



## **Northern Watershed Ecosystem Response to Climate Change (North-Watch) - Towards a comparative ecohydrology of northern catchments.**

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In few places will the changes and challenges associated with climatic change be greater than in the circumpolar mid-high latitudes of the northern hemisphere. Slight temperature differences determine whether precipitation falls as rain or snow, and the degree to which winter snow packs accumulate and the rate at which they subsequently melt. This has implications for stream flow regimes, water quality and in-stream hydroecology. The Northern Watershed Ecosystem Response to Climate Change (North-Watch) programme is an international interdisciplinary inter-site comparison project spanning a transect of hydro-climatic zones in Scotland, the USA, Canada and Scandinavia. The overall aim is to better understand the integrated consequences of climate change on the physical, chemical and biological characteristics of water resources across northern regions. Here, we present initial findings from these analyses. The way in which hydroclimatic drivers interact with catchment characteristics are examined to show how the synchronicity, resistance and resilience of input-output responses varies spatially and temporally across sites. The dominant influence is the nature of the snowmelt period and how strongly this influences the hydrological regime. Linked to this is the variable nature of the threshold response of input – streamflow dynamics and how this changes for rainfall and snowmelt events. The ways in which these hydrological controls regulate Carbon fluxes from different catchments are also explored, and the implications for in-stream ecosystem response assessed. As the hydroclimatic drivers influencing the catchments are changing in a warming climate, vegetation and soil are also likely to change. This in turn will affect patterns of partitioning, storage and release of water with associated changes in streamflow dynamics. Budyko Curves are used to examine the current differences between the North-Watch catchments in terms of water and energy limitations, and likely future trajectories given climatic change scenarios. This highlights the sensitivity of certain catchments and underlines the need for integrating ecological concepts into hydrological classification schemes.