

Analysis of the coastal food web and influence of terrestrial input in Toyama Bay using $\delta^{13}\text{C}$ and $\delta^{15}\text{N}$

Chihiro Urasawa¹, *JING ZHANG¹, Osamu Inamaura², Shota Kambayashi¹, Shohei Hattori³, Naohiro Yoshida³

1.University of Toyama, 2.Uozu Aquarium, 3.Tokyo Institute of Technology

Toyama Bay is a semi-enclosed bay facing the Sea of Japan, which has a distinctive coastal environment. It receives a large amount of freshwater (such as river and submarine groundwater discharge (SGD)) and it is also affected by the Japan Sea water. In this study, to evaluate terrestrial effect on coastal organisms in Toyama Bay, we analyzed food web structure and estimate utilization situation of organic matter and nutrient (NO_3^-) derived from land in food web using stable isotope ratios ($\delta^{13}\text{C} \cdot \delta^{15}\text{N}$; $\delta^{15}\text{N} \cdot \delta^{18}\text{O}$ in nitrate).

The $\delta^{13}\text{C}$ values of consumers (such as bivalve, crustacea and fish) in the coastal area of Toyama Bay were clearly higher than those in the riverine particulate organic matter (POM). This indicates that consumers do not use terrestrial organic matter as their carbon source. The calculated contribution of benthic microalgae to diet of consumers was about 30 - 60 %, suggesting that ^{13}C -enriched benthic microalgae is an important carbon source for the coastal food web in Toyama Bay. Primary producer in coastal area of Toyama Bay shows much lower $\delta^{15}\text{N}$ values than typical primary producer in other coastal area. In addition, $\delta^{15}\text{N}$ (NO_3^-) values of coastal area in Toyama Bay are also lower than the $\delta^{15}\text{N}$ (NO_3^-) values of deep seawater of Toyama Bay and Japan Sea water. Low $\delta^{15}\text{N}$ (NO_3^-) values were also observed in the rivers and SGD around Toyama Bay. Our results suggest that coastal organisms in Toyama Bay are influenced by terrestrial input of low $\delta^{15}\text{N}$ (NO_3^-) through the rivers and SGD.

Keywords: Toyama Bay, Carbon and Nitrogen stable isotope ratio, Food web