

Long- term fluctuation of eelgrass *Zostera marina* metapopulation in Tokyo Bay

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Seagrass bed is one of the main landscapes in coastal ecosystem. It is a open habitat, and biological communities constitute metapopulation in which component species migrate between local habitats that occur along the coastline in a scattered manner. To predict the fluctuation in biological communities and to evaluate the ecological function of seagrass beds, it is required to conduct research to understand dynamics of communities taking into account the characteristic of habitats not only at local spatial scale but also broader scales. Because seagrass beds develop in shallow sea bottoms, it is possible to estimate the changes in areas of seagrass bed using remote sensing techniques including analysis of aerial photographs.

The aim of this study was to clarify the long-term spatial changes of seagrass beds along the Chiba coast in Tokyo Bay. First, we conducted visual census from the land, and mapped the distribution of eelgrass *Zostera marina*, a dominant seagrass species in the area. Second, we analyzed the long-term spatial dynamics of several seagrass beds during 1989 to 2005, based on remote sensing and geographic information system techniques using aerial photographs.

As a result of the visual census, 29 eelgrass beds were found in 2006 along the Chiba coastline of outer parts of Tokyo Bay. Comparing this result with the census in 2003, the extinction of local population was confirmed at eight sites, and the appearance of new local population was confirmed at six sites. It was suggested that the extinction and the appearance happen frequently among local populations of eelgrass in Tokyo Bay.

Analysis of the long-term spatial dynamics of seagrass beds using aerial photographs revealed great year-to-year variation in seagrass bed areas. However, the patterns of fluctuation varied from sites to sites, suggesting that changes in seagrass bed area occur asynchronously, possibly affected by different local factors. For example, the area of seagrass bed increased 3 times in a few years in one site where changes in surrounding environment occurred as a result of harbor construction. The results suggest that it is necessary to examine the influence of large-scale environmental factors around seagrass bed as well as those within the seagrass bed for better understanding of seagrass metapopulation dynamics and its precise prediction in future.