

INTEGRATING HUMAN-ECOLOGICAL DIMENSIONS INTO URBAN GREEN INFRASTRUCTURE PLANNING

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Rapid and profound shifts in urban ecosystem patterns and configurations can threaten cities' livelihood and originate multiple challenges that demand urgent response and action. Urban landscape transformations have also contributed to the emergence of unprecedented plant species assemblages (mixtures of native and non-native species) resulting from complex and prevailing interactions between human and ecological dimensions in urban environments. There is a growing interest in studying novel ecosystems, their origin, dynamics, and societal roles, particularly in urban contexts. This way, we argue that the assessment of urban ecological novelty and the integration of this concept into urban green infrastructure planning and management is pertinent and necessary. This research aims to present a new working methodology to assess and map ecological novelty in urban areas and to reflect on the role that urban green spaces with distinct degrees of urban ecological novelty can play in the urban green infrastructure regarding current challenges that urgently need to be addressed (e.g., urban green infrastructure connectivity, climate change adaptation, and mitigation, biodiversity conservation, social cohesion).

In this methodology, the human dimension is explicitly considered a fundamental component in the measurement of novelty, alongside the biotic dimension of the concept. Thus, we evoke an innovative, holistic, and integrative vision of the urban environment by exploring both human and ecological spheres. The new methodology was tested in the city of Porto, Portugal, considering study sites from three types of urban green spaces: urban woodlands, parks and gardens, and vacant lands. The application of the methodology allowed positioning the green spaces in a continuum of urban ecological novelty.

In general, vacant lands showed higher urban ecological novelty, parks and gardens occupied more intermediate positions in the continuum, and urban woodlands showed lower urban ecological novelty. Nevertheless, it was also possible to verify that the degree of novelty does not always depend on the type of urban green space under evaluation. The presence of urban green spaces with different degrees of ecological novelty contributes to the diversity, multifunctionality, and resilience of the urban green infrastructure. In addition, the degree of urban ecological novelty may entail different planning and management goals that will determine the urban green infrastructure's social-ecological resilience and how prepared it will be to respond to adverse environmental impacts. Novel combinations of species are already thriving under the cities' harsh conditions, suggesting that they may be better prepared to face change in its various forms. Ultimately, the assessment of urban ecological novelty will be useful to inform decision-makers and assist the integration of uncertain and intricate environmental challenges into the planning and management agendas.