

## Channel Adjustment Downstream of the Hapcheon Re-regulation Dam in South Korea

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**Abstract.** The Hwang River is a tributary of the Nakdong River as it covers a drainage area of 1,329 km<sup>2</sup> in South Korea. The Hwang River has experienced channel adjustments after the construction of two dams. The Hapcheon dam and re-regulation dam, located 2 km downstream of the main dam, were completed in 1989. The purpose of the lower dam is to regulate the flow from the main power station to the downstream. The 45 km reach below the re-regulation dam changes in flow regime after dam construction, specially changes channel width, bed material distribution, vegetation expansion, and island formation. The Hapcheon dam trapped 600,000m<sup>3</sup> of sediment annually since the completion of the dam in 1989. The re-regulation dam also dramatically reduced annual peak flows from 654.7 m<sup>3</sup>/s to 126.3 m<sup>3</sup>/s. An analysis of a time series of aerial photographs taken in 1982, 1993, and 2004 showed that the non-vegetated active channel width narrowed an average of 152 m (47% of 1982). Also, the non-vegetated active channel area decreased an average of 6.6 km<sup>2</sup> (44% of 1982) between 1982 and 2004, with most narrowing and decreasing occurring after dam construction. The average median bed particle size increased from 1.07 mm in 1983 to 5.72 mm in 2003, and the bed slope of the reach decreased from 0.000943 in 1983 to 0.000847 in 2003. The riverbed degradation is approximately 2.6 m at a distance of 15 km below the re-regulation dam. The measured channel width and bed slope are quite close to the predicted equilibrium values of the Julien and Wargadalam (1995) hydraulic geometry equations.

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