Reservoir Sedimentation in Wadi Flash Floods Mitigation Structures

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In Arabic countries, wadi flash floods frequently occurs with increasing rate. In the fact, nowadays wadi flash floods is one of the severest natural disasters in the Arabic region. Where this disaster affects properties in the wadi system such as infrastructure, premises and sometimes kills humans. The most challenging and unique characteristic of flash floods is its difficulty to estimate the time and place to occur. Generally, flash floods occur within 6 hours after rain starting to fall, and it is a short timescales compare to other types of urban and river flooding. Moreover, flash flood occurs locally and its irregular spatial scales and distribution makes the anticipation difficult. Accordingly, it is urgently required to construct wadi flash flood mitigation structures. The current existing mitigation structures in Arabic countries, as dams or artificial lakes, still facing significant issue, which is sedimentation problem. Sedimentation problem is caused by sediment-laden flow from upstream and not only decrease the reservoirs capacity, but also affect structure body itself. Also in Japan, there are around 3000 dams and most of them are affected by sedimentation problem due to the high sediment yield. Therefore, Japan has a long experience in flood and its related sedimentation issues, which could be useful for wadi system integrated management. In order to mitigate sediment related problems, many countermeasures are developed and which can be divided into sediment yield reduction, sediment routing, and sediment removal are applied. Wadi Samail at the coastal area of Oman is selected as case study for flash flood and sediment transport assessment. This research objectives are to: i) discuss the different types of flash flood and sedimentation mitigation structures, ii) clarify challenges facing flash flood mitigation structures especially sedimentation, iii) assess flash flood hazard and its related sediment yield in the Wadi Samail case study, iv) propose and evaluate different flash flood and sediment mitigation structure based on Japan experience. This study is expected to conclude recommendations for flash flood integrated management at wadi system in arid environments.