Drainage Basin

In the wide sense, a drainage basin is a portion of space drained towards an outlet by way of a system of slopes; in the strict sense the drainage basin is the elementary portion of space made up of a topographical feature or features enabling drainage towards an outlet.
The origin of the concept of the drainage basin (bassin versant in French) can be found with P.Buache, Louis XIVth's official geographer, in his notion of the "river basin" (bassin de fleuve). The scholars of the time then took over the concept and used it to divide up the whole planet, tracing watersheds (divides, in American English) that were sometimes defined too theoretically, without verification in the field. However the success was such that the river basin became the essential unit for geographers in the way regional subdivision was apprehended. This excessive influence on human geography eventually led to its abandonment and neglect. The notion returned in the field of river geo-morphology in English-speaking countries, and, following the early work by W.M.Davies, it was the research by R.E.Horton and later R.J.Chorley that diffused what then came to be referred to in scientific literature the "drainage basin" for the British and the "watershed" in US English. The term "watershed" in British English refers to the water parting (as in the French "ligne de partage des eaux"), or the boundary between two drainage basins, known as the "divide" in American English. The two concepts, it is true, are closely linked, since the parting lines delineate the drainage basin and form its boundary. In France the use of the term "bassin versant" (close to the "drainage basin" in meaning) was promoted by the establishment of the Bassins-Versants ReprÃ©sentatifs et ExpÃ©rimentaux (BVRE) from the start of the 1960s. This corresponds, as in other countries, to the first detailed measures on experimental areas enabling calculation of water and transportation budgets, and the modelling of runoff, flow, and specific attrition rates. The need to quantify in the disciplines of hydrology and geomorphology imposed the use of the bassin versant in French, as in English in a non-dimensional sense.

Strictly speaking, the drainage basin is elementary, and therefore relatively small; this is indeed why it lends itself to mathematical Â« modellingÂ». Large surface areas draining towards an outlet are referred to in French as "bassins d'alimentation" (or "feeder basins"). The largest basins in the world, the Amazon (6.2M km2 without the Tocantins), the Congo (3.6M km2), the Mississippi (3.3M km2) are obviously made up of numerous elementary drainage basins, but this is also true of much smaller river basins. The choice of term rests on a typically geographical question of scale, akin to the contrast between the range effect and the slope effect in Â«mountainÂ» area. The term "bassin hydrographique" (hydrographic basin), more widely used in French, could, without reference to dimension, group the notions of "bassin d'alimentation" (feeder basin) and "bassin versant" (drainage basin). However there is no real synonymy. Indeed, an elementary drainage basin may not have a permanent, concentrated, linear flow, while a "hydrographic basin" necessarily has a network of rivers and streams converging towards an outlet. English usage also makes a distinction between "drainage basin" and "catchment basin" (or catchment area). It can therefore be concluded from these various subtleties of usage that a basin is first of all an impluvium, a portion of terrestrial space on which precipitations fall, and which, by way of a system of slopes, and after interception, storage, and throughflow of variable durations, will feed the outlet. Land use clearly plays an important part in the interception of precipitations, and in runoff and throughflow coefficients. Groundwater storage generally forms the major part of temporary storage. According to the geographer J. Whittow, this is what constitutes the difference between the "drainage basin" which considers solely the surface area defined by the divide or watershed, and the "catchment basin" which also takes account of underground flows. For the French hydraulics specialist G.RÃ©mÃ©niÃ©ras, this is exactly the distinction between the "topographical drainage basin" and the "real drainage basin". As research progressed, it was the topographical drainage basin that for a long time focused most attention. This focus corresponds to a period of morphometric research, into both the shape of the area and its variable compactness (the Gravelius coefficient), and into the "stream ordering" of the rivers draining the surface area (the "orders" in Horton, Shumm and Strahler). Subsequently, and up to the present day, the main body of research has focused on integrating, and if possible quantifying, all the interrelations among the different elements in the system, in particular the influence of land use within the basin. Thus the drainage basin has become a notion that is close to that of a Â«hydrosystemÂ».

Bibliographie