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Contesting the role of regional geomorphology in spatial planning through non-eucledian geometries and fuzzy clustering methodologies.

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Regional Geomorphology is defined as the scientific discipline in charge of explaining the spatial distribution of landforms at both regional and sub-regional scales, and has been traditionally considered by land use and spatial planners, as an essential scientific field when attempting to define both landscape character and dynamics. The use of landforms, and land-units, to delimit and define planning units useful for land and natural resource management is a classic procedure intensively and extensively employed on classic Spatial planning science. Such relationship(geomorphology/planning) has traditionally been approached through the design and application of either physiographic (synthetic) or parametric (analytical) landform-based methodologies. Either by using a synthetic or analytical approach, the definition and delimitation of homogeneous land units is as essential step to define a proper planning strategy and geographically delimit decision-making. Nevertheless, the once high importance that was once attributed to landforms on regional definition and characterization, has recently suffered from a continuous decrease in both scientific and operational (political/administrative) popularity, and is actually reduced almost exclusively to very specific, and exclusively specialized planning procedures (e.g. watershed planning, natural hazard mitigation, landscape impact assessment...). Out of the multiple causes that might explain the aforementioned decrease on the importance of regional geomorphology within Spatial Planning, there should be specially highlighted the recent trend that is refocusing Spatial Planning towards a more complex socio-environmental, and progressively less exclusively land-use-centred, discipline, thus progressively shifting Its main focus towards unravelling the complex dynamics that define humanenvironmental systems. Therefore, and in order to properly address Its new complex objectives, Spatial planning needs to embrace the socio-environmental paradigm and Its associated principles, therefore inevitably assuming the importance of concepts such as the complexity and uncertainty of Land-Systems. This paper discusses the applicability of a conceptual methodology specifically designed to provide Regional Geomorphology with both the epistemic foundations and practical tools, necessary to demonstrate Its ability to act as a complex science, and thus get back to the core of Spatial Planning decision making. For such purpose, a number of quantitative indicators of complexity and uncertainty in landforms and land-units were designed, tested and implemented, using the theoretical basis provided by tools such as fractal and complex geometric analysis, and fuzzy clustering methodologies. The possibility to obtain fuzzy metrics and limits of landforms and land-units, and to quantify the spatial uncertainty associated with their delimitation and definition, intends to contribute, both epistemologically and from an applied perspective, to generate more flexible and less erratic methodologies for Spatial Planning, adding reliability and accuracy to land-system-based decision making.