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## **Can we read the Landscape and translate it into model structures?**

One of the big challenges of PUB is to translate landscape characteristics that we can observe, into functional elements of a hydrological model. Or in other words (freely after Beven): can we map the landscape into the model space? The landscape is a manifestation of the hydrological system. The topography has been shaped by the water through processes of erosion and deposition, the ecosystem living on the landscape has co-evolved with the hydrological system, and the land use by humans is closely related with the hydrology and the characteristics of the substrate. If there is such a close link between landscape and hydrological system, then there must be ways to derive hydrological indicators from the landscape that characterise hydrological behaviour.

What information can the landscape provide? Topographical information can give us information on elevation, slope, orientation (aspect), and, very importantly: the distance above the nearest open water and the distance to the nearest open water. This information can be used to classify the terrain into landscape elements such as: wetlands, riparian zones, hillslopes, terraces, plateaus and mountain ranges. This is important information that connects to dominant hydrological processes. Land cover maps (from remote sensing) can provide information on dominant ecosystems, dominant land use, density of vegetation and built-up area. This information can be combined with geological maps or soil maps if available. Related products are leaf area maps or NDVI maps. We can also go into the field (in fact we should go into the field) and observe land forms, dominant ecosystems and characterise landscape elements that demonstrate certain hydrological behaviour. For instance, it is safe to assume that wetlands, where the groundwater is close to the surface, will experience saturation excess overland flow, or flow with a variable contributing area. It is also safe to assume that vegetated hillslopes, which don't experience surface erosion, will be dominated by storage excess sub-surface flow, while plateaus are not likely to generate lateral flow but mainly recharge the groundwater system.

The issue is to translate these hypotheses into model structures and to test these hypotheses in real catchments. This paper will present an example of such a trial and will discuss the level of realism that can be achieved by this mapping of landscape into model space.