



Development of hydrologic landscape regions for classifying hydrologic permanence and hydrological-ecological interactions

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In a 2001 paper, Winter proposed the concept of the hydrologic landscape unit as a fundamental unit composed of an upland and lowland separated by a steeper slope. Winter suggested that this concept could be useful for hydrologic research, data analysis, and comparing hydrologic processes across multiple scales. In 2004, Wolock and colleagues used Winter's conceptual framework to develop a set of hydrologic landscape regions (HLRs) for the US, based on principal components and cluster analyses of GIS-derived climate, bedrock, soils, and land-surface form data. HLRs should be useful for characterizing hydrologic and ecologic interactions, because they incorporate fundamental information that determines regional hydrologic processes. In particular, HLRs should be useful for assessing hydrologic permanence (the distribution of ephemeral, intermittent, and perennial streams in an area) and for understanding the effects of a wetland or headwater stream on downgradient waters. Because of the importance of timing in determining hydrologic permanence, however, it was necessary to modify Wolock's HLRs to account for seasonality. For this presentation, we describe the development of a set of modified HLR maps for the state of Oregon. In addition to incorporating seasonality, other major changes included: use of higher quality GIS data that had higher spatial resolution (and which were not available for the entire US), modification of the moisture surplus term to include estimated snowpack formation and melt, and design of thematic classes based on conceptual thresholds, rather than statistical clustering procedures. In addition to their potential utility in assessing hydrologic permanence and the effects of wetlands and headwater streams on downgradient waters, the HLRs should be useful in predicting regional flow, recharge, stream density, wetland distribution, and other hydrological and ecological characteristics. Future testing of the HLRs is also discussed.