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Deterioration of Eelgrass, *Zostera Marina* L., Meadows by Water Pollution in Seto Inland Sea, Japan

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Abstract

Eelgrass (*Zostera marina* L.) meadows are highly productive components of estuarine and coastal ecosystems and support large and diverse faunal assemblages. They are excellent habitats for many commercial fishes, especially as hatcheries and cradles for juvenile fishes. Eelgrass filters and retains nutrients from water column and provides a major component of biomass for the detrital food chain. However, there are many areas where eelgrass declined even with enough light underwater and little disturbances by waves in Seto Inland Sea. We studied historical changes in eelgrass meadows in Seto Inland Sea and estimated possible factors responsible for the deterioration of eelgrass.

In Seto Inland Sea, there were more than 23,600 ha of eelgrass meadows in 1960, whereas it decreased down to 6,409 ha in 1981 probably due to water pollution and/or coastal developments. Although many transplanting projects have attempted to restore eelgrass meadows either as mitigation for development losses or as enhancement of fishery production, many of them failed to maintain sustainable habitats, i.e. transplanted habitats disappeared within a few years.

We carried out a comparative study on water quality, bottom sediments, sedimentation, and flow regime in the center, edge, and at the outside of eelgrass meadow located in a eutrophic coastal zone in northern Hiroshima Bay, Seto Inland Sea, Japan.

The bottom sediments at the outside of the meadow were softer than that in the center. Also, silt content at the outside was higher than that in the center. The sediments were oxic from the surface to 2 cm deep in the center, whereas those at the edge and the outside were reductive almost from the surface. The sediment characteristics typical in

eutrophic water seemed to be a factor responsible for the deterioration of eelgrass meadows.

Although suspended solids concentrations in the water column were the same, the amount of sediments deposited on leaves of eelgrass at the outside was higher than that in the center of the meadow. The deposition at the outside was enough to prevent photosynthesis; i.e. the light intensity available for eelgrass was only 36 % of that without any deposition. The deposition in the center, however, was small enough to secure 84 % of the original light intensity. Flow rates determined at 30 cm above the bottom, a half height of average eelgrass, suggested that the rate at the outside was not enough to remove deposited sediments from the surface of eelgrass leaves. Thus, the large amount of sediment deposition caused by water pollution and/or eutrophication seemed to be another limiting factor to inhibit the growth of eelgrass outside of the meadow.