Biophysical interactions on the succession of subtidal benthic community in the inner part of Ariake Bay

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Keywords: Ariake Bay, Anadara kagoshimensis, benthic community, indirect effect

Abstract

Community succession is a key process for the recovery of ecosystems after disturbance. Succession proceeds from assemblages of small short-lived species to ones including large long-lived species in general. In marine coastal ecosystems, long-lived species is often commercial species. The understanding of succession process therefore provides an important insight for the restoration ecology of coastal waters. In the inner part of Ariake Bay, hypoxia occurs every summer, and the disturbance is a cause of the deterioration of subtidal benthic community there, as found in the long-term dominance of several small species, such as the semelid bivalve *Theora fragilis*, venerid bivalve *Veremolapa micra*, and sternaspid worm *Sternaspis costata*. However, a large commercial arcid bivalve *Anadara kagoshimensis* sometimes settle over hypoxic periods. During succession, early species often affect the settlement of later species positively or negatively, interacting with physical factors. Here we investigated how the settlement of *A. kagoshimensis* was affected by other dominant species under varying conditions of mud contents and hypoxia in the inner part of Ariake Bay. We performed a piecewise structural equation modeling to see if currently dominating small species affected the settlement of *A. kagoshimensis* under mud contents and hypoxic conditions of settlement sites using yearly monitoring data of benthic community in this area. We could not find evidence that the settlement of *A. kagoshimensis* was directly affected by the other dominant species, hypoxia, or mud contents. However the settlement of arc shells was positively and negatively influenced by the existence of adult *A. kagoshimensis* and mud contents in the settlement site, respectively. Although we could not find significant direct and indirect effects of hypoxia on *A. kagoshimensis*, other studies report that hypoxia has often causes mass mortality of benthic organisms including *A. kagoshimensis* in the inner part of Ariake Bay. It is still possible that hypoxia indirectly affects the recruitment of *A. kagoshiumensis* by decreasing adult abundance.