

Creation of Annual Record of Sediment Discharge in Mountainous Watershed

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1. Background

Grasp of sediment movement in mountainous watershed is important for formulation of sabo (erosion control) basic plan and consideration of comprehensive sediment management policy, as well as from the viewpoint of land monitoring. Attempts have been made to date to estimate sediment discharge from the survey results on sedimentation in erosion control dams. However, this method needs much effort and has some issues including coarseness in time resolution. Meanwhile, centering on sabo offices under direct control, hydrological observation of sediment discharge has begun to be conducted in recent years using hydrophone, which observes bed load discharge with echoes generated when bed load collides with the metal pipe installed in the river bed, or using a turbidimeter¹⁾ (see Photo). Accordingly, Sabo Planning Division has organized the hydrological observation data on sediment discharge observed by the sabo offices under direct control as "Annual Record of Sediment Discharge" as defined by the Technical Criteria for River Works (Survey Part).

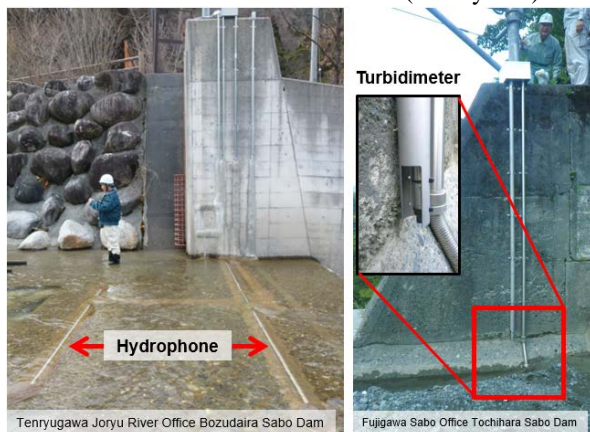


Photo: Example of sediment discharge observation facility

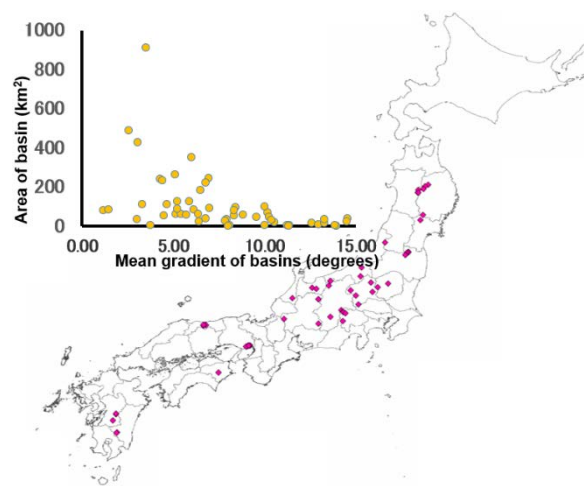
2. Outline of observation data

This study examined the data on the hydrological observation of sediment discharge conducted by the sabo offices under direct control at 54 locations across the country from fiscal 2009 to fiscal 2013 (see Figure). The areas of target basins range from approx. 3 to 913 km², and mean gradient of the basins, approx. 1.2 to 14.5 degrees.

Observation items covered by this Annual Record of Sediment Discharge are water depth, flow rate, bed load discharge, and suspended sediment. Bed load discharge was determined by converting the acoustic waveform

obtained by the hydrophone into the unit-width bed load discharge using the synthesized sound pressure method provided by Suzuki et al (2010)²⁾ and then multiplying the result by river width, while suspended sediment was determined by converting the turbidity measured by turbidimeter into suspended sediment concentration and then multiplying the result by flow rate. The Annual Record of Sediment Discharge has also organized data on daily and monthly sediment discharge as well as sediment discharge by flood.

Figure: Locations of sediment discharge observation



and the area and average gradient of the observed basins (Upper left)

3. Conclusion

This Annual Record of Sediment Discharge is going to be published as Technical Note of NILIM. This is expected to serve as basic data for grasping sediment movement in mountainous watershed, information on which had been limited, and to be utilized for various purposes. Meanwhile, many technical issues remain in the hydrological observation of sediment discharge in mountainous watershed. Therefore, further technical development and study are required.

[Reference]

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2) SUZUKI Takuro, MIZUNO Hideaki, OSANAI Nobutomo: "Basic study on sediment rate measurement with a hydrophone on the basis of sound pressure data,"

