

Water Purification by Bivalves in Shallow Areas of Tokyo Bay

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Abstract

To evaluate the biological efficiencies of shallow-water areas for use in preserving coastal ecosystems, we conducted field surveys from September 1996 to September 1997 at 4 sampling stations (1–4) in a shallow area at Sanbanze, at the head of Tokyo Bay, and 2 stations (5, 6) in a deeper adjacent area in the central part of the bay. Plenty of macrobenthos was observed in the shallow area (Stns. 1–3) during the summer, its biomass (wet weight) being 1.26–3.41 kg·m⁻². Dissolved oxygen at Stations 1–3 was > 3 mg·l⁻¹, even in summer, when the water is stratified. On the other hand, no living animals were observed at Stations 5 and 6, where water depth was 15–18 m and dissolved oxygen was < 1 mg·l⁻¹ during the summer. The distribution of bivalve species was also observed at 17 stations at Sanbanze in June 1998.

Bivalves were the dominant animals in the shallow area, accounting for > 98% of the total biomass. Respiration and filtration rates of *Macra quadrangularis*, a dominant clam species in the area, were measured at various temperatures in a static chamber. The rates were greater at higher temperatures. The respiration rate varied from 0.17 at 7°C to 2.88 mg O₂·g⁻¹·h⁻¹ at 25°C, and the filtration rate varied from 0.60 to 5.72 l·g⁻¹·h⁻¹ (bivalve mass expressed as grams dry weight of soft body). The in-situ clearance time by bivalves where water depth is about 2 m can be estimated to be 2–3 days on the basis of the product of the observed filtration rate and the biomass of the bivalve. This indicates an important role of bivalves in the biogeochemical cycle in shallow areas.