# Dredged sediment applications for making micro-habitat pellets and bases for seagrass germination in Ago Bay, Japan

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**Abstract**

Ago Bay is well known as an ideal location for pearl cultivation. Cleaning pearl oyster besides other activities generates organic matters. Furthermore, it produces suspended particles which increase the turbidity. Dredging the accumulated sediments is one of the important ways to help the ecosystem to achieve its prosperity. The present study is a part of the Ago Bay Environmental Restoration Project under the program of Japan Science and Technology Agency.

Usually dredged material is placed in confined disposal facilities, but as land development and acquisition costs continue to rise, emphasis is shifting towards utilizing these materials for beneficial applications.

One application of dredged sediment is to be used as micro-habitat beads to enhance the microbial activities in the sea bottom, since organic substances are dominantly used by heterotrophic bacteria as a carbon source. Sediment pellets were prepared so that uniform size and shape were obtained (rod shape, D≃6mm, L≃20mm) and then used as a carrier for soaking the media in the porous holes. *Sc51* (CFU=$10^9$~$10^{10}$ / g) media was used as denitrification bacteria. Complete removal of nitrate ($NO_3^-$) was achieved at almost 6 and 12 hrs for low (≃25μmole/L) and high (≃700μmole/L) concentrations, respectively. Even though complete removal efficiency for nitrite ($NO_2^-$) when low concentration (≃25μmole/L) was used, the high concentration (≃700μmole/L) does not reach zero level.

Another application is to be used for enhancing the stability of the bottom sediment areas where the conditions are poor so that it can provide suitable bases for culturing seagrasses and seaweeds. Bases were prepared mainly from dredged sediments treated with Aquarefine (ARP), then mixed with different hardeners to be used as a beds for eelgrass (*Zostera marina* Linné) germination. Hardeners used in this study were Gypsander, Polyvinyl alcohol (PVA). Grass germination and propagation were closely observed for almost 6 months. Data show fast and high germination rate efficiency with the samples treated with different hardeners compared to the ones without treatment. For original sandy sediments which were used as control sample, data show low germination rate presumably due to the particle size and lack of nutrients as well. Leaf area index (LAI) for eelgrass germinated in the control and mud only were less than that for samples treated with AR-P and different hardeners.

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