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125 Years of Hydrologic Change in the Puget Sound Basin: The Relative Signatures of Climate and Land Cover



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Pfundler Auditorium, Room 241
3:30 p.m. (refreshments at 3:00 in Pfendler Gallery)

Abstract

The Puget Sound basin has experienced substantial land cover and climate change over the last century. We use a spatially distributed hydrology model (the Distributed Hydrology-Soil-Vegetation Model, DHSVM) to deconvolve the concurrent effects of a changing climate and land cover in the basin, based on land cover maps for 1883 and 2002, and gridded climate data for 1915 – 2002. We find that land cover and temperature change effects on streamflow were partitioned differently at high and low elevations. In the lowlands, land cover has occurred primarily as conversion of forest to urban or partially urban land use, and here the land cover signal dominates climate change. In the uplands, climate change has played a more important role, especially in the medium elevation or so-called transient snow zone, where the winter snow line is most sensitive to temperature change – despite the effects of forest harvest over the same part of the basin. Our model simulations show that current land cover results in higher fall, winter and early spring streamflow but lower summer flow, higher annual maximum flow and higher annual mean streamflow as compared with pre-development conditions, although the predicted change is largely within the range of variability of current observations for the upland basins. Land cover change effects in urban and partially urban basins have resulted in changes in annual flow, annual maximum flow, fall and summer flow. For the upland portion of the basin, shifts in the seasonal distribution of streamflow (higher spring flow and lower summer flow) are clearly related to rising temperatures, but annual streamflow has not changed much.