

Relationships between Food Web Structure of Benthic Community and Origin of Sedimentary Organic Matter in Tidal Flats of Two River Mouths in Shikoku Island, Japan

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Many studies were conducted to analyze food web and estimate the origin of sediment using carbon and nitrogen stable isotope ratios in estuarine ecosystems. Since the environmental factors are changeable and various spatially and temporally, characteristics of sediment in tidal flats are not uniform. It is assumed that spatial distribution of sediment characteristics influences food web structure, and food web structure may be different among the different sediment characteristics.

The objective of this study is to analyze food web structure and estimate the origin of sediment using carbon and nitrogen stable isotope ratios in two tidal flats of river mouth. We collected macrobenthos and potential food sources in tidal flats and surrounding reed marshes in the Yoshino and Katsuura Rivers, Tokushima Prefecture of the Shikoku Island, Japan. Carbon and nitrogen stable isotope ratios were measured for macrobenthos and sediments collected at 50 and 32 stations in the Yoshino and Katsuura estuarine tidal flats, respectively.

Carbon stable isotope ratios of sediments were distributed with spatial characteristics in the two tidal flats. Contribution of terrestrial organic matter was lower in the downstream section of the tidal flat comparing with in the upstream section. It is thought that sediment in many stations consisted of terrestrial organic matter, that is mostly originated from reed. Although benthic consumers were distributed in the stations with sediment from terrestrial organic matter, they did not assimilate terrestrial organic matter as their food sources. Moreover, benthic consumers have selectively assimilated food sources that are supplied from water column. Reed marshes play a role as habitat and food sources are indirectly supplied through the reed marshes, indicating that reed is not useful for benthic consumers as a food source.

Sediment groups were distinguished according to the physical characteristics of sediment by cluster analysis for particle size composition and difference in elevation. As a result, carbon stable isotope ratio of sediment and contribution of terrestrial organic matter showed statistically significant difference among the sediment groups. However, macrobenthos mainly assimilated MPOM and benthic diatoms as their food sources even in the station of sediment groups with rich terrestrial organic matter.

It was implied that the difference in sediment characteristics hardly corresponded to food web structure of benthic community.

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