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The freshwater continuum: function and structure of lotic-lentic and lentic-lotic transition zones

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Context

Freshwater ecosystems are hotspots of biodiversity and provide critical services to society, since humans rely on lakes, streams, and groundwater for much of their freshwater supply. Freshwaters are generally separated into lotic (i.e., flowing water, e.g., streams) and lentic (i.e., still water; e.g., lakes) ecosystems, both of which have been proposed as sentinels of environmental change. Despite the clear connection between the two aquatic ecosystems, as lakes are generally fed by tributary streams and lakes alter the conditions of the stream along its continuum, the study of lakes and streams is rarely combined. Direct study of lentic-lotic linkages, both in terms of the transition zones and the freshwater continuum (i.e., stream-lake-stream interactions) is needed to better understand the freshwater aquatic ecosystem. In fact, water resource management and protection of aquatic ecosystems is mostly based on river basins that include various freshwater bodies, be they streams, rivers, or lakes, and requires thinking about freshwater ecosystems at a more integrated level, including the consideration of physical, chemical and biological properties. To enable integration across disciplines and understanding of the interplay between catchment, lakes, and streams for management, conservation and restoration, this project argues that understanding lotic-lentic transition zones in terms of the physical, chemical and biological dimensions is a first key step, followed by an understanding of how a lake impacts the stream continuum from inlet to outlet

Objectives and Methods

This research will explore energy flow and food webs in alpine freshwater transition zones, starting with those where a tributary stream enters a lake, where there can be reciprocal effects between lentic and lotic freshwaters. Lakes and their streams are seldom studied in tandem, especially in relation to the transition zones between the lentic and lotic ecosystems, and despite their inherent linkage via flowing water. Understanding stream-lake and lake-stream transition zones is a first critical step for holistic aquatic ecosystem management in this era of increasing anthropogenic pressure.

The current lake of study is Lac Derborence (VS). The sampling to date included physical properties such as temperature and flow using hand-held devices, chemical properties such as nutrient concentrations via the collection of water samples, and the stream and littoral benthic metabolism (using metabolic chambers) and organismal communities (via collections). However, many aspects of the stream-lake linkage remain unexplored.

Many research questions present themselves, such as whether nutrient dynamics and uptake vary in the transition zone and between stream and benthic littoral sediments. Also, to extrapolate findings from the transition zones to the lake, and to determine the importance of the zone compared to the remaining littoral areas, lake surveys and habitat characterization could be combined with spot measurements in the transition zone.

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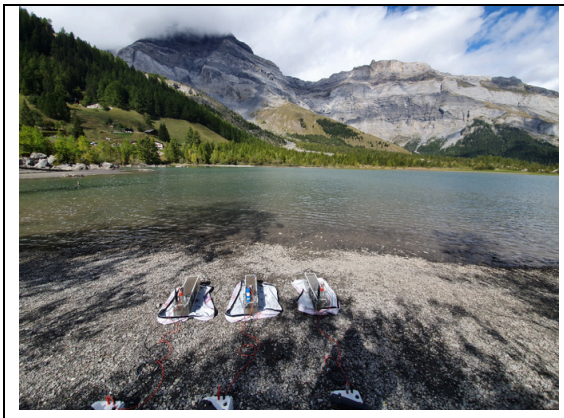

WEBSITES

http://wp.unil.ch/lakes

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