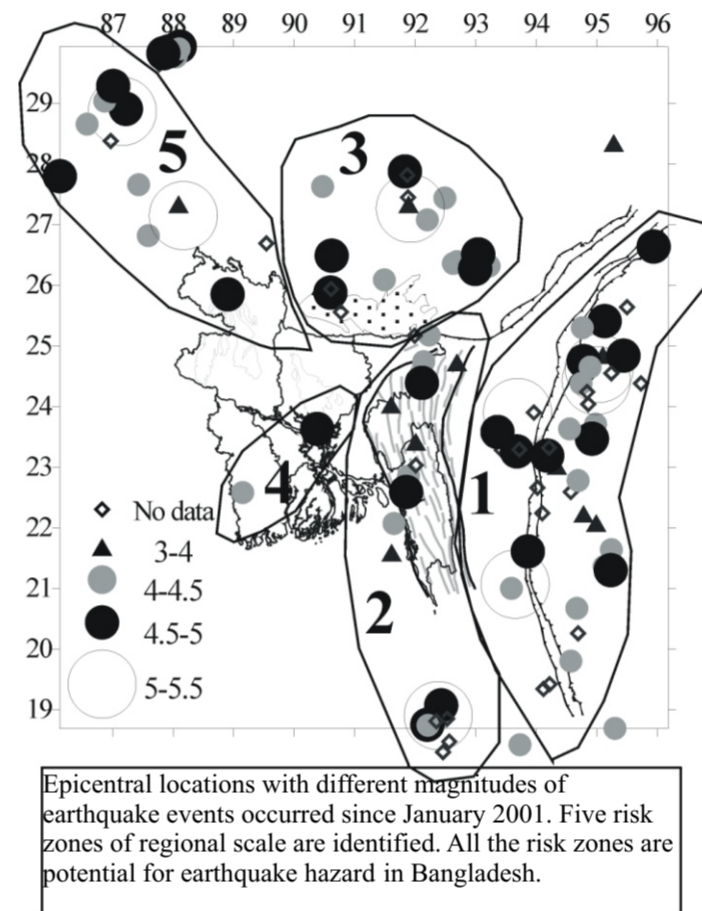
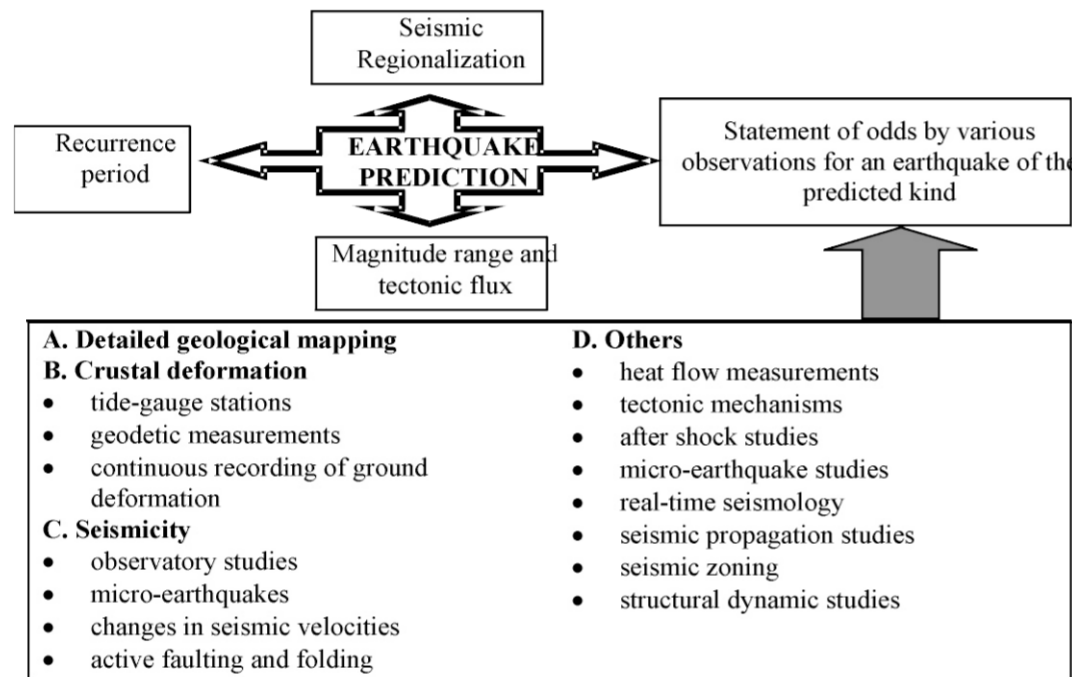
Doctors at the Australia's Canberra clinical school have found that cancer is now occurring in a different part of the bowel. Tumors that once appeared on the left side are now tending to appear on the right. They couldn't explain it why but warn that it's reason for people to be more vigilant than ever before because right-sided tumours are usually difficult to detect. They don't have symptoms like obvious bleeding or bowel obstruction. They grow quietly and many develop tiredness and anaemia.

