



Geomorphological Responses to Anthropogenic Alterations within the Nakdong and Yeongsan Estuaries, South Korea

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On the Korean Peninsula, significant anthropogenic alterations have occurred to drainage basins and estuaries due to river diversion for agricultural practices, coastal construction of estuarine barrages, and extensive seawalls in land reclamation projects. Over the past century these practices have considerably modified the shoreline and altered both net transport of sediment and freshwater from these systems and modulated the timing and intensity of the discharge. As a result, the sediment dynamics and ecosystems within the estuaries have been significantly altered. Considering drainage basins >500 km², 56% of rivers reaching the coast in South Korea have been occluded by an estuarine dam, restricting delivery of sediments and altering/preventing natural tidal exchange of fresh and saltwater. The Nakdong and Yeongsan Estuaries are prime examples and are respectively representative of micro and macro-tidal estuaries found in the region. The impacts of the modifications include a substantial decrease in the tidal prism, reduction of accommodation space in intertidal zones, and changes in the dispersal mechanisms and accumulation of sediments. In order to assess these alterations, a series of gravity and vibracores were analyzed using ²¹⁰Pb and ¹³⁷Cs radioisotope geochronology, laser diffraction particle analyses, and X-radiography. Additionally, side scan sonar and CHIRP seismic data were collected. Our observations have found a shift in depositional environments as a natural response to an extensive array of anthropogenic alterations. The changes in sediment trapping efficiency that have ensued resulting from extensive coastal construction provides the basis for reevaluating traditional facies models for estuaries in the Anthropocene