Evaluations of Nutrient Dynamics and Carrying Capacity in Coastal Waters

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Summary

As a part of a research program on sustainable exploitation of biological productivity in coastal waters, primary productivity of both phytoplankton populations and cultivated wakame, *Undaria pinnatifida* was investigated in Otsuchi Bay, a ria in the Pacific coast of the northern Honshu, Japan from mid January to late April 1998. The seaweed was intensively cultivated during the study period in the Pacific coast, and competitive for nutrient salts with phytoplankton.

The ria was characterized by an intense exchange of sea waters between inside and outside the bay: outflow of near-surface water over inflow of oceanic water at depth. This circulation was driven by seasonal westerly wind, and controlled formation of spring bloom of phytoplankton: a calm weather with less active circulation allowed accumulation of phytoplankton biomass. Phytoplankton population of the bay water was composed consistently by bloom-forming diatoms, mainly *Chaetoceros* and *Thalassiosira* species throughout the investigation period. Parameters for photosynthesis-irradiance curves indicated the population was photosynthetically active from mid February to late April. These observations suggest net growth of phytoplankton was expected and potentially blooms could be formed once the wind-driven circulation became weakened. This inference was confirmed by observations with a high temporal resolution using moored current meters and optical sensor for natural fluorescence. Photosynthetic index derived bio-optically from natural fluorescence showed the spring bloom was not necessarily associated with an elevation of photosynthetic activity, and the water exchange was more important factor.

Growth of wakame was also examined in order to estimate amount of nutrient salts consumed by this species. Amount of nutrient salts used by phytoplankton will be also evaluated by a physical-biological model to understand dynamics of nutrient salts in the bay.