

The Estimations of Nutrient Cycles of Artificial Tidal Flat in Tokyo Bay

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Tidal flats are important fields for coastal environments. Because of the loss of tidal flats, a marine environment in coastal area in Tokyo Bay was abruptly deteriorated. The amount of catch of fish was considerably decreased last several decades. The impacts of tidal flats on marine environment are dependent upon the characteristics of each tidal flat. We carried out field investigations in order to know the ability of water quality purification by each tidal flat. The study field is the tidal flat in Tokyo Port Wild Birds Park. This tidal flat has two channels, which connect to adjacent sea in Tokyo Bay. We carried out the measurements of tidal velocity, the concentration of nutrients such as Nitrogen and Phosphorus, Chlorophyll-a, turbidity, etc. for two tidal cycles in Summer, 2005 to 2010 and in Winter, 2009 to 2010. Then we estimated the nutrient fluxes pass through the channels from the tidal flat to adjacent sea. From the field measurements of nutrient fluxes, it is found that the tidal flat has the functions of a net source of Phosphorus and a net sink of Nitrogen and Chlorophyll-a. In order to know the mechanism of the function conducted in the tidal flat, we carried out the sampling of benthos and bottom sediments and counting the individual numbers of water birds in the tidal flat. Furthermore, we estimated the Nitrogen flux from the sediments to atmosphere by denitrification and anammox by means of revised isotope paring technique.

From the field studies, we found following conclusions. (1) From the field measurements of nutrient fluxes pass through the channels, the tidal flat has the function of a net source of Phosphorus and a net sink of Nitrogen and Chlorophyll-a. (2) Predominant species of water birds in the tidal flat is cormorant. The excretion of water birds is a source of Phosphorus, but the nutrient flux by the birds is not so large compare to nutrient flux of the channels. (3) The nutrient flux between bottom sediment and water column in the flat is quite large. (4) The main factor of a net sink of Nitrogen in the tidal flat is denitrification and anammox.

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