

Simulation and control of morphological changes due to dam removal in the Sandy River, Oregon, USA

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Abstract A one-dimensional channel evolution simulation model (CCHE1D) is applied to assess morphological changes in a reach of the Sandy River, Oregon, USA, due to the Marmot Dam removal in 2007. Sediment transport model parameters (e.g. sediment transport capacity, bed roughness coefficient) were calibrated using observed bed changes after the dam removal. The validated model is then applied to assess long-term morphological changes in response to a 10-year hydrograph selected from historical storm water records. The long-term assessment of sedimentation gives a reasonable prediction of morphological changes, expanding erosion in reservoir and growing deposition immediately downstream of the dam site. This prediction result can be used for managing and planning river sedimentation after dam removal. A simulation-based optimization model is also applied to determine the optimal sediment release rates during dam-removal that will minimize the morphological changes in the downstream reaches.

Key words sediment transport; dam removal; numerical modelling; sediment control; optimization