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CLIMATE CHANGE AND WATER SOURCES IN ARCTIC STREAMS; EFFECTS ON PHYSIOCHEMICAL VARIABLES AND BIOTIC COMMUNITIES.

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In Arctic regions climatic change is modifying the relative contributions and temporal dynamics of water sources (rainfall, ice-melt, snowmelt, and groundwater) to river flow. These changes will have significant implications for physicochemical habitat and associated biotic communities. Evidence from a number of Arctic and also alpine studies indicates reductions in glacial meltwater runoff are expected to drive an overall increase in local alpha diversity and abundance, but a decrease in regional diversity and rareness as specialist cold water taxa become extinct. Aquatic systems downstream of glaciers may shift from one of a deterministic nature to one with greater stochasticity, both in terms of their physicochemical variables, associated biological communities and functional trait composition. Our understanding of potential ecological tipping points and associated indicator taxa is limited but data from a number of regions have identified threshold changes in community composition of stream taxa at <5.1% glacier cover and <66.6% meltwater contribution. Nutrient uptake experiments in Svalbard streams indicated most rivers exhibited a low demand for NO_3 and PO_4 but demand for NH4 and acetate was more variable and in several rivers comparable with that measured in sub-Arctic regions. These data suggest NH_4 retention and uptake may be facilitated by labile dissolved organic carbon availability in these streams which may increase with climate change. An unexpected impact of glacier volume loss has been the liberation of contaminants, including pesticides and other persistent organic pollutants, from the early industrial revolution and onwards. A recent concern has been regarding uncertainty is how climate change is shifting these contaminants from glacial stores to other ecosystems, with potential detrimental effects.