

LOTIC AQUATIC ECOSYSTEMS

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ABSTRACT

Limnology of running waters has progressed very fast over the last three decades. Most momentous has been the deduction of the intensive interactions between stream and riparian vegetation, the importance of the instream microbiocoenosis and the longitudinal connections (e.g. "River Continuum Concept", Vannote et al. 1980; "The riverine productivity model", Thorp & DeLong 1994). The knowledge we have now is mainly based on studies in the temperate zone. Although basic ecological interactions and functions are most probable universal, it seems to be at least misleading to assume tropical streams and rivers as nothing more than warmer versions of their temperate analogues (Dudgeon, 1992). Actually, published studies on tropical running waters are quite numerous (Cushing et al. 1995). Many of them deal with high order streams and produced outstanding results (e.g. "The flood pulse concept", Junk et al. 1989). Low order streams are investigated less intensive and many of these studies deal with applied problems like pollution.

Most obvious and impressive are large rivers with their floodplains, which are still existing in the tropics, at least to a large extend. In spite of their size, they are restricted to the area of their occurrence. Low order streams are much more numerous, in sum much longer and more or less evenly distributed over the entire area inhabitable for men (Leopold et al. 1964). In relation to high order streams, low order streams are not only analogues on a lower scale but entireties with a high diversity and manifold interactions with the human population. It seems to be justified therefore, to concentrate on smaller streams and headwaters.

There is evidence for tropical streams, that the interactions between primary production, allochthonous organic matter imports, retention, hydrology, sediments and the biocoenosis are basically comparable with the findings in temperate running waters. Differences and deviations will be discussed on the basis of available data, regarding especially the organic matter import regimes and their limnological consequences. It is quite evident, that "the typical tropical stream" is not existing, in the same way as there is no typical "temperate stream". There are groupings of streams more similar to each other than to streams of other groups. Management measures should take into account primarily basic functional interactions common to all of them.

In pollution studies, the chemical water quality is measured and related to sewage imports, very much in the same way as it is done in the temperate zone. Beside of the chemical pollution, tropical low order streams are very often mechanically "polluted" by direct river uses, like watering the livestock, doing laundry, playing children or fetching water. The latter may also cause a major water diversion, having in mind the dense human populations along the course of many streams and rivers. A detailed example will be given from an African tropical stream (Njoro River, Kenya). More than a century ago "direct

river use" stopped to occur in the temperate climatic zones, but it has to be considered in the management of tropical streams.

Saprobic systems are widely used for measuring organic pollution but each system is highly regional and has to be based on a great amount of empirical data. There is no possibility to construct a global tropical saprobic system and even the development of a regionally working system is hampered by the lack of detailed empirical studies and taxonomical shortcomings.

Since it became evident, even on the political level, that for the ecological integrity of streams water quality is not enough, morphology of stream channels and the riparian vegetation became a great concern. The very important selfpurification capacity depends highly on channel morphology and its temporal dynamics. To achieve this, streams have to be "revitalized" or "decorrected" in Europe, a very expensive undertaking. The production of still undisturbed or only slightly disturbed river systems is therefore most reasonable and a chance for at least some tropical areas.

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