Regeneration of Algal Beds in Enclosed Sea Waters
- An Experiment at Kobe Port area –

Hashimoto, Kunio.[1], Nakao, Michitaka.[1], Yamamoto, Susumu.[1], Kawai, Hiroshi.[2]
1. City of Kobe,Japan 2. Kobe University

1. Purpose and methods

Offering high biological productivity and diversity in the littoral ecosystem, macro algal beds (kelp and *Sargassum* forests) play an important role in maintaining the coastal environment. However, due to the decrease or disappearance of algal beds in recent years, it has become necessary to regenerate algal forests, in addition to conserving and restoring surviving algal beds.

In the Water Environment Conservation/Creation Program developed by Kobe City, one key measure is to facilitate the regeneration of algal beds by using gently sloped masonry seawalls to create a sound marine ecosystem of high biodiversity. However, the seawater and coastal conditions of Kobe Port area are not favorable for the growth of large marine algae, for the water transparency is very low and the considerable portions of coast are used for port facilities. It has become an important task to regenerate algal beds in harmony with the port and other functions.

Since 1997, Kobe City and Kobe University have carried out a joint research project in the waters along gently sloped masonry seawalls on the west coast of man-made Port Island (2nd Stage). In the project, four macro algal species that constitute algal beds (*Undaria pinnatifida* [wakame], *Ecklonia cava* [kojime], *Sargassum filicinum* [shidamoku], and *Sargassum ringgoldianum ssp. coreanum* [yanagimoku]) have been transplanted on an experimental basis to regenerate algal beds, and the change of biodiversity in the adjacent area has been monitored to evaluate the effects of regenerating algal beds.

2. Results

1) After transplantation, *Undaria pinnatifida*, *Ecklonia cava*, and *Sargassum filicinum* have successfully settled and regenerated in the area, though these species were seldom observed in the waters before the experiment.

2) Considering potential removal by wave actions in the shallows, and the shortage of light intensity for photosynthesis in the deeps, the depth range at which an algal beds can develop in this area is as narrow as 3 to 4 meters (2-6 m below low water level).

3) The transplantation of fertile thallus was most effective for *Ecklonia cava*, and installation of spore bags was effective for *Undaria pinnatifida* and *Sargassum filicinum*.

4) In the experimental area, members of Serpulidae(Annelida:Polychaeta) ,Columbellidae(Mollusca:Gastropoda) and Corophiidae(Crusfacea:Amphipoda) have established large populations, suggesting the potentially serious problem of competition with the macro algae for substrata.

We are continuing the monitoring of the status of the transplanted macroalgae and changes in the surrounding biota, for quantitative assessment of the effects of the regeneration of the algal beds. Furthermore, we plan to develop more effective methods for transplantation, and to reduce the load to neighboring coastal areas by securing mother plants for transplantation.