Seismicity of Kenyir, Terengganu

CHE NOORLIZA LAT
Department of Geology
University of Malaya
50603 Kuala Lumpur

Among the more documented cases of man-made or induced earthquakes are those associated with fluid, including the ones induced by dams or reservoirs. Prior to building, background seismicity data can be used to site a dam. The seismicity records obtained before and after construction can be used to monitor a dam for safety reasons. Monitoring is done throughout the life of the reservoir to assess its seismic risks. Other possible applications of the seismicity data is to study the regional geology and the crust structure between the source and the recording stations.

Reservoir-induced seismicity or RIS, are expected from dams constructed in seismically active areas. However, dams that exceed 100 meters high, with high capacity volume and large surface area are much more likely to experience significantly large tremors (larger than magnitude 4), even when the sites were previously

Warta Geologi (Newsletter of the Geological Society of Malaysia), Vol. 23, No. 3, May-June 1997

aseismic. Among the factors contributing to the shocks are existence of nearby failure planes and the rate of change of water levels in the reservoirs. The Kenyir Dam was no exception; tremors were reported (and recorded) near the Kenyir area since 1984. There was no reported earthquakes before from this area. This may be due to lack of local seismic (recording) stations or the fact that no one felt any shocks because the place was remote and the shocks were not big enough. The Kenyir earthquakes of 1984 till 1987 were recorded by stations in Ipoh, Kluang and Petaling Jaya. These stations are a part of a nationwide network managed by the Seismological Division of the Malaysian Meteorological Service (MMS). The data used in this study is from paper seismograms dated back to 1979 and from the published annual reports (1979–1995) from MMS, which also include all of the regional earthquakes.

A total of 27 shocks were recorded by the MMS, with the magnitude ranging from 2.5 to 4.6 on the Richter scale. There were other signals on the seismograms: teleseisms, regional earthquakes from East Malaysia and other neighbouring countries, and localised tremors (probably from explosions). The signals are classified according to the S-P times, their frequency contents and their relative sizes (amplitude and duration). For instance, the S-P time for the Kenyir earthquakes recorded in Kluang is about 35 seconds. The times vary accordingly with distance between source and stations.

Although the probability of any dam suffering significantly damaging shocks is small, the risk is substantial for those who live near and who are directly affected by the dams. The increase in population demands a higher, continuous supply of electricity. Hydro-electricity is usually preferred as it is cheaper and cleaner than fossil fuel, with an added bonus of the reservoir being a tourist attraction. The results of this study is beneficial for future dam projects in Malaysia (especially the larger ones) and manage the risks involved.