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Environmental Impacts on Seasonal Changes of Macrobenthic Animals on the Mud Flats in Dokai Bay

Naoko Ueda[(1)], Machiko Yamada[(1)], Manabu Suzuki[(1)], Hiroaki Tsutsumi[(2)] and Shigeru Montani[(3)]

[(1)] Kitakyushu City Institute of Environmental Sciences, Kitakyushu 804-0082, Japan
Tel +81-93-8820333 Fax +81-93-8712535
e-mail: ug7n-ueda@asahi-net.or.jp
[(2)] Prefectural University of Kumamoto, Kumamoto 862-0920, Japan
Tel +81-96-3832929 Fax +81-96-3846765
[(3)] Kagawa University, Kagawa 761-0701, Japan
Tel +81-87-8913143 Fax +81-87-8913021

Abstract

Dokai Bay, our study area, is the one of the most severe entrophicated bay in Japan. In this study, we described the environmental factors that control the seasonal changes of the abundance of the macrobenthic animals on the mud flats and offshore the mud flats at the innermost areas of this bay. In summer, the hypoxic water occurred from 4 m in depth to the bottom (12 m in depth) at offshore areas, due to the heavy organic enrichment of the sediments. This hypoxic water imposed a severe environmental stress upon the macrobenthic animals offshore the mud flats and presumably also those on the mud flats. Unexpectedly, the macrobenthic animals on the mud flats were also very scarce during summer.

After a return of normoxic conditions (DO>2.0ml/l) from hypoxia, a rapid recovery of the macrobenthic animals was observed on the mud flats. Highest biomass of the macrobenthic animals reached over 2 kg WW/m^2. It demonstrates the mud flats in Dokai Bay still retains enough potentials to recover their extremely high productivity. The dominant species of macrobenthic animals that increased rapidly on the mud flats were the bivalves; *Limnoperna fortunei* and *Mytilopsis sallei*, and the balanoids; *Balanus eburneus* and *Balanus amphitrite*, which were almost introduced from overseas.

These results indicated that the hypoxic water occurred on the bottom at offshore areas occasionally brought an environmental catastrophy in the macrobenthic animals at the neighboring mud flats. To stimulate the activity of ecosystem on the mud flats in the enclosed coastal seas, like Dokai Bay, it is necessary to control the amount of nutrient discharge in the whole areas of coastal seas and to prevent the occurrence of hypoxic water.