

Ecological succession of bivalve community associated with oyster reef formation in Sanbanze tidal flat, Tokyo Bay

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This study focuses on various basic ecological data (size, age of formation, spatial structure) of an oyster reef near the mouth of Nekoanegawa River in the western part of Sanbanze tidal flat, Tokyo Bay, and discusses the factors that are considered as a key factors for the formation of the oyster reef. Such basic data on the reef size, the form, the spatial structure, and the cause of the reef formation will be a useful fundamental data for the paleoecology of oyster reef evolution. This study consists of three stages. At first, I observed the reef, measured its size, and described the oyster reef. Next, I made boring core samplings inside and outside the oyster reef, in order to clarify the change in diversity and species composition of benthic macro invertebrates (mainly bivalves) during oyster reef formation.

Finally, in order to determine how much time it took for the oyster reef to form, we carried out three independent methods: aerial photographs taken between 1970 and today; first occurrence of recorded exotic species into the reef; and radioactive carbon dating using the pattern of decreasing ¹⁴C after the ban of atmospheric atomic bombings.

As a result, following conclusions were drawn.

1. The oyster reef extends in north-south direction in 140 m, with the east-west width of 50 m, 60 cm thick and areal dimension of 4000 m².
2. The age of the oyster reef was estimated by the 3 independent methods, and this oyster reef can be judged to have grown to its present size within about 20 years.
3. It was clarified that the forming process of oyster reef can be divided into the following three stages; tidal flat stage, byssal mats stage, and oyster reef stage, by the observation of the boring core samples in the oyster reef.
4. For the oyster reef formation in Sanbanze, appearance of byssally attached species, such as *Mytilus galloprovincialis* and *Musculista senhousia*, as well as mat formation and an increase of nutrients, are regarded as playing an important role.
5. By the formation of oyster reef, a community change in bivalve species has occurred, and the bivalve fauna has become very different from that of the surrounding tidal flat. However, the total number of species and the diversity are maintained in the same level, compared with those before the reef formation
6. Oyster can be an "ecological engineer" in the sense that they can create a new ecologic niche that has not been present before the reef formation.

Keywords: oyster reef, ecological succession, bivalve, community ecology, Tokyo Bay, tidal flat