Concept and specific methods for management which provides a flow capacity margin

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1. Management of flow capacity anticipating river course change

The enactment of basic policies for river improvement and river improvement plans is accompanied by the planning and implementation of river course excavation and tree cutting etc. to expand flow capacity. When doing this, it is important to carefully watch for change of river courses to study the optimization of the management labor, but sufficient knowledge is not always obtained. As one method of ensuring the specified flow capacity in river course sections prone to sedimentation, in addition to the river cross-section necessary to transport a flood flow, installing cross-section space for sedimentation (a margin) is also considered. This means that flow capacity is managed by (1) as part of river course design, predicting fluctuation of future flow capacity according to sedimentation and, for example, setting the optimum margin to balance the annual average quantity of soil re-excavated and the maintenance labor force, and (2) as part of river course management, observing the state of sedimentation by sectional surveying to set judgment standards to reliably implement maintenance excavation before the margin is filled in by deposited sediment.

2. Incorporating the optimum margin in river course design

On a river course with a gravel riverbed, if the low-water channel is widened across a series of sections, in areas where vegetation flourishes on slight elevations of the riverbed, every time fine sediment, which is almost non-existent in the riverbed material, is deposited by a run-off, a high water channel forms, returning the low-water channel to its original width[1)], and cases where this occurred in the relatively short period of less than 10 years [2)] are known. A river course design which provides a margin was tested for a case where it is necessary to devise a way to quickly reduce the size of the river section to maintain flow capacity in this way. First, we constructed a simple prediction model for high water channel reformation radically simplified to a range where the essential mechanism of fine soil deposition in flourishing vegetation areas is not harmed [2)]. This model was applied to the Sendaigawa River, confirming that the model provides a certain degree of reproducibility of the form and height of sedimentation, and that it can predict and evaluate the river cross-section reduction. This model can be used to study the form of excavation or margin of the river section, etc. which slow the river section reduction rate to optimize the maintenance labor.

3. Inspection technologies to more reliably manage flow capacity

We proposed the Basic River Course Management Sheet as a tool to inspect flow capacity in cooperation with the Kyushu Regional Development Bureau's River Management Research Committee. It was prepared by organizing data of various categories in order to be able to longitudinally compare change over years of the water level calculated for the time when the management target flow rate is flowing (two versions: present situation and when the trees have been cut) and the average riverbed height. Sections where, for example, the calculated water level approximates the design high water level (eliminating leeway in the flow capacity) and the average riverbed height has tended to rise in recent years, are reorganized so that they can be interpreted as sections where there is danger of the flow rate being insufficient. Using this sheet, it is possible to evaluate the degree of reduction of the margin of the designed river section in the present river course and to more reliably manage the flow capacity by, for example, performing maintenance excavation before the margin is filled by deposited sediment.

We are counting on rational river course design and flow capacity maintenance being implemented in the

field in this way, further improving the level of river course management technology.

[Sources]
1) Fujita et al.: Collected Reports of the Japan Society of Civil Engineers, No. 551/II-37, pp. 47-62, 1996
2) Takeuchi et al.: Civil Engineering Journal, Vol. 52, No. 7, pp. 26-29, 2010