Environment and Mcrobenthic Assemblages in the Salt Marsh Created by the Great East Japan Earthquake

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1. Introduction

As a result of land subsidence accompanied by the Great East Japan Earthquake on the 11th of March 2011, 3 salt marshes with tidal flats emerged in the Moune area of Kesennuma city in Miyagi prefecture. Monitoring the environment and biocenoses is essential to understand the transition process mechanisms of newly establised ecosystems. This can be valuable information for determining the land utilization in disaster stricken areas. How to manage and utilize the flooded areas is one of the biggest challenges. Public recovery works have pushed forward based on the policy of restoration to the original state before the disaster. However, strategies based on the situation in each area are needed, because the geography and environment in the coastal zone were completely disrupted. This makes it difficult to restore such lands to their original states. In the case of Moune area, it was decided one of the 3 salt marshes would be conserved for the practice of environmental education and the establishment of a model for regional development. The objective of this research is to understand the environment and monitor the transition of biocenoses in this salt marsh, with a focus on macrobenthic assemblages.

2. Methods

The salt marsh studied (9000 m^2) is connected to the Nishi-moune River through a drainage pipe (60 cm diameter). Seawater enters the salt marsh through this pipe during high tides. Sampling of macrobenthos and sediments was conducted in September 2012 and January 2013 at 34 stations in the salt marsh. After sorting, the number of individuals per species and, after blot drying with tissue, the weight without shell was recorded to the nearest 1 mg. Morisita's similarity index (C_λ) and the cluster analysis were used to identify distinct assemblages in the wetland. Sediment chemical factors such as acid-volatile sulfide (AVS), total organic carbon (TOC), total nitrogen (TN), $\delta^{13}C$ and $\delta^{15}N$ and the current velocity, which was estimated by using plaster ball, were determined to examine the relationship between benthic assemblages and the envrionment. Stable isotope analysis was conducted to reveal the trophic structure in the salt marsh. Samples of animals were colleced from the salt marsh in May 2013. Possible food sources such as riverine particulate organic matter (rPOM), terrestrial organic debris (TOD), sedimentary organic matter (SOM), marine particulate organic matter (mPOM) and benethic microalgae (BM) were also colleced.

3. Results and discussion

The macrobenthic community in the area was composed of 74 species including cnidaria, platyhelminthes, nemertinea, annelida, gastopoda, bivalvia, crustacea and insecta. The macrobenthic community can be considered to be in the course of transition, as its major component species was opportunistic species such as *Capitella* sp. As the distance from the drainage pipe increases, the time-averaged current velocity decreases, and the biomass and species diversity of the macrobenthos decreases. The organic matter contents and sulfide concentrations were relatively low close to the dainage pipe, whereas these values were considerably high at stations far from the drainage pipe. These findings suggest that the current velocity has a significant effect on the environment and macrobenthic community. The stable isotope analysis revealed that organic matter in the sediment derives from the terrestrial environment, and that such organic matter doesn't contribute to the diet of macrobenthic animals in the salt marsh. The present research infers that the management of the current velocity can be an important tool for improving the environmental condition of the salt marsh.