



## **Pairing Qualitative Reasoning (QR) simulations and field observations: representing information on riparian vegetation response to changes in hydrology induced by dam removal**

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Dam removal is developing as a restoration practice for regulators and ecologists who wish to restore the natural continuum that supports hydrological, ecological, and morphological processes in river. The immaturity of the science on dam removal results in a deficiency in observed responses of the physical, chemical, and biological features of rivers, making predictions about the outcomes of such large disturbances difficult and uncertain. However, ecologists have theorized about the potential short and long term consequences of dam removal and a handful of studies have documented various pieces of the larger ecosystem response. General conclusions were taken from such existing literature to develop a Qualitative Reasoning model. This model was developed to simulate the potential changes in vegetation upstream and downstream of a theoretical dam removal. Relationships were defined to represent interactions between grasses, shrubs, and trees in aquatic, riparian, and upland settings. Changes to the hydroperiod and sediment erosion/deposition resulting from dam removal were used to initiate dynamic behavior in the system. Two dam removal scenarios were simulated – staged breaching and instantaneous removal of the entire dam – with various sediment storage conditions to predict the changes in vegetation based on changes in hydrologic and sediment transport regime. Model results highlight potential transitions in vegetation communities over time. The author expects to validate the model with two dam removal projects to be executed in Oregon, USA in 2007 and 2008. Plans for model validation are critical to designing the vegetation monitoring scheme, in addition to investigating fundamental science questions seeking the response of vegetation to dam

removal. However, the translation of qualitative variables and values into a measurable and feasible monitoring plan is a complex and novel endeavor. Several decisions must be made prior to data acquisition to ensure that monitoring is effective for both model validation and scientific inquiry. This discussion will briefly describe model development and simulations before focusing on the critical questions to pairing Qualitative Reasoning models to field observations of vegetation responses to dam removal.