Geological hazards assessment on the Wadi Dayqah Dam, the Sultanate of Oman

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Abstract: Having been devastated by the recent tropical cylone events, Cyclone Gonu in June 2007 and Cyclone Phet in June 2010, the government of the Sultanate of Oman recognizes the need to study the impending natural/geological hazards associated with the mountainous terrain in Oman in order to prevent disaster in the future. With this vision in mind, a Consortium led by Consultant HSS (CHSS) Dubai, in collaboration with Euroculture (M) Sdn. Bhd., SC Geoconsult, SEADPRI (South East Asia Disaster Prevention Research Institute, UKM) and the Department of Earth Sciences, Sultan Qaboos University of Oman, has carried out an initial study to identify the pertinent and potential hazards on important major infrastructures. Amongst them is the newly built Wadi Dayqah Dam, which is the largest dam in Oman located in the Qurayat Wilayat.

This paper presents some of the major findings of the initial field study in the Wadi Dayqah Dam site. This study has found that the slopes, notably along the access roads leading to the various sections of the dam are in unsatisfactory conditions. Slopes were cut too steep and without due consideration given to the geological structures and geomechanical properties of the rock mass condition. Most of the slopes are unprotected, too steep, lacking in drainage control systems and erosion protection measures. Some of the slopes have already failed. Detailed studies should also be carried out on the natural slopes which formed the right abutment of the main dam. There are indications that the foot slopes have been badly scoured by the sudden rise of water levels in the downstream river due to overflows from the reservoir brought on by Cyclone Phet. Toe undercutting of the slope can lead to slope instabilities, and the resulting progressive failures may jeopardise the stability of the entire hill slope and consequently, the main dam itself. Another serious problem that needs immediate/urgent attention is the seepage that developed in the lower rock slope on the left abutment of the main dam.

The evidences presented show that the ever presence of inherent hazards and risks pertaining to precipitation-induced landslides and slope failures in the dam site. Therefore, it is vital and imperative that a concerted effort is undertaken by Government of Sultanate of Oman to implement a comprehensive mitigation and management plan to address and overcome such hazards.

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