

SENSITIVITY TEST OF YELLOW SEA FORAMINIFERS AND OSTRACODES TO THE ENVIRONMENTAL CHANGES

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The purpose of this study is to test the sensitivity of foraminifers and ostracodes to the environmental changes. To test the environmental sensitivity the following data are collected in the Shihwa Lake: number of benthic foraminifers and ostracodes, abundance of pyrite-filled benthic foraminifers, species compositions of benthic foraminifers, species diversity of benthic foraminifers, and coarse fraction content in the sediment. Then, these environmental variables are compared with the heavy metal concentrations in the sediment.

Shihwa Lake, which is located in the eastern part of Yellow Sea (the western part of the Korean Peninsula), is chosen due to its severe anthropogenic influences during the past decade. Yellow Sea water could not enter freely to the Shihwa Lake due to the construction of the Shihwa Seawall. Shihwa Seawall starts to build in 1987 and completed its construction on 1994. The Shihwa Lake was an estuarine environment (called the Banwol tidal flat) before the Shihwa Seawall was completed. After the completion of the Shihwa Seawall, the Shihwa Lake has started a restricted circulation. As a result, the surface water (surface to approximately 5 m water depth) of the Shihwa Lake is brackish, while the bottom water contains saline water.

The Shihwa Lake is approximately 25 km long and 4 km wide. The water depth ranges from 4 to 18 m. The surface water temperature ranges from 3.0 °C (December) to 29 °C (August). The surface water salinity lies between 1.5 ‰ (September) and 24.8 ‰ (December). The bottom water temperature ranges between 20.9 °C (August) and 3.0 °C (December).

The Shihwa Lake receives an enormous amount of industrial pollutants from the neighboring Shihwa-Banwol Industrial Complexes and almost untreated domestic sewage from the municipal areas enters the lake through six major streams. Therefore, the study area is a good site to test the sensitivity of foraminifers and ostracodes to the environmental changes.

Five short cores are used in this study. The length of five cores ranges from 30 to 80 cm. Sediments in the Shihwa Lake are mainly brownish- to dark-colored organic-rich mud and sandy mud.

The result reveals that the heavy metal (Cu and Zn) polluted eastern part of the Shihwa Lake shows barren or nearly barren zone of benthic foraminifers both at the surface and

downcore sediments. Intrusion of pollutants after the construction of the Seawall in 1994 severely modified the Shihwa Lake environment as evidenced by the low number of benthic foraminifers, low number of *Ammomia beccarii*, low species diversity, and absence of *Elphidium* spp., and ostracodes in the surface sediment compared to those of the downcore sediments. Except the barren station (eastern part of Shihwa Lake), the western part contains pyritized benthic foraminifers both in the surface and downcore sediments, suggesting a foraminiferal disease by bacteria.

Either pyritized or non-pyritized *Elphidium advena*, *E. excavatum*, and *E. subincertum* do not occur in the surface sediment. But they are abundant in the downcore sediment. The absence of these species in the surface sediment is due to probably a fresh-waterized nature of the Shihwa Lake after the completion of the Seawall in 1994. The surface sediments contain low number of species compared to the downcore sediments, suggesting the relatively recent modification of the Shihwa Lake bottom water environment by pollutants.

Ostracodes do not occur in the surface sediment of all five stations. Even, it is not found adjacent to the Shihwa-Banwol Industrial Complexes and outfalls of sewages both at the surface and downcore sediments, indicating that ostracodes can also be used as a sensitive pollution indicator.