Development of Water Quality Improvement Channel with Citizen in Amagasaki Canal, Japan

*Ryoichi YAMANAKA[1], Yasunori KOZUKI[1], **Keisuke ISSHIKI**[2], Sayaka MORI[2], Mari MAEDA[2], Hironori OKEGAWA[2], Hiroshi KAWAI[3], Mamoru ISHIGAKI[4], Takashi NAKANISHI[5], Hideki UESHIMA[6]* and *Sumio HIRAI[7]*

[1]Ecosystem Design, Institute Technology and Science, The University of Tokushima, Tokushima, Japan
[2]Department of Ecosystem Engineering, Graduate School of Engineering, The University of Tokushima, Tokushima, Japan
[3]Kobe University, Research Center for Inland Seas, Kobe, Japan
[4]Department of Civil Engineering, Faculty of Engineering, Hiroshima Institute of Technology, Hiroshima, Japan
[5]Osaka City University, Osaka, Japan
[6] Graduate School of Environmental Studies, Hiroshima Institute of Technology, Hiroshima, Japan
[7]Hyogo Prefecture, Hyogo, Japan

Amagasaki Canal has been polluted because it is a sheltered water with artificial vertical structures and is affected by waste water from factories. According to restore water environment in the canal for recreation demand, design of new improvement channel and experiment for new water quality improvement system are preceded by the Amagasaki Sea Blue Project. In this study, long-term field experiment of water quality improvement techniques using bivalve and algae was examined.

We suggest new improvement system of water quality. This system is made up of Suspended Solids removing tank, Algae channel and Algae harvesting for composting by civic collaboration. Suspended Solids removing tank have a function with reduction of organic suspended solids in pumping-up sea surface water and change organic suspended solids to dissolved nutrient using bivalve biology. Algae channel have a function with assimilation of dissolved nutrient in treat water come from Suspended Solids removing tank or pumping-up sea bottom water of the canal using primary productivity of green algae and blue-green algae which grow naturally in the channel. Algae harvesting for composting is for removal of nutrients out of the system by turning removed waste sea algae into compost by citizen participation.

According to the experiment of Algae channel, DIN and PO4-P reduction function was measured by distribution of DIN and PO4-P. These max values are roughly equivalent to about 96 % of amount of DIN and PO4-P inflow to the channel and reduction function of advanced sewage treatment. These high performances only expressed in daytime. The quality of bottom water improved hypoxic condition by primary productivity of algae at daytime. Removing decomposed sea algae of 13 wetkg by local junior high-school student was conducted in August, 2010. According to the componential analysis picked algae include 414gC, 65gN and 9gP. These value are roughly equivalent to 28 % of amount of DIN and PO4-P inflow to the channel. Moreover, we conducted environmental education to elementary school student and junior high-school student. At last, we tried to design for improvement channel based on the findings of the study. Consequently, we found only twenty-nine 60m-channels are required for total industrial effluent water to meet environmental standards for PO4-P.

Contact Information: Keisuke ISSHIKI, Department of Ecosystem Engineering, Graduate School of Engineering, The University of Tokushima, 2-1, Minamijosanjima-cho, Tokushima, 770-8506, Japan; Phone:+81-88-656-9736, Fax:+81-88-656-9736, Email: isshiki@eco.tokushima-u.ac.jp