VARIABILITY OF FISH PRODUCTION: NUTRIENTS AS CHEMICAL DRIVERS ACROSS DIVERSE REGIONS

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Abstract

Nutrient regimes, primarily total phosphorus, are known for the role they play in driving primary production in aquatic systems, having a measurable effect on the productivity of fish communities. These water quality interactions have been investigated in freshwater lakes, but few studies have measured trends across a range of landscapes in lotic systems and reservoirs. A unifying trend between these three systems is the variability of their nutrient sources and loading due to both natural and anthropogenic factors.

An example of natural nutrient variability is found in the headwaters of the Kootenay-Columbia River system in British Columbia where differences in catchment geology plays a role in nutrient behaviour. We used the characterisation of the water quality attributes of the underlying geology in this region to identify how physiochemical relationships in comparable mountain systems will affect nutrient sources and shift productivity of fish communities. Nutrient regimes have also been modified anthropogenically by the development of dams, impacting the longitudinal transport of nutrients. Regulated systems are highly influenced by shifts in the natural flood pulse and nutrient release from reservoir outflows. We will investigate the nutrient regime in regulated and unregulated paired rivers, compared against measured fish biomass, which should provide indicators of expected fish production in these systems.

Investigating aquatic systems across an extensive geographical range, we expect that nutrient concentrations (predominantly total phosphorus) will be a strong predictor of productive capacity of fish habitats. For river management, the ability to identify the specific baseline nutrient regime of regulated and unregulated systems, and what our expectation should be of the aquatic community, will be useful tools for regulation in hydropower.