

Joint Research on Non-point Pollution Load (Otsu City)

Year of Research

2007

(Purpose)

Otsu City has advanced measures to reduce the point source pollution load based on the Water Quality Conservation Plan for Lake Biwa and obtained steady results. Setaura Creek is situated in the Seta region, and it was constructed a long time ago under a Lake Biwa coastal reclamation project to drain rainwater in the upper basin. To improve the water quality of Lake Biwa, it was decided that work should be conducted on plane source (non-point) pollution load reduction measures for this creek. As a result, it was determined that a plan be developed outlining non-point pollution source prevention measures for around Setaura Creek. A basic survey was conducted for this, in which past data was gathered and a field survey was conducted to ascertain present land use and the condition of the transport infrastructure. At the same time, a water quality survey was conducted to determine the necessity for the measures.

(Results)

(1) Summary of present conditions

Mountains, urban areas, and farmland coexist around Setaura Creek. Moreover, the Tokaido Shinkansen and Keiji bypass run through this area. Consequently, there are various potential pollution sources, so water quality monitoring was conducted to ascertain the current status of non-point pollution loads flowing into Setaura Creek. As a result, it was recognized that pollution loads of relatively high concentration were flowing into Setaura Creek from the various basins during rainy days with a precipitation of 12 to 25 mm, as shown in Table 1. Therefore, measures against non-point pollution sources are thought to be necessary in all basins.

(2) Measures for non-point pollution loads

The principle techniques for measures against non-point pollution sources to be taken in the runoff process were cited and examples provided. At the same time, a plan for the introduction of the measures was extracted according to the features of Setaura Creek. As a result, the following cases were determined to be conceivable.

- ① Retention and settling ponds
- ② Retention and settling ponds + Stream cleanup facility
- ③ Stream cleanup facility
- ④ Plant cleanup in creek

(3) Study on measures evaluation techniques

For measures against non-point pollution loads, the total quantity of loads flowing into the creek is measured and the quantity that needs to be reduced is investigated. Then, a method for the measures is selected and design specifications are determined. For evaluation of the measures, the effects of introducing the proposed measures will be estimated, with the estimation being performed based on the following two models.

1) Calculation of annual input load by runoff analysis model

To determine the annual quantity of non-point pollution loads, a field water sampling survey will be performed on rainy days. The survey results will be reflected in the runoff analysis model to calculate the load quantity for each rainfall and the annual load quantity.

2) Estimation of effects by water quality model

A water quality model will be created aimed at Setaura Creek to estimate the effects. Here, the water quality model should be an ecosystem model that can estimate the eutrophication and internal phytoplankton production of the lake.

Table 1 Survey results

Date of survey	Site surveyed	Water quality item	Clear day	Rainy day
Nov. 5 and 6, 2007	Lower reaches of Asakawa	BOD	< 1	5-8
		COD	3-8	13
		SS	1	50-60
		T-N	1.6	1.7
		T-P	0.04	0.3
Precipitation: 12 mm (Otsu)	Lower reaches of Miyakawa	BOD	2-3	5-8
		COD	6	15
		SS	2	100
		T-N	1.8	1-2.2
		T-P	0.2	0.4-0.6
Feb. 25, 2008	Lower reaches of Ubatagawa	BOD	1.7	10-12
		COD	2.7	12-14
		SS	3	170-180
		T-N	3	2.2
		T-P	0.12	0.7-0.8
	Keiji bypass	BOD		10-49
		COD		60-100
		SS		280-370
		T-N		2-7.3
		T-P		0.26-0.36
Precipitation: 25 mm (Otsu)	Shinkansen	BOD		2.9-4.2
		COD		3.7-6.6
		SS		44-100
		T-N		1.5-3
		T-P		0.05-0.08

Existing data was used for the water quality on Nov. 5 and 6, 2007.

(Future plan)

A future study will be conducted based on the results of (2) and (3) above in the following order: ① basic survey, ② field survey, ③ study on measures to address pollution loads, ④ demonstration test, ⑤ calculation of the standard unit of pollution output, ⑥ determination of inflow and outflow mechanisms, ⑦ simulation analysis, and ⑧ summarization. In the field survey (②), the creek inflow and outflow water, the state of the creek, and source effluent water will be surveyed on rainy and clear days to collect basic data for the simulation, which is the object of the study to be conducted in ⑤ to ⑦. In the demonstration test (④), an experimental cleanup facility will be installed at the creek to evaluate the effects of cleanup methods in the measures and points to consider when these methods are applied.

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Key words

Non-point, Plant cleanup, BOD, SS, Pollution load