

# Ecosystem management of eelgrass beds and the good practice detected by eelgrass DNA analysis in the Seto Inland Sea, Japan

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Seagrass beds are one of the most important coastal habitats with high productivity and biodiversity and thus various ecosystem services. Therefore they often become the target of ecosystem restoration such as a marine protected area. This study demonstrated the contribution of oyster farmers' long-term activities to eelgrass bed restoration in the Hinase area, located at the central of the Seto Inland Sea, Japan, based on a DNA analysis for the eelgrass population-genetic structure using seven microsatellite markers.

Hinase area was famous for the fishing by coastal pound netting to catch fish and shrimp migrating to eelgrass beds, but gradually the fishing had been replaced by oyster farming with the massive loss of eelgrass. The fishers conducted eelgrass bed restoration using a seeding method for several decades even after the oyster farming became the majority, because they already knew eelgrass can maintain a better coastal environment for oyster farming as well as coastal productivity for fishing. The farmers collected eelgrass seeds from natural sites with better environmental conditions, and then sowed the seeds in the sites where eelgrass beds had disappeared.

We collected 30 eelgrass shoots as DNA samples from each of nine sites where the farmers collected seeds and where they sowed the seeds. Our DNA analysis revealed the farmers' seeding activity did not disturb the genetic structure by natural eelgrass dispersal but significantly facilitated the recovery of the eelgrass distribution, suggesting that the eelgrass-oyster farmer relationship in Hinase is a good practice as an ideal ecosystem restoration.

Keywords: *Zostera marina*, Seagrass restoration, Microsatellite markers, Oyster farming, Indigenous and local knowledge