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A scale-independent model for the analysis of geomorphodiversity index

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The World Urbanization Prospects (ONU) estimates that within 2050 about 70% of the world's population will live in urban areas. The use of GIS and spatial analysis are essential tools for proper land use planning, which takes into account the geomorphological characteristics of the territory, as the starting point for the safeguard of urban ecosystems.

Several geological and environmental approaches have been proposed, albeit they usually lack a new objective, quantitative and scale independent model. At variance with common approaches, recently a new geomorphodiversity index was proposed which aims at an objective classification of joint geological, hydrological, biotic and ... features, in Italy.

In this work, we show results of a study performed in urban areas in Italy, where we apply systematic spatial analysis for the identification of the geomorphodiversity index. The approach proposed a quantitative assessment of topographic features (i.e., slope and landforms classification) is a spatial analysis in GRASS GIS through the use of geomorphon method and additional morphometric quantities. We aim at the definition of a new scale-independent approach, analyzing all of the morphometric quantities calculated at different scales (i.e., within moving windows of different sizes). We shown that scale- and model-independent selection of such features is possible for most of the considered quantities.

We argue that our work is relevant for the objective selection of quantities to define a geomorphodiversity index, and its calculation in areas of arbitrary size and geomorphological properties, provided the same input data is available.