



Invisible geomorphosites. A case study in the Rhone River valley (Switzerland)

Mélanie Clivaz and Emmanuel Reynard

University of Lausanne, Institute of Geography and Sustainability, Lausanne, Switzerland (melanie.clivaz@unil.ch, emmanuel.reynard@unil.ch)

During the last two decades, numerous inventories of geosites have been carried out at various scales. As all kinds of inventory, they aim at documenting the state of the geological heritage, which is the basis for management strategies (geoconservation, geoeducation, geotourism, etc.). In very humanized regions, where the original geomorphology has been highly modified by human infrastructures, agriculture, urban sprawling, and various modifications of the landforms, it is interesting to inventory not only the landforms visible today but also former landforms that have been destroyed or hidden by human activities.

To address the issue of the inventory of invisible geomorphosites, two approaches have been tested in the Rhone River valley, in Switzerland. For centuries the river was flowing quite freely on the floodplain and alternated – both in time and space – braided and meandering sectors. Tributaries fed by glaciers and snow-melting as well as torrential systems were building alluvial fans at their confluence with the Rhone River, and more or less extensive wetlands were isolated by these alluvial fans and the braided sectors of the main river. Floods were frequent and temporary lakes were formed during the snow-melting season and during intensive rainfall events, especially in autumn. Even sand dunes were visible in several places due to the remobilisation of fine fluvial deposits by wind processes. During the second half of the 19th century, the Rhone River and the majority of its tributaries was channelized, the sand dunes were completely destroyed – partly for filling the depressions –, and most wetlands were drained during the first half of the 20th century and replaced by intensive agricultural crops.

The first study consisted to inventory the geomorphosites of the research area. Not only the visible landforms but also the landforms that had completely disappeared were evaluated using the assessment method of Reynard et al. (2015). A total of 28 geomorphosites were evaluated, including 4 missing sites (two sand dune areas, a braided sector of the Rhone River, and a former marsh). These invisible geomorphosites were assessed, and their “management” was discussed. In particular, proposals for their interpretation within education programs and their usefulness for improving the awareness of former landscapes by the public were discussed.

The second study was a multi-method analysis of former landscapes of the 19th century. Several data (historical maps, place names, written archives, DTM, and iconographic sources) were combined and allowed the reconstruction of ancient landscapes and landforms.

Reference

Reynard E., Perret A., Bussard J., Grangier L., Martin S. (2015). Integrated approach for the inventory and management of geomorphological heritage at the regional scale. *Geoheritage*, doi: 10.1007/s12371-015-0153-0