

A STUDY ON PURIFICATION ABILITY OF TIDELAND IN MIKAWA BAY

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The Mikawa bay is located on the Pacific Ocean side of the central Japan, and is enclosed by two peninsulas of Chita and Atsumi. Its area is 365 km². In the last decades increased human activities in the watershed and the bay area have resulted in damage to the ecosystem of the Mikawa bay. In spring and summer, the eutrophication and alga bloom occur frequently in this bay. These are probably caused by a combination of high nutrient loading and long residence time of the water in the bay. Thus reduction of the nutrient flux from land to sea and/or control of the re-suspension of nutrient from the bottom sediment is an important task for prevention of the estuarine eutrophication. The reduction of nutrient flux from land to sea needs control of point and non-point sources, and requires a lot of money.

Tideland or shallow area in the bay is recognized as a place of birth and living for diverse invertebrate, home to a diverse range of plants and animal communities, and a place to feed and to rest the migratory birds. From these facts the tideland may be regarded effective for reduction of nutrient.

In this study, a scenario of nutrient removal in the tideland is evaluated by using an eco-system model. The scenario is based on topographically realistic sites of potential tideland with a total area around 45 km². The ecological model in the tideland consists of 6 state variables, i.e., benthic alga, suspension feeder, deposit feeder, meiobenthos, bacteria, and detritus. The model simulates population dynamics that reflects predator-prey interaction, daily change in the light intensity, water temperature, and nutrient availability. The ecological model is described with a simple and robust first-order reaction type, and was modified for the current use. Especially, various model parameters were determined against the measurements at sites in Mikawa bay. Furthermore this ecological model was incorporated into the model CE-Qual-W2, which can calculate hydrodynamics and water quality in a laterally averaged 2-dimensional domain.

In this study, a combined system of the model CE-Qual-W2 and an ecological model designed for the Mikawa bay has been developed. The model was applied for the evaluation of the water purification ability of tideland in the Mikawa bay.