
Abstract

The weather conditions are getting worse as the frequency and intensity of heavy rain increases due to climate change. However, reservoir is exposed to the risk of collapse by deterioration in durability due to aging and insufficient maintenance. In this study, the current state of reservoir managed by Gyeonggi-do was examined, and problems related to safety and maintenance were analyzed, and a maintenance plan was proposed accordingly.

The structural weakness factor of the city-gun reservoirs is that it is difficult to respond to climate change as the weather conditions are getting worse compared to the low design standard for flood in the past, and most of the small reservoirs were found to have an increased risk of collapse as the water level is controlled by natural overflow. In particular, old reservoir has a high risk of collapse if not properly maintained because settlement, internal erosion, and leakage occur as the durability deteriorates. The institutional weakness factor of the city-gun reservoirs is that most of city-gun reservoirs are small-scale with a total storage capacity of less than 300,000 tons and are not subject to precise safety diagnosis or emergency action plan. In particular, Although most of the reservoir collapse accidents occur in small reservoirs with a storage capacity of less than 100,000 tons, safety management for them is insufficient. The current safety inspection standards are based on large-scale reservoirs, so they are not suitable for small-scale reservoirs, and the results of safety diagnosis may be underestimated. In addition, lack of finance and professional manpower of local governments, lack of business continuity, and insufficient management system were also found to be vulnerable factors to the risk of reservoir collapse.

In order to evaluate disaster response capability for climate change, CMIP6-based future climate scenario provided by IPCC was established, and future rainfall data for each city and gun in Gyeonggi-do was established through downscaling of climate scenario. The constructed future rainfall data were used to evaluate disaster response capability of city-gun reservoirs through the concept of flood vulnerability proposed by IPCC.

Finally, measures for efficient safety management and operation of city-gun reservoirs were proposed. For the reservoir management and operation plan, it was necessary to prepare detailed evaluation items and evaluation criteria for safety inspection along with strengthening the professionalism of inspector, and to perform efficient maintenance by establishing an advanced maintenance management. In addition, it is necessary to promote the unification of reservoir management by Korea Rural Community Corporation to improve work efficiency and strengthen professionalism. However, it is not easy to unify the reservoir management at once due to lack of finance and manpower. Therefore, it is necessary to consider a consignment management plan in which the local government bears the maintenance cost.

As a disaster response plan, it was necessary to expand the target of establishing an emergency action plan according to the current storage capacity standard.

It was found that efforts are needed to prevent secondary damage and strengthen resilience so that residents can quickly return to their daily lives by promoting and activating wind and flood damage insurance and crop disaster insurance to compensate for actual damage even in the event of a disaster. In addition, it is necessary to strengthen resilience for residents to quickly return to their daily lives and prevent secondary damage.

Keyword Reservoir, Aging, Climate change, Safety management, Flood vulnerability, Operation planing