

Human induced environmental changes in bottom sediments during the past 100 years in Kitanada Bay, Ehime Prefecture, Japan

Atsuko Amano[1]; takahiko inoue[2]; Naoya Iwamoto[1]; Fujihiko Shioya[3]; Yoshio Inouchi[4]

[1] Earth Sci., Ehime Univ; [2] Graduate School of Sci. and Eng., Ehime Univ.; [3] Environ. Sci., Ehime Univ; [4] CMES, Ehime Univ.

During the past 50 years, marine environments in Japan have been changed by human activities, particularly by fish farming. This study is chiefly focussed on the impact of fish farming on marine environment in Kitanada bay as a model for other applicable areas. Present sea bottom environment is shown in distribution pattern of grain size and element contents of surface sediments. The distribution pattern of grain size shows that coarser sediments are distributed around the bay mouth and becomes finer toward the bay interior. This result suggests that hydrodynamic environment in inner Kitanada bay is stagnant. Contents of total organic carbon, total nitrogen and total sulfur are high around fish farming cages in the north. Recently, much organic substances are supplied into fish cages. Bottom environment has become strongly reductive due to the supply of much organic substance in combination with stagnant hydrodynamic environment. Environmental changes during the past 100 years show the impact of fish farming on bottom environment. Total organic carbon and total nitrogen concentration in sediment cores increase toward the top from 1970's when fish farming started in this bay. Kitanada bay has become eutrophic due to fish farming. At the same time, grain size profiles show decrease toward the bottom surface in the northern part and increase in the southern and bay mouth area. These results suggest that the hydrodynamic environment has been changed by the setting up of fish cages. In the northern area, hydrodynamic environment has become more stagnant by the setting of fish cages which somewhat resist tidal current. In the southern and bay mouth area where no fish cages are observed, tidal current has become faster. As a result, sea water exchange has become more active, and bottom environment has become more weakly reductive. Fish farming in this bay is one of the main reasons for eutrophication. Hydrodynamics and bottom environment have been greatly changed by fish farming.