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Application of Marine Environmental Information System Data to Support Marine Spatial Planning in the Nakdong River Estuary, Busan Metropolitan City, South Korea

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The Nakdong River in South Korea has a length of nearly 510 km, with a drainage basin of around 23,384 km^2, and is subject to natural erosion, sedimentation and various potential human developments, including relative water diversion, reservoir construction and a large river–estuary construction. The Noksan floodgate, built in April 1934, blocks the flow of the west Nakdong River. The Nakdong River Estuary (NRE) barrage in Busan Metropolitan City was completed in November 1987 to regulate flow from the Nakdong River. In this study, marine environmental information system (MEIS) data collected after May 2015 were applied to support marine spatial planning (MSP) in the brackish water zone. The NRE barrage has been characterised as a barrier–lagoon system with 14 *a priori* group sub-environments (n = 30). The surface sediment analysis generally showed that a sand sediment dominated on the seaward side of barrier islands and a muddy sand sediment dominated in the lagoon (n = 90). Short-term sedimentation dominated erosion on the tidal flats at Eulsukdo on the east side of the system, with an annual erosion rate of -12.76 $mm \cdot yr^{-1}$ (n = 29). At the inlets and channel, it was found that net suspended sediments were transported to the open sea during a tidal cycle (n = 4). The calculated residual flow of the main stream NRE mooring station veered seaward in the surface and middle layers, and landward in the bottom layer. In the stratification index analysis (n = 14, along three lines), the Nakdong River at the bottom of the Noksan floodgate was classified as a saltwater wedge estuary, with strong stratification during the ebb tide. It was found to be a well-mixed estuary, in which surface–bottom mixing occurred during the flood tide. However, the Nakdong River on the east side of Eulsukdo Island and the right main stream of the Nakdong River had a distinctive saltwater wedge estuary showing stratification during both the ebb and flood tides. On 27 August 2015, depth-integrated net suspended sediment loads for one tidal cycle showed a seaward movement of 1,698.4 $kg \cdot m^{-1}$. The NRE and surrounding locations could be divided into areas continuously managed by government, marine protected areas, sand mining resource development areas, areas for the development of marine attractions, areas conserved for research education, areas where an environmental risk assessment would be required prior to ship navigation, military protective sectors and coastal areas subject to safety management, *etc*. For MSP, it was possible to use comparative data of the characteristics of environmental changes in the estuarine watershed to prepare the NRE for the partial opening or drainage extension in 2019. Available MSP data for the target area should be collected, processed and analysed to facilitate decision making. Therefore, MSP documents and databases according to a geological field survey and protected areas as established by government guidelines should be classified by core values. In addition, the scientific analytical data used should be validated, and standard positional information should be verified to produce spatial data.