

DENITRIFICATION AND NITROGEN FIXATION IN TIDAL FLATS AND SHALLOW COASTAL AREAS IN HIROSHIMA BAY, JAPAN

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Hiroshima Bay is located in the western part in the Seto Inland Sea, representative enclosed sea in Japan. The area is about 1000 Km² with mean depth of 24m. It's enclosed bay, surrounded by several islands at the mouth and receives urban loadings from Hiroshima city. Therefore, water pollution in the bay is serious; Red tides and oxygen deficits at bottom water appear in coastal areas every summer season.

Organic loadings and heavy metal pollutions due to industrial effluents were reduced by various countermeasures by water pollution control law. Some of the measures included industrial effluent load regulations to various toxic substances and total mass regulation for COD loadings, and as a result the numbers of outbreaks of red tide also decreased. However, organic pollution in the bay shows little improvement despite these severe countermeasures, because it's mainly controlled by eutrophication in the bay.

Therefore, total mass regulation system for nutrient loadings from effluents was introduced in the Seto Inland Sea in 2001. Also, effective applications of purification function in natural environments against water pollution is also expected in addition to these effluent regulation systems in Japan now, to improve the eutrophic condition in enclosed coastal sea. It is well known tidal flats and seaweed beds have purification functions against water pollution, as well as important values in fishery productions, although they reduced rapidly during high economic growth period after 1960 in Japan. During the 70 years between 1900 and 1970, reclamation area for developments in the Seto Inland Sea amounts to 26,400ha, 33% of which has been degraded within only a 5year period from 1965.

There is a denitrification function by denitrifiers in the sediment as for nitrogen sink in these coastal areas, but nitrogen fixation, which acts as one of the nitrogen sources, also exists there. Therefore, it's necessary to measure these two processes simultaneously to evaluate the environment purification activities. For this purpose, we investigated the characteristics and behaviors in denitrification and nitrogen fixation in tidal flats and coastal area in Hiroshima bay from 2001 to 2002, to estimate and enhance the purification abilities against eutrophication in the bay. We report the results about their seasonal variations and the comparisons in their rates between tidal flats and coastal sediments and also among different sediment qualities in various kinds of tidal flats.