

Possible effects of submarine groundwater on biodiversity and fishery production in coastal ecosystems

SHOJI, Jun^{1*} ; SUGIMOTO, Ryo² ; TOMINAGA, Osamu² ; KOBAYASHI, Shiho³ ; YAMADA, Makoto⁴ ; TANIGUCHI, Makoto⁴

¹Hiroshima University, ²Fukui Prefectural University, ³Kyoto University, ⁴Research Institute for Humanity and Nature

Economic values of the ecosystem services of coastal ecosystems have been evaluated as among the highest of those the world's ecosystems. Recently more attentions have been paid on the mechanisms how the freshwater contribute to the high productivity and species diversity of the coastal ecosystems. In the present paper, previous researches that focused on effects of freshwater input from the land on productivity and species diversity of fishery resources in the coastal ecosystems are reviewed. In addition, results from recent surveys conducted in order to examine the possible effects of river water and submarine groundwater on productivity and species diversity of fishery resources are introduced.

Relationship between river discharge and recruitment of several estuarine-dependent fish species (flatfish, seabass and clupeid) have been reported in the world. Among these fish species, the mechanisms how river discharge promotes survival during the early life stages and recruitment of Morone fishes (striped bass and white perch) have been well studied. Larval survival rate is high and recruitment of 1-year-old fish is successful in years with high precipitation in these species. High freshwater discharge has been reported to increase availability of prey for the larvae, decrease predation through affecting predator species composition and biomass, then increase the growth and survival during the larval stage.

In a previous paper, on the other hand, low salinity zone has been reported to be one of the ecosystems where biodiversity is the lowest among the world's aquatic ecosystems. High fluctuation in salinity and tidal level within a relatively small spatial and temporal scale could be stressful for a variety of animal species. Recently high abundance of juveniles of several flatfish species were observed in low salinity zones nearby an estuary in the coastal waters of Japan. Species diversity of fishes was higher in a seagrass bed where freshwater supply from the land through submarine groundwater was expected compared to the surrounding areas. These observations suggest that low salinity condition does not always decrease diversity of fish species in coastal ecosystems. Future research plan to investigate the mechanism how the freshwater input from the land contributes to the high productivity and species diversity in the coastal ecosystems will be introduced.

Keywords: water-food NEXUS, fishery production, species diversity, submarine groundwater