Hydro-morphodynamic Simulation for Physical Habitat Simulation

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Physical habitat simulation consists of hydraulic simulation and habitat simulation with such habitat variables as velocity, flow depth, and substrate. The hydraulic simulation provides flow depth and velocity for a given discharge. Using the results from the hydraulic simulation, the habitat simulation estimates the quality of the physical habitat for the target species over a study reach. The information on the substrate normally comes from field monitoring. If the hydraulic simulation is replaced with the hydro-morphological simulation, it can provide changes in channel morphology and substrate as well as velocity and flow depth. This study investigates the impact of the use of the hydro-morphological simulation in the physical habitat simulation.

The study area is a 12.8 km long reach located downstream of the Yongdam Dam in the Geum-gang River, Korea. It is a gravel-bed river, being comprised of a series of bends. For the physical habitat simulation, the HEC-RAS 1D model and habitat suitability curves were used for hydro-morphodynamic simulation and habitat simulation, respectively. Zacco koreanus, the most dominant and endemic fish species, was selected as the target fish species. The hydro-morphodynamic simulation successfully provided both bed elevation change and the change in substrate after the flood. Compared to the bed elevation change, the change in the substrate appeared to be more important to the physical habitat simulation. However, to reflect this change in the physical habitat simulation, the habitat suitability curve should be sensitive enough.