Reservoir induced seismicity (RIS) — a case study from Kenyir, Terengganu

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Reservoir Induced Seismicity (RIS) is associated with earthquakes caused by the impoundment of water. The general "rule of thumb" used is that dams with height of more than 100 metres and capacity of more than 1 cubic kilometre may be prone to RIS. With a lot of large dams exceeding this criteria being built for water and energy supply around the world, the need for RIS assessments is crucial to ensure that people, property and the environment are safe during and after the construction of each dam. Even though, statistically, less than 20% of large dams experienced RIS, reservoir induced tremors, such as the magnitude 7.0 in Koyna, India, has been known to destroy the dam and cause casualties and damages to villages downstream. Most RIS occurred near the dam, originating from shallow depths. RIS has been known to occur as early as during dam construction to as late as 18 years after completion.

RIS could be caused by several factors including the additional stress put on the crust by the dam structure and water reservoir, the change in pore pressure, and the failure of nearby faults or other plane of weaknesses. Before the construction of a large dam, an RIS assessment should be done using integrated data, including dam statistics, geology and pre-construction seismicity, to evaluate the risk involved. Continuous monitoring is also necessary to see how the seismicity changes with the changing of water levels and time.

In Malaysia, RIS was made "popular" by the occurrence of tremors after the Kenyir Dam was built in Terengganu. Kenyir Dam is 150 metres high with a storage capacity of 13.6 cubic kilometres. The dam, built in a previously aseismic area, was responsible for several earthquakes from 1984 to 1987. The Seismology Department

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of the Malaysian Meteorological Services recorded a total of 28 earthquakes with magnitudes ranging from 2.5 to 4.6. The tremors were felt at a distance of more than 50 km. The area now is again aseismic; a suggestion that the region may have achieved a new, stable stress regime.