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Changes in landscape diversity induced by climate over a Mediterranean region

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Climate is certainly a controlling factor for the spatial organization of vegetation and the distribution of ecosystems at the global scale (Scheiner and Rey-Benayas, 1994). At this and several other scales, plant types, species richness, distribution and structure of vegetation are closely related to resources availability (including water, nutrients, etc.), soil type and surface morphology. The study of the existing links between vegetation organization and climatic parameters can be extremely useful for determining the effects induced by future climate changes on our landscape.
In this context, the Basilicata Region (in Southern Italy) is an ideal test area to analyze the relationship between climate and vegetation, since it is in the core of the Biodiversity Hotspot area of the Mediterranean basin and its territory includes a significant variety of climatic conditions ranging from humid to semi-arid and arid. This variability affects the spatial characteristics of land cover (composition and configuration of different patches) that have been studied using landscape ecology indices. In particular, some landscape metrics (e.g. Shannon's Diversity index, Simpson's Diversity index, Mean Patch Area, Shannon's Evenness index, Simpson's Evenness index, Interspersion and Juxtaposition index) are strongly influenced by the climatic conditions described through climatic indices as well as vegetation water stress defined using numerical simulation of soil-vegetation interactions. It was observed that landscape diversity tends to increase non linearly with climate changing from dry to humid, with a sharp increase observed when moving from arid to semiarid conditions. This behaviour seems to be similar to the relationship observed in literature between the number of plant species and climate (e.g. Shmida and Burgess, 1982). These findings can be a useful basis for the characterization of landscape diversity in the context of identification and delimitation of protected area as well as for their planning and management.