

Hydrosystem

The term hydrosystem can be loosely defined as a system made up of water and the associated aquatic environments within a delimited geographical entity. This term, which has been in existence for some forty years, has considerably evolved in meaning. These changes can be approached from a thematic angle on the one hand, and from a spatial viewpoint on the other. For its thematic evolution, the term appeared at the start of the 1960s among English-language geo-morphologists. It was the physical geographer Richard John Chorley who is generally acknowledged as the inventor of the concept, on account of his lifetime commitment to developing a systemic approach to geomorphology. However in his pioneer article in 1962 on "geomorphology and the general theory of systems", he did not create the actual term, since he merely referred to a "stream system" in his approach to open systems.

Up to the present day, the term has in fact retained a strong connotation of river dynamics. It is most frequently used in this discipline, rather than in hydrology or biology. This is why the hydrosystem has in some cases been viewed as the only a-biotic part of the aquatic ecosystem, i.e. the *«biotope»* with which organisms living in the water sustain relationships. However, since it has also come into use among biologists, and with the advent of pluri-disciplinary study, the concept has been widened to include the relationships between two complex entities, the aquatic biotope and the aquatic *«biocoenosis»*. Thus the hydrosystem has been seen as more or less equivalent to an aquatic ecosystem. Finally, with the evolution of geographical study, which generated the term in the first place, human action has been introduced, aligning the hydrosystem with the notion of geographical aquatic environment. Concerning the evolution of the term from a spatial viewpoint, the hydrosystem, because it originated in river geomorphology, was first of all a set of longitudinal relationships between upstream and downstream within a "drainage basin". But this portion of space also comprises lateral relationships between the minor and major channels, between the water and the sedimentary and plant formations of the alluvial plain, and also oxbow lakes (cutoffs), wetlands and stagnant waters of the main channels, which are all themes that have been given particular consideration in recent years. A third dimension taken into account concerns vertical relationships between underground and surface waters. Thus the hydrosystem, incorporating longitudinal, lateral and vertical interrelations, is a term that is often used to refer to a drainage basin within which there is a hydrographic network that can be studied in systemic manner for the purpose of producing management recommendations. The atmospheric and climatic components have also, justifiably, been pointed to, in addition to the three above dimensions, so that the hydrosystem then becomes a portion of geographical space, more or less natural, more or less shaped by man (see *«anthropization»*), within which the water cycle occurs, and within which, for epistemological reasons, it is running water that is the first object of study. Outside the context of water courses, the term hydrosystem is very little used as such, even with the qualification "lake" or "lacustrine". It is replaced by the term limnosystem, the epistemology of which has had its own specific career. The notion of the limnosystem, which appeared in the 1980s, was above all used by limnologists to justify the joint study of a lake and its feeder basin, positioning themselves in opposition to Forel's initial conception of limnology, that of the study of the lacustrine microcosmos. Present research shows a tendency to widen the concept downstream, and in particular to the outlet, while at the same time maintaining the lake in its central position within the relationships existing between it and the surrounding space. Thus the limnosystem is viewed as a space in which interrelations occur between a volume of lake water, the biomass, sediment, and the immediate atmospheric layer, and which is linked to exchange media both upstream and downstream.

The hydrosystem, whether lake or river, has no dimension as such, and can range from a pond or puddle to the Amazon in its basin. Each hydrosystem has a size that depends on its components, and its overall balance results from the permanent responses of its components and the re-forming of the relationships that hold them together. The spatial scale of the hydrosystem is thus related to its temporal scale, in particular by way of its inertia and the shifts that occur in the re-establishment that follows a natural or man-made disruption, where the time required and the ability to re-establish a balance form the *«resilience»* of the system. This notion is essential for apprehending damage in the form of water pollution or eutrophication, and the capacity for self-purification that the hydrosystem possesses.

Laurent Touchart

Bibliographie