Geophysical Research Abstracts
Vol. 19, EGU2017-15599-1, 2017
EGU General Assembly 2017

Building Adjustable Pre-storm Reservoir Flood-control Release Rules

Shun-Nien Yang (1), Li-Chiu Chang (1), Fi-John Chang (2), and Cheng-Daw Hsieh (3)

(1) Department of Water Resources and Environmental Engineering, Tamkang University, New Taipei City 25137, Taiwan, (2) Department of Bioenvironmental Systems Engineering, National Taiwan University, Taipei 10617, Taiwan, (3) Taipei Feitsui Reservoir Administration, New Taipei City 23160, Taiwan

Typhoons hit Taiwan several times every year, which could cause serious flood disasters. Because mountainous terrains and steep landforms can rapidly accelerate the speed of flood flow during typhoon events, rivers cannot be a stable source of water supply. Reservoirs become the most effective floodwater storage facilities for alleviating flood damages in Taiwan. The pre-storm flood-control release can significantly increase reservoir storage capacity available to store floodwaters for reducing downstream flood damage, while the uncertainties of total forecasted rainfalls are very high in different stages of an oncoming typhoon, which may cause the risk of water shortage in the future. This study proposes adjustable pre-storm reservoir flood-control release rules in three designed operating stages with various hydrological conditions in the Feitsui Reservoir, a pivot reservoir for water supply to Taipei metropolitan in Taiwan, not only to reduce the risk of reservoir flood control and downstream flooding but also to consider water supply. The three operating stages before an oncoming typhoon are defined upon the timings when: (1) typhoon news is issued (3-7days before typhoon hit); (2) the sea warning is issued (2-4 days before typhoon hit); and (3) the land warning is issued (1-2 days before typhoon hit). We simulate 95 historical typhoon events with 3000 initial water levels and build some pre-storm flood-control release rules to adjust the amount of pre-release based on the total forecasted rainfalls at different operating stages. A great number of simulations (68.4 millions) are conducted to extract their major consequences and then build the adjustable pre-storm reservoir flood-control release rules. Accordingly, given a total forecasted rainfall and a water level, reservoir decision makers can easily identify the corresponding rule to tell the amount of pre-release in any stage. The results show that the proposed adjustable pre-release rules can effectively reduce the risk of reservoir flood-control operation in numerical examples, providing a good option to reservoir decision-makers.