

REDUCTION OF DIFFUSE POLLUTION INTO A CLOSED WATER BODY USING CONSTRUCTED WETLAND

SATOMI URA¹, MASATO NOGUCHI²,
WATARU NISHIDA² and YUICHI SUEMITSU¹

¹ Graduate Student, Graduate School of Science and Technology,
Nagasaki University, 1-14 Bunkyo-cho, Nagasaki, 852-8521, Japan
(Tel: +81-95-819-2626, Fax: +81-95-819-2627, e-mail: ura@stu.civil.nagasaki-u.ac.jp)

² Professor, Department of Civil Engineering, Nagasaki University,
1-14 Bunkyo-cho, Nagasaki, 852-8521, Japan
(Tel: +81-95-819-2619, Fax: +81-95-819-2627, e-mail: noguchi@civil.nagasaki-u.ac.jp)

Nagasaki, Japan, has been suffered damages by a lot of natural disaster, because of its location. Especially, Isahaya in Nagasaki had experienced a big flood (Noguchi, 2003a), so Honmyo river has been managed as one of the A-class rivers by the Ministry of Land, Infrastructure and Transport (MLIT). Then, a big project called construction of sea-dyke and reclamation project is now going on. It is well known that deterioration of water quality has been frightened in a closed water body, if runoff load of pollutants is not sufficiently controlled. In this paper, pollutant runoff loads from the watershed into the regulation pond of Isahaya are first identified, classifying those from point and non-point sources. On the other hand, it becomes very urgent to reduce the pollutant runoff loads, so efficiency of constructed wetland as one of the Best Management Practices (BMPs) is briefly discussed, based on a field observation and an experiment in campus of Nagasaki University. Finally, some discussion has been done, related to a strategy for reducing the pollutant runoff loads into the regulation pond of Isahaya.

The objectives of this study are to estimate pollutant runoff loads from watershed of regulation pond of Isahaya and to discuss the strategies for reduction of nutrients.

After an overall estimation of pollutant runoff loads, available Best Management Practices is discussed, in order to consider its application to Isahaya area. As the Isahaya project is progressing, facilities in a sewage system will be completed, mainly reducing the pollutant runoff loads from the point sources. At the same time, it can be expected that production of organism in the pond will be suppressed by means of the several schemes. Then, ten percent reduction of T-N runoff loads from the non-point sources is aimed as a first step for the reduction of diffuse pollution. In this paper, optimum condition for the allocation of the facilities has been discussed, considering the differences of land use at each watershed, i.e. Honmyo, Northern (Sakai, Yue, Tajima, Oe and Fukaumi River basins) and Southern (Ohkoba, Yamada, Chidori, Ariake and Nitanda ones) districts. Reduction rates of T-N from non-point sources have been illustrated in Fig. 1, for changing the distribution ratio of volumes of the constructed wetlands among the each district. Referring to the results in Fig. 1, the effective distribution of volume is expressed within the top zone of the graph to reduce 40 t of T-N loads. It is clear that the Honmyo and southern districts occupy more volume than northern district. The most effective allocation of volumes among each district is 80,000 m³, 10,000 m³, 100,000 m³ for the Honmyo, northern and southern districts, respectively. Under the condition, reduction rate of T-N runoff loads from non-point sources is 43.1 t. Since those facilities are big-scale, it

is also discussed if they can be divided into small parts at each district. On a present discussion, the rate of pollutant runoff loads has been evaluated not only from the point sources but also from the non-point sources. At the same time, how to reduce the pollutant runoff loads has also been discussed to some extent. It becomes important to correspond to this matter, for accelerating the effect of reducing the pollutant runoff loads especially from the non-point sources.

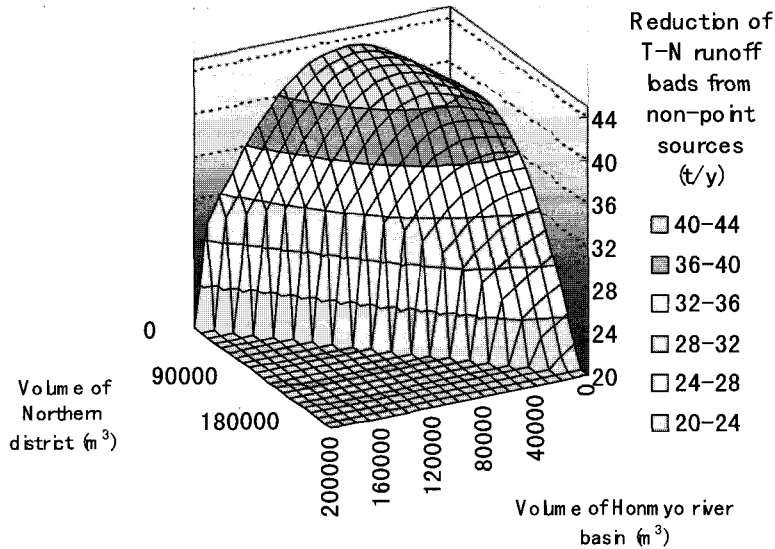


Fig. 1 Reduction Effect of T-N loads due to the allocation of constructed wetland under a condition of constant volume.

REFERENCES

- Noguchi, M. (2003). "Necessity of the Integrated Water Management at Honmyo River Basin in Japan," *World Water Council 3rd World Water Forum, Proc. the Forum Technical Session: Integrated River Basin Environment Assessment*, pp. 25-34.