There is now more reason for healthy people over 50, particularly men, to be checked for bowel cancer, one of the common internal cancers. A family history in these cases is always alarming. The bright side of this topic is that if a tumour is found early, the cure rate is around ninety percent.

Did you know?

Anthrax can survive in the environment for years or decades, awaiting uptake by the next host. Cutaneous anthrax is acquired when a spore enters the skin through a cut or an abrasion. Gastrointestinal tract anthrax is contracted from eating contaminated food, primarily meat from an animal that died of the disease, and pulmonary (inhalation) anthrax from breathing in airborne anthrax spores. The above types of anthrax are potentially fatal if not treated promptly. Antibiotic therapy usually results in dramatic recovery. Antibiotic therapy may also be used for prophylaxis in asymptomatic patients in special circumstances.

Next: World of heart diseases



Magurchhara blowout and the energy ministry

NURUDDIN MAHMUD KAMAL and SKM ABDULLAH

WHEN the Ministry of Energy turned a deaf ear recently on the Magurchhara damage compensation claim of 685 million US dollar, Petrobangla was genuinely disheartened. The cat is now out of the bag after an elapse of about five years. Although the Magurchhara blowout took place on 14 June 1997, Petrobangla either could not or did not demand compensation as some high ups in the Government temporarily shelved the official probe committee report, withholding it as classified document. Worse still was that Occidental was allowed to continue its operation, without any penalty. Rather, the Contractor (Occidental) was awarded an extension of the lapsed Production Sharing Contract (PSC). That is not the whole story. Occidental was allowed to sell its share to Unocal and escape Bangladesh unhurt. This perturbed the whole nation.

With the probe report in hand perhaps early this year Petrobangla continued to dilly-dally on processing the compensation claim. Later, the ministry of energy initially pursued a go-slow policy over the draft claim. Suddenly this summer surprisingly the state Minister Mr. A. K. M. Mosharruf Hossain allowed Petrobangla to file the claim to Unocal after holding the same for some weeks on the pretext that a thorough scrutiny was needed prior to issuing the claim. The usual Bangalee gossip was that behind the scene a drama was

played which influenced the game plan. As expected, on receipt of the claim letter Unocal retorted by saying that the compensation claim has already been settled through the Supplementary Agreement signed in 1998. The State Minister said that the Supplementary Agreement certainly gave Unocal a scope to deny the claim of Petrobangla. People smelled rat in the episode. Gossips went on in Dhaka, this time rather in an articulated manner. End of the day good news came. The State Minister promised that a high powered Judicial Committee headed by a retired Justice would look into the matter. An insider viewed that the issue of compensation could have been raised long before had the then Energy Secretary, Dr. Taufiq-e-Elahi did not deliberately decline to open the Probe Committee Report in front of the Parliamentary Sub-Committee. The Daily Star reported on 11 July, 2002: Why, asks PM: Probe ordered into Petrobangla's delay in Magurchhara blowout claim. As per PM's instruction, the judicial committee would also verify whether the former energy secretary played any role in shelving the Magurchhara blowout Probe Committee Report that blamed Occidental's negligent operations and faulty drilling practices for the exploration. But, the intriguing part is that the State Minister for Energy conveyed the PM's instructions to the Law Minister Mr. Moudud Ahmed, who happens to be very close relation of Dr. Taufiq-e-Elahi. There is also a rumour that Mr. Moudud Ahmed had a legal relationship with Unocal. We only hope that the

tangle do not get extended further. It may also be noted that shortly after the blow-out the then Energy Minister Mr. Nooruddin Khan visited the Magurchhara site. There is nothing wrong in the visit. But his unfortunate remarks and his dubious role at that time stood as a road block in processing the case. In this background, issues related to the Supplementary Agreement as



Magurchhara blowout : 14 June 1997

FILE PHOTO: STAR

the SA has been clearly undermined for an extension because, "the contractor was unable to fulfil its obligations within the Initial Exploration Period of three years from the date of signing of the PSC. The parties also wished to amend certain provisions of the PSC to enable the contractor to undertake and fulfil its obligations. The Ministry is a party to the grant of exten-

agreed to disclose to the Government and Petrobangla all claims and receipts of any insurance policy in connection with MB # 1 blowout. Reportedly, neither the contractor informed nor Petrobangla/Government enquired about the matter. If the assertion is true, why it was done so?

