ATTEMPTED REMOVAL OF EUTROPHICATING NUTRIENTS IN THE PORT OF AMAGASAKI, OSAKA BAY BY CULTIVATING SEAWEEDS

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As a section of the "Project Aimed at Packaging Optimal Environmental Restoration Technologies for Enclosed Coastal Seas" of the International EMECS Center, supported by the Japanese Ministry of the Environment, we conducted experiments at the Port of Amagawaki in the Osaka Bay area, in order to examine the feasibility of restoring marine macroalgal (seaweed) biodiversity and to improve the water quality by harvesting the seaweeds in an extremely eutrophicated and enclosed coastal area. We chose to use a floating raft made of bamboo and polystyrene foam floats instead of growing seaweeds on natural substrates because: 1) the seawater transparency is extremely low and therefore the depth of the light compensation point would be very shallow; 2) oxygen-deficient water masses might more severely affect the subtidal/intertidal bottom where algal vegetation normally develops. Unfortunately, the surface seawater up to 1 m deep was subject to considerable influence by freshwater inputs, which can adversely affect seaweeds. We transplanted young plants of various seaweed species commonly found in the Osaka Bay area, either collected in the field or raised indoors: *Ulva pertusa* (green algae); *Gracilaria chorda, G. incurvata, Porphyra yezoensis, Pachymeniopsis lanceolata* (red algae); *Ecklonia cava, Sargassum filicinum, S. hemiphylluj, S. muticum, Undaria pinnatifida* (brown algae). Among these algae, only *U. pinnatifida* ("wakame") showed good growth and became reproductive. Due to the use of the hanging rope substrate, *Undaria* was able to show good growth at depths of 1-4 m. There were no serious effects of fresh water below 1 m and the water transparency was relatively high during the November - April growth season, so that sufficient light reached the plants. The biomass of *U. pinnnatifida* gathered from a 4 m hanging rope ranged from ca 4 to 7 kg wet weight (0.6-0.9 kg dry weight). A preliminary analysis of the heavy metal contents suggested a relatively high concentration of As, Hg and Cd in the *Undaria* tissue. Attachment of various filter-feeding invertebrates (copepods, sponges, caprellid amphipods, mussles, etc.) was observed on the *Undaria* plants, as well as aggregation of swimming crabs and the young of fishes (e.g. black rock fish) around the *Undaria* population. *Gracilaria chorda* and *S. muticum* showed some growth, but eventually died before becoming reproductive.