Environmental Conservation and Fishery of the Seto Inland Sea, Japan

Kuninao Tada[12], Masatoshi Nakakuni[2],Hitomi Yamaguchi[2], Kazhuhiko Ichimi[12]
Seto Inland Sea Regional Research Center, Kagawa University[1]
Faculty of Agriculture, Kagawa University[2]
tada.kuninao1@kagawa-u.ac.jp

Ⅰ. Objectives

The Seto Inland Sea is the largest enclosed sea in Japan (Fig.1). The sea is well known as beautiful landscape including about 600 islands. This sea is also an industrially developed area and about 30 million people live in the coastal area. During high economic growth since the 1960s, this sea became heavily eutrophicated due to serious water pollution by industrial effluent and urban wastewater. At that time, red tides often occurred. To resolve the situation, the Law for Conservation of Environment of Seto Inland Sea was enacted in 1973. Since 1973, the industrial effluent and urban wastewater were regulated by this law. After that, the number of red tide occurrences decreased from 300 times to 100 times per year and then it is now constant under 100 times. Whereas the water quality has improved, recent seaweed (*Nori*) bleaching due to lack of nutrient has often occurred and *Nori* culture in this sea was heavily damaged, and Fish catches have also gradually decreased. Here, we review the change of water quality for about the last 40 years in this sea. We will discuss the nutrient decrease, focusing on Harima Nada, the eastern part of the Seto Inland Sea based on information obtained during our previous study.

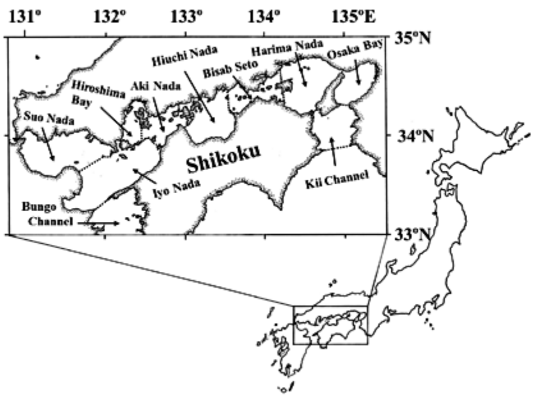

Figure 1. Location of the Seto Inland Sea

Ⅱ. The nutrient dynamics in Harima Nada

The nutrient concentrations (NO_3, NH_4, and PO_4) have apparently decreased since 1970s, as has dissolved inorganic nitrogen (DIN: NO_3 + NO_2 + NH_4). However, total nitrogen (TN) and phosphorous (TP) concentration have not apparently decreased, although TN and TP loading to the sea were reduced 40% and 61%, respectively, from 1979 to 2009 by implementing a Total Pollution Load Control System. It suggested that the decrease of nutrient concentrations could not be explained by only reducing of TN and TP loading. To maintain the appropriate nutrient condition, we need to know the mechanism of nutrient circulation and nutrient behavior. The nutrient concentrations of this sea water should be decided by the balance of nutrient income and outgo at three sites. Those are the freshwater inflow from the river, the interface between the coastal sea and open ocean or adjacent sea, and the interface between the bottom sediment and bottom water. In three sites, we monitored the upward nutrient flux across the overlying water-sediment interface. In Harima-nada, it was estimated that nutrient flux from bottom sediment during summer was larger than nutrient inflow from the river by 3.2 times (Tada *et al.* 2014). To know the nutrient dynamics, we are trying to reveal the budget of the nutrient cycle in the water column, including the primary production of phytoplankton, organic matter settling fluxes, decomposition of settling matter in the bottom layer, and nutrient upward flux from bottom sediments.

Ⅲ. References

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