

Functional roles of a deposit - feeding polychaete, *Capitella* sp. I, on the purification of bottom sediment

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The organic pollution caused by fish net pen culture in coastal water of Japan tends to be a serious environmental problem which is necessary to be assessed. In this study, we introduced a new technique with the use of biological activities of a deposit-feeding polychaete *Capitella* sp. I for purification of the organically enriched bottom sediment. The process of organic accumulation (as fish food) to the bottom sediment has been imitated in the experimental marine sediment systems and the roles of biological activities of *Capitella* on the purification of biogeochemical characteristics of the organically enriched sediment were examined.

The laboratory colonies of *Capitella* increased very rapidly in the organically enriched sediment of the culturing boxes. In the process of the rapid population growth, the biological activities of the worms apparently promoted the decomposition of organic matter e.g. total organic carbon (TOC) and total nitrogen (TN) in the sediment, and decreased the levels of acid volatile sulfides (AVS) in the sediment. Comparing to the controls (without worm), increase in worm biomass (B ; g/m^2) promoted the decreases in TOC, TN, and AVS [$dTOC$, dTN , and $dAVS$; $mg/g(d)$] of the sediment as the relationships: $dTOC = 0.94 \times 10^{0.34B}$ ($r = 0.81$), $dTN = 0.19 \times 10^{0.36B}$ ($r = 0.85$), and $dAVS = 0.30 + 0.16 \log B$ ($r = 0.97$), respectively. The biological activities of the worms also significantly enhanced the increase in the levels of adenosine triphosphate (ATP) of the sediment. Because of the simultaneous decreases in AVS of the sediment, these phenomena may indicate that either the gardening or feeding activities of the worms play an important role stimulating the growth and the successional development, and effectively controlling the number of sediment-living bacteria. Low levels of NO_2+NO_3-N concentrations but the apparent increases in NH_4^+-N concentrations in pore water indicated that these biological activities of *Capitella* should relate to the anaerobic decomposition processes occurred in the sediment. Since the activities of *Capitella* have clearly revealed to promote the decomposition of the organic matter and oxidation of reduced sulfides in the sediment, the effect of this polychaete imposed on the sediment is considered to be an appropriate method for purification of the sediment which has been organically enriched by the fish culture.