

Examination of System for Improving the Sea Water Environment, Combining a Constructed Tidal Flat and Seaweed Bed

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This experimental study was carried out as part of a demonstration project for improving the seawater environment utilizing a natural purification function drawn up by the Ministry of the Environment. The study evaluated the effects of an artificially introduced natural purification function as a system to improve the seawater environment.

The system consists of a constructed tidal flat and seaweed bed, and the mechanism of water quality improvement is as follows. Organic pollution is purified by predation of plankton and organic sediment by macro benthos and sessile animals, which inhabit the constructed tidal flat. Also, the nitrogen and phosphorus excreted by the macro benthos in the constructed tidal flat are assimilated by the seaweed, sea tangle and laver growing in the constructed seaweed bed, and the grown algae are removed outside the system as food. The assimilation quantities of nitrogen and phosphorus are estimated from the change of biomass and composition of nitrogen and phosphorus stocked in the seaweed. The constructed tidal flat is a horseshoe-shape of 20m in widths and 30m in length, and is enclosed by banks built of natural rectangular rock of 50 – 100 cm length. The bank protects the tidal flat from erosion by waves. The seaweed bed, which is a square shape of side 10 m, is constructed with buoys and rope.

This system was built in a canal sea area of the inner bay of Tokyo in 1999. In the approximately two years that have passed since then, the following results have been obtained:

1. The natural purification function has improved steadily as the food chain of various aquatic animals inhabiting the system has developed.
2. Growth of seaweed, sea tangle and laver has been shown to be possible in the experimental sea area. The main factor that influences the growth of algae in the experimental water area is the decline of salinity.
3. The nitrogen and phosphorus excreted from aquatic animals in the tidal flat are absorbed by the seaweed, sea tangle and laver of the constructed seaweed bed, and can be almost eliminated from the system by harvesting.
4. Construction of the tidal flat has clearly increased the diversity of aquatic life and helped restore the coastal ecosystem. This system is considered useful for improving seawater quality and restoring the coastal ecosystem.