THE LONG-TERM CHANGES OF THE WATER QUALITY AND THE MANAGEMENT OF POLLUTION LOAD IN OSAKA BAY

Hajime Miyazaki[*], *Akira Yoshimura*[**], *Ikuyo Kamimura*[**], *Masakazu Furuki*[**], *Kunio Kohata*[***] *and Masataka Watanabe*[***]

[*] *Water Quality Division of Hyogo Prefectural Government, 5-10-1 Shimoyamatedori chuo-ku Kobe 650, Japan*

[**] *Hyogo Prefectural Institute of Environmental Science, 3-1-27 Yukihira-cho Suma-ku Kobe 654, Japan*

[***] *National Institute for Environmental Studies, 16-2 Onogawa Tsukuba 305, Japan*

1. Introduction

Osaka bay is one representative of enclosed coastal seas. It has such a huge industrial area and population(more than 17 million people) that it gets a lot of industrial drainage. Because of these characteristics, the environmental management of Osaka bay is very important to protect the surrounding environment. The monitoring of the water quality of Osaka bay plays the main role of the environmental management of Osaka bay. The purposes of this monitoring are to deepen the understandings of the effects of regulations on the water quality and find the methods which can improve the water quality. The data which has been acquired in this monitoring will be also very useful to evaluate the environment of enclosed coastal seas.

We have monitored the water quality of Osaka bay for 20 years. We will evaluate the long-term changes of the water quality and the management of pollution load in Osaka bay.

2. Summary of the Research

The regulation of the total amount of COD(Chemical Oxygen Demand) has been effective since 1979 around Seto Inland Sea. Phosphorous has also been reduced in many products such as detergent since 1979. Owing to these regulations, the concentration of total phosphorous had decreased from 0.134mg/l in 1978 to 0.083mg/l in 1994 in the northern(coastal) part of Osaka bay, from 0.041mg/l in 1978 to 0.034mg/l in 1994 in the southern(offing) part of Osaka bay. Contrary to COD and phosphorous, no regulation was adopted to reduce nitrogen, therefore the concentration of nitrogen hasn't decreased so much.

In spite of regulations, COD hasn't decreased so much. At the bottom layer of the sea, organic matter consumes oxygen when it is inorganized, therefore, in the summer when the sea water doesn't mix well vertically, oxygen deficient water mass has often built up at the bottom layer in the coastal sea areas of Osaka bay that have high concentrations of COD. To clear this problem, we have been researching the rate of internal production of COD(ICOD) by using 3 methods.

(1) ***ICOD=Annual average of Total COD(TCOD)-minimum COD in one year***
(2) ***ICOD=Annual average of TCOD-COD in winter***
(3) ***ICOD=Annual average of TCOD-annual average of dissolved COD(DCOD)***

using all these methods, we can estimate the annual average rate of ICOD as following.

Annual average rate of ICOD(%)=(ICOD/annual average of TCOD)× 100

At monitoring stations in coastal sea area, average rates of ICOD(%) for 15years (1979 to 1994) are from 39 to 66%. Sometimes, it had reached more than 80%. At monitoring stations in offing sea area, average rates of ICOD(%) for 15years (27 to 52%) are less than they are in the coastal sea area. In both sea areas, annual average rates of ICOD(%) haven't decreased, and in case of (3), they have increased recently in the coastal sea area.(Fig.1)

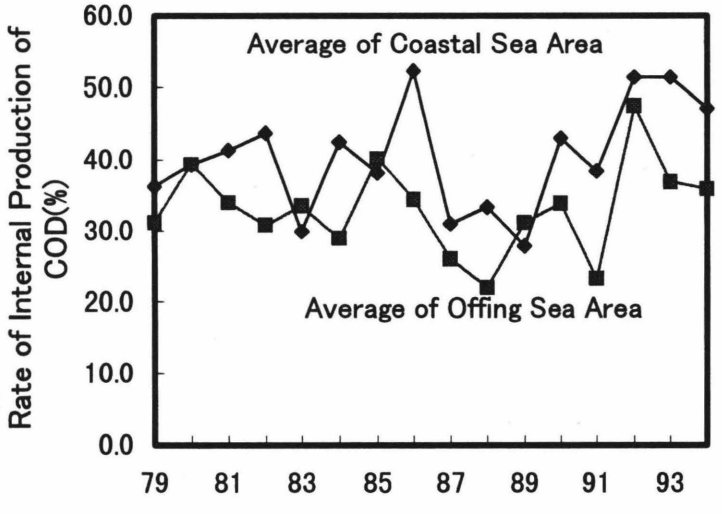

Fig.1 Change of Internal Production of COD(3)

Therefore, in addition to the regulation of COD and phosphorous drainage, we should depress internal production of COD to improve the sea environment. For this purpose, the regulation of nitrogen which has become effective since 1994 is effective and important.

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