



## **Characteristics of depositional environments in the Nakdong River Estuary, South Korea**

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Most of the major Korean estuaries, under high pressure from development, have dams with environmental problems, including restricted water circulation, low water quality, decreased biodiversity and wetland destruction. The Nakdong estuary on the southeastern coast of Korean Peninsula is an enclosed type with two large estuarine dams that were constructed in 1934 and between 1983 and 1987. The construction of dams has led to geomorphologic evolution of the barrier islands within Nakdong estuary. The estuary has been characterized as barrier-lagoon system with various subenvironments and microtidal with a 1.5 m tidal range. The sedimentary analyses and monitoring short-term sedimentation rates were investigated to understand characteristics of depositional environments in barrier-lagoon system of the Nakdong River Estuary. The surface sediments in the system were classified into three sedimentary facies in summer 2015. Generally, sand sediment was dominated in the seaward side of barrier islands and muddy sand sediment was dominated on the lagoon. Sandy mud and mud sediments were distributed in the tidal flat near Noksan industrial district and channels near dams. Fourteen a priori subenvironments were distinguished based on differences in landscape characterization (sediment texture, salinity, total organic carbon, pH and C/N ratios). The dendrogram resulting from cluster analysis of environmental variables from 14 a priori subenvironments could be clustered into 4 groups that were characterized by different sediment texture and hydrodynamic energy. The short-term sedimentation rates were obtained seasonally from three lines by burying a plate at sub-bottom depth from May 2015 to May 2016. The deposition was dominated on the tidal flat between mainland and Jinudo (JW- Line) and Sinjado (SJ-Line) with the net deposition rate of 10.09 mm/year and 12.38 mm/year, respectively. The erosion was dominated on the tidal flats at Eulsukdo (ES-Line) on the east side of the system with an annual erosion rate of -13.15 mm/year. Two 12.5-hours anchoring surveys at inlets were revealed that net suspended sediments were transported to the open sea during a tidal cycle in summer 2015 and 2016. The sedimentary processes of the anthropogenically altered barrier-lagoon system in Nakdong estuary showed that sediments transported into the lagoon through inlets during flood condition and moved to westward and deposited sediments on the tidal flat and channels near dams in low energy environments. In the east side of the system, sediments flowed out the sea with discharge from Nakdong Dam during ebb condition. These data will provide an important baseline for future assessments of environmental quality on dam open.