

Organic and Inorganic Matter Dynamics in the Han River Estuary

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This study investigated seasonal dynamics of organic and inorganic matter in the Han River estuary, a natural system without dam influence in South Korea. Analysis of water samples from eight stations across four seasons (November 2021, February, May, August 2022) measured dissolved organic carbon (DOC), particulate organic carbon (POC), particulate nitrogen (PN), dissolved inorganic nutrients (DIN, DIP, DSi), optical properties (HIX, BIX, FI, SUVA₂₅₄), and environmental parameters. Concentrations were calculated using the inverse distance weighting(IDW) interpolation. Spring (May) exhibited phytoplankton bloom conditions with high chlorophyll-a (9.87 µg/L), highest POC (202 µM), and depleted nutrients, while elevated BIX values confirmed increased microbial-derived organic matter. Summer (August) showed high concentrations of DIN (129 µM), DIP(2.18 µM), and DSi(103 µM) along with HIX(6.64) and SUVA₂₅₄(6.77) values, coinciding with the strongest salinity gradient (1.2-28). Winter (February) showed highest DOC (651 µM) concentration with high FI values (1.5-1.6) despite reduced biological activity, indicating increased contribution of microbial-derived organic matter. This research demonstrates that seasonal biological changes primarily regulate organic and inorganic matter dynamics in this estuarine system, providing baseline data for evaluating anthropogenic impacts on coastal ecosystems.