

## Reservoir Sedimentation management after Chi-Chi Earthquake in Taiwan

○Fong Zuo LEE, Tetsuya SUMI, Jihn-Sung LAI, Yih-Chi TAN, Chen-Chia HUANG

The sustainable usage of reservoirs is always an important issue for reservoir long-term operation. In Taiwan, after Chi-Chi earthquake in 1999, large volume of sediment was delivered into reservoirs by strong typhoons such as Sinlaku and Morakot, and serious sedimentation problem occurred in several reservoirs. This paper discusses present reservoir sedimentation problems after Chi-Chi earthquake and how to select suitable management strategies depending on reservoir characteristics referring Japanese experiments.

In this study, flushing, replenishment and bypass strategies are discussed according to the experience and successful operation in Japan. In order to identify the characteristic of all reservoirs in Taiwan, parameters of the turnover rate of water ( $CAP/MAR = \text{Total capacity} / \text{Mean annual runoff}$ ) and sediment ( $CAP/MAS = \text{Total capacity} / \text{Mean annual inflow sediment}$ ) are compared.

Fig.1 shows the characteristics of 54 reservoirs and weirs in Taiwan. Based on these characteristics ( $CAP/MAR$ ,  $CAP/MAS$ ), three groups can be proposed for sediment management strategies. Wushe reservoir (Taipower Co.) is located in Group 2 area and desiltation strategy is between flushing and replenishment and possessed bypassed condition referring to Japanese examples. In 2008, Typhoon Sinlaku attacked middle Taiwan and reduced Wushe reservoir capacity up to 37% of its original effective storage (Fig.2). Fig.3 shows comparison of reservoir life before and after Chi-Chi earthquake which is reduced from 110 year to 36 year. The designed venting and bypass tunnels can prolong reservoir life

from 36 to 56 years and from 36 to 125 years respectively. If they are both executed, reservoir life can be prolonged from 36 to 227 years.

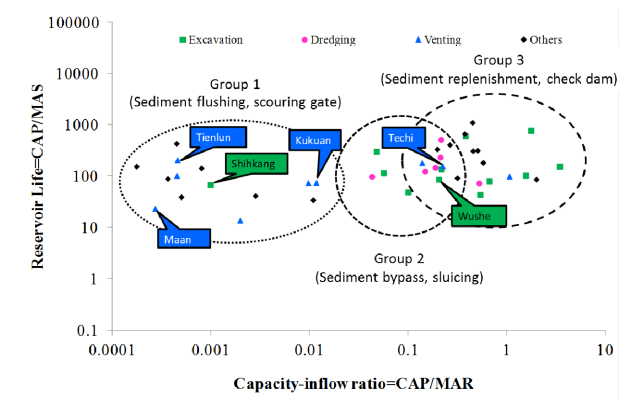


Fig.1 Reservoir sediment management in Taiwan

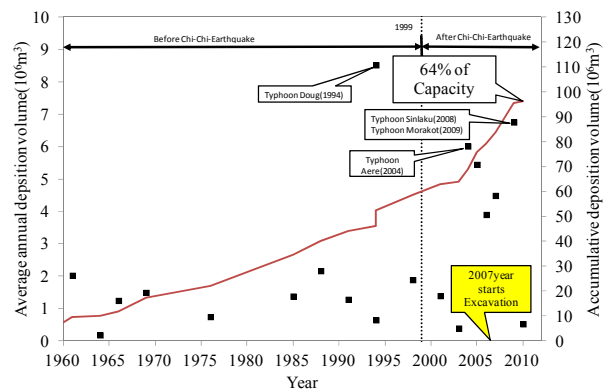


Fig.2 Sedimentation record in Wushe reservoir

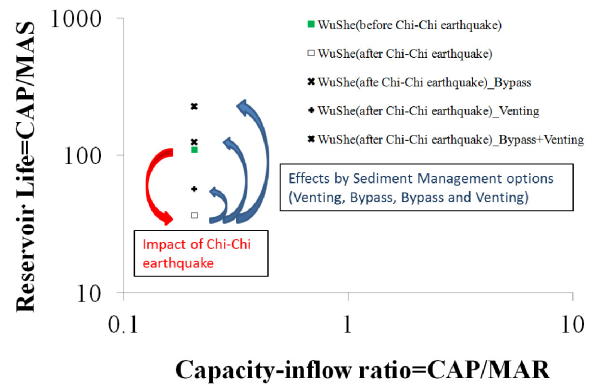


Fig.3 Impact of Chi-Chi earthquake and effects by sediment management options in Wushe Reservoir