Fifth : Under Article 3.3, it has been found that if the terms and conditions of this SA are publicised in any manner (other than by the Contractor), then Petrobangla and the Government shall support and cooperate with contractor in responding to any negative publicity relating to the SA. This has certainly prejudiced the SA because the Contractor and the officials concerned anticipated that there is likely to be negative publicity. We strongly feel that this has been done with malafide intention. Otherwise, how could a Supplementary Agreement preempt the issue of negative publicity?

Sixth : Under 8B.3, if Contractor produces Natural Gas in Moulavi Bazar (MB) area from the sand layers (reservoir), encountered by the MB well No.1 (MB # 1), which suffered a blowout on June 15, 1997 (sands to the drill depth of 840 meters), then with 8B.1 (original PSC), Petrobangla's allocation of profit Natural Gas pursuant to Article 8B.1 shall be increased by five (5) percentage points and the Contractor's Allocation of profit Natural Gas pursuant to Article 8B.1 shall be decreased by five percentage points to only that pay zone at 840 meter, which is the topmost sand layer out of an expected three defined sand layers in the same general area of Moulavi Bazar. Incidentally, in any development well, production starts from the bottom most sand layer (pay zone). Consequently, the exploitation of the topmost sand layer (at 840 meter) is likely to occur after 10 to 12 years of production period.

Seventh : According to media report, the State Minister for Energy said it is not clear why Unocal has agreed to increase Petrobangla's share. He clearly stated that the SA is full of obscurity. Indeed, the agreement did not mention anywhere that the additional five percentage profit gas will be given to Petrobangla to compensate the Magurchhara blowout (MB #1). Then in whose interest the SA was signed?

Eighth : Government (represented by the Ministry of Energy) has clearly become a party to the S.

(Article 4.3) in respect of the Joint Review Committee (JRC) composed of eight (8) members including one from the Ministry. It is unclear whether the JRC convened regular meetings and raised the issue of compensation claim and insurance claim etc.

Ninth: Despite its magnitude, the State Minister does not find this situation overly alarming or difficult to overcome. Nor does he consider that we will be putting our nation or our future at risk by doing things contrary to the desire of the people. This new development is just a tiny sample of the avalanche of misfortune of the energy resource in the recent years. Perhaps Unocal is given undue liberty and they do not consider themselves accountable to anyone in Bangladesh. God only knows how can we save our only commercial energy resource (natural gas) from greedy hand? If such an occurrence had taken place in any western country, the company concerned would have been sued for billions of dollars for destroying a geologic structure, environment and other damages, as it happened in the case of EXXON in the famous Alaskan oil spill case in the recent past.

Nuruddin Mahmud Kamal is former Chairman, Power Development Board and SKM Abdullah is former Chairman, Petrobangla.

reliably learnt, have been critically analyzed as given below in a chronological order.

First : Although the Supplementary Agreement (SA), was signed after 17 months of the blow out (MB #1) on 15th June 1997, it appears to have been formulated with a bad intent because it did not relate anywhere the blowout compensation for Petrobangla. The parties (Government, Petrobangla and Contractor) concerned should explain the reasons for such an irregular act.

Second : The SA is related to PSC (blocks 13 and 14) dated 11th January, 1995, which expired on 11th January, 1998. But the SA was signed on 25 November 1998 i.e., almost eight months after the expiry of the PSC. The reason for signing

It cannot disown the responsibility.

Third : From Article 1.1 (b), (c), it appears that the Contractor cleverly made provisions for MB # 1 blowout costs and Third Party claims with a view to making insurance claims but nowhere in the agreement it was even intended that the recipient of the claims for damages and losses relating to MB # 1 will be Petrobangla. In fact, reportedly, Petrobangla has neither been involved on the insurance claim issue nor was the recipient of such claims. If this contention is true, Occidental/Unocal has bypassed Petrobangla/Government on this count, which deserves to be explained.

Fourth : Under Article 3.2 the Contractor (Occidental / Unocal)