

New Evaluation Method of Dam Reservoir Sedimentation Countermeasures based on Estimation of Mid- to Long-term Effect and Cost

(Study period: from FY2017-FY2018)

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1. Introduction

Dam reservoirs are normally designed to secure the required capacity considering the sedimentation estimated for 100 years in future. However, in the event of sedimentation exceeding such estimation due to change of raininess or other factors, study of countermeasures for sedimentation may be required in order to maintain the dam function over the long term. Then, we studied a new evaluation method for sedimentation countermeasures based on the mid- to long-term effect in flood control and estimation of countermeasure cost so that a reasonable countermeasure method may be selected from various countermeasure methods according to the characteristics of individual dam reservoirs.

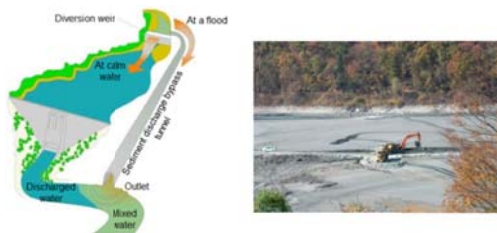


Fig. 1: Example of sedimentation countermeasures (from the Guide to Dam Reservoir Sediment Management (Draft))

2. Estimation of mid- to long-term effect and cost

The concept of basic study on dam reservoir sedimentation countermeasures is provided in the Guide to Dam Reservoir Sediment Management (Draft) (2018, Ministry of Land, Infrastructure, Transport and Tourism (MLIT)). The Guide (Draft) states that economic evaluation should be conducted by comparing life cycle costs in selecting a countermeasure method, but does not provide specific methods for evaluation. For this reason, we studied the estimation method of mid- to long-term effect and cost for conducting reasonable evaluation from the viewpoint of economic efficiency in selecting superior countermeasure methods for individual dam reservoirs.

For effects, we decided to estimate the accumulated flood damage prevention (mitigation) benefit, which is lost when forecasting the progress of sedimentation over time when no countermeasures are taken, by applying the project evaluation method for dam projects. Cost was estimated from the sum of initial

cost of countermeasure facility construction and maintenance cost by listing general cost items for each countermeasure method based on past cases and organizing estimation methods.

For reference, Fig. 2 shows an example of estimation / comparison of long-term effects and costs for (i) Proposal for constructing a sediment bypass as drastic measure and (ii) Proposal for implementing sedimentation excavation / dredge continually in reference to past countermeasures in Japan (An example of calculating the effect and cost that are generated each year when scale of countermeasures is taken so that sedimentation is within the planned sedimentation capacity for 100 years after starting the countermeasures, as well as accumulated total of such effects and costs). Fig. 2 suggests that the effect of countermeasures is estimated to be greater as the evaluation period is taken longer and that the advantageous countermeasure method can vary according to the length of evaluation period due to difference in cost generation characteristics, such as ratio of initial cost to total cost.

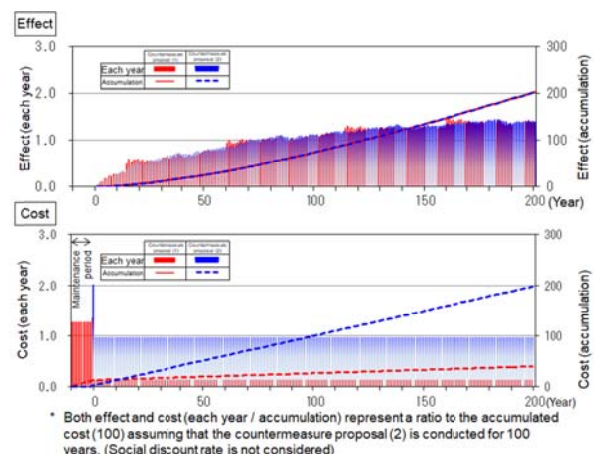


Fig. 2: Estimation of the effect of sedimentation countermeasures in flood control and countermeasure cost

3. Future development

We intend to organize study findings as engineering data. It is important to evaluate sedimentation countermeasure methods from a mid- to long-term viewpoint according to characteristics of individual dam reservoirs and we hope that our study will be helpful in considering reasonable countermeasure methods.