

# Dam Flood Control Operation with Maximum Utilization of Existing Dam Functions

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### 1. Introduction

If a dam causes a flood exceeding the planned scale, operation will be conducted in accordance with the predetermined procedure of disaster prevention operation for extraordinary floods. In many of the cases where such disaster prevention operation for extraordinary floods was conducted in accordance with the current procedure, the reservoir level was maintained below the maximum water level in case of a flood. Meanwhile, however, there are many cases where flood control ends without using the flood control capacity sufficiently. In response to the recent concern about the increasing frequency and growing intensity of large-scale floods, implementation of the disaster prevention operation for extraordinary floods is expected to reduce downstream damage by using the flood control capacity as much as possible. Under such circumstances, a number of methods for disaster prevention operation for extraordinary floods have been proposed, and some of them are considered more effective in reducing discharge from the dam than the operation in accordance with the current procedure. The NILIM has been organizing the concepts of the horizontal review for a number of methods of disaster prevention operation for extraordinary floods as well as characteristics of each method through simulations in a number of case study dams. As part of such activities, this paper briefly describes some methods of disaster prevention operation for extraordinary floods and introduces examples of calculation for case study dams.

### 2. Various methods of disaster prevention operation for extraordinary floods and examples of calculation

#### (i) Minimum-required discharge method

A method of operation based on a table prepared with specification of the volume of minimum discharge required (minimum-required discharge) at present to ensure discharge at the designed maximum water level even in case of rapid increase in any inflow or inflow from the reservoir level.

#### (ii) Method of successively reviewing discharge curve

A method aiming to use the flood control capacity as much as possible by reviewing discharge curve successively every 60 minutes so that the inflow at that point may be discharged at the maximum water level in

case of a flood when the inflow is decreasing after reaching the peak.

#### (iii) VR method

A method aiming to use up the flood control capacity at the end of flood control by estimating the total inflow during flood reduction and determining whether to increase or decrease discharge based on the total inflow thus estimated and the level of vacant capacity at that point.

#### (iv) Marginal operation method

A method aiming to keep the rising rate of downstream water level under the target value by calculating a variable called "marginal inflow" analytically and starting discharge when the inflow exceeds the marginal inflow.

The Figure shows the results of calculation by applying the foregoing methods of disaster prevention operation for extraordinary floods. It suggests that all of the methods result in more effective operation using the flood control capacity than the operation in the present procedure.

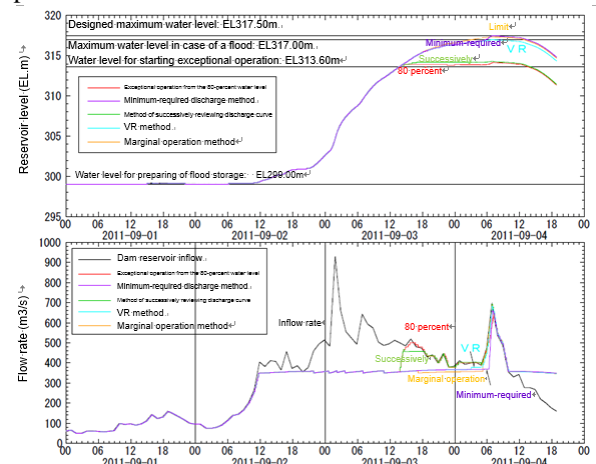


Figure 1: Examples of calculation in various methods of disaster prevention operation for extraordinary floods

### 3. Conclusion

In order to introduce the above-mentioned methods of disaster prevention operation for extraordinary floods into existing dams, it is also necessary to evaluate characteristics in management, such as ease of operation, in addition to flood control effect. We aim to introduce these methods into practical operation by preparing a guide describing considerations for introduction.