

Distribution Changes of Benthic Animals under the Influence of SiltFence Spreading around Reclaimed Area in Hakata Bay, Japan

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The man-made island has been constructed in front of tidal flat at the head of Hakata Bay, the western part of Japan. During the construction of island, the silt fence spreads between the island construction area and tidal flat area to protect ecosystem of tidal flat from the damage due to turbidity of water mass caused by the construction. However, as the construction progresses, the population of benthic animals and wild birds which work as compartments of the tidal flat ecosystem has been decreasing remarkably. Therefore, we studied the cause of the ecosystem changes, with observing the distributions of benthic animals, plankton, and Oxidation-Reduction Potential (ORP) of sediment at seabed around the silt fence. And also, we examined availability of silt fences spread around the constructing area from perspective of ecosystem conservation.

According to the observation at the construction area and the tidal flat area divided by the silt fence, the concentration of particulate materials such as phytoplankton was high level at the construction area, comparing with that of the tidal flat area. Adult benthic animals at the tidal flat area were a third in population and a fortieth in amount of those at the constructing area. And adult bivalves, the dominant species at the constructing area was rarely observed at this area. Moreover, the level of ORP at seabed sediment where the benthic animals live on was about 150mV lower than that of the constructing area. And the population of bivalves larvae at the tidal flat area showed the half value of the constructing area.

In spite that we could confirm the enough effect of silt fence to prevent the diffusion of particulate materials to the tidal flat area, we had to consider that the silt fence worked as the obstructive equipment to the supply of the oxygen and the recruitment of bivalve larvae, and affected to the survival of benthic animals based on the results of observation. For this reason, decrease of wild birds population can be caused depending on the change of benthic animals through the food chain of ecosystem.

In our study, we found that the silt fence did not work effectively for the tidal flat ecosystem behind the construction area of the island. We concluded that it is essential to decide the suitable countermeasures to conserve natural environment with understanding how the ecosystem working, taking ecological roles and life history of benthic animals into consideration, in case that the development will be carried out close to natural area such as tidal flat.