Functional Process Zones and Issues of Scale along the Grande Ronde River

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Although it appears from our observations that the River Continuum Concept is not applicable at the scale at which we were working, our trip down the Grande Ronde River has confirmed the primary thesis of Thorp et al.'s *Riverine Ecosystem Synthesis.* Thorp et al. propose a conceptual framework for examining a river that accounts for both scale, and upstream/downstream patterns, without being wed to a continuum, gradient, or other longitudinal patterns for those observations. This is consistent with the data that we have collected during our surveys, as well as my own general observations down the river. However, if we can conceptualize the river in terms of hierarchical patch dynamics (Frissel et al., 1986; Wu and Loucks, 1995) (See Hestir, 2007, this volume), then perhaps the River Continuum Concept should not be completely disregarded.

Thorp et al. advocate the use of the patch dynamics concept, presented by Wu and Loucks, 1995 in understanding issues of ecological patterns in a river system. A concept originally developed for terrestrial ecosystems, they describe systems in terms of hierarchical patch mosaics that account for heterogeneity within the system, especially in terms of spatial and temporal dynamics. That is, what appear to be transient events at a local scale can be viewed as process-based events of stability at a larger scale. Although we were not able to survey the temporal aspects of heterogeneity along the river (our trip was nothing more than single "snap shot" approach to observation), spatial heterogeneity was manifest in every survey site at the local scale of the functional process zone.

Ultimately, survey sites were initially screened following a process-domain based approach advocated by Montgomery, 1999 (Hestir et al., 2007, this volume). Within any given process domain, there were many different hydrogeomorphic patches (Hestir, 2007, this volume) that could be observed controlling the structure and function of the ecological communities observed during surveys. A single survey site was elected in an effort to capture a single hydrogeomorphic patch, and hence a single functional process zone. However, heterogeneity with in a single patch was also observed. For example, a given patch could have both a riffle and a pool, as well as the presence of edge habitat along one of both of the banks. Any one of these habitats is rightly a patch in its own light, with the heterogeneity within being less than the heterogeneity of its surroundings. Additionally, although sampling occurred during a short time period, the temporal aspect was evident in our geomorphic observations such as sediment transport and mainstem-tributary interactions (Hestir et al., 2007, this volume, Lawson flog, this volume).

Using this perspective gained from the field, a hierarchical patch dynamics concept in my opinion is the best approach to use in river ecological studies. Although we did not see any downstream gradients, distinct longitudinal patterns did show up in our data. If we could scale up even more, using this hierarchical approach, then I believe we may indeed see a pattern that is predicted by the River Continuum Concept.

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