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Conference Abstract

Plant invasion syndromes: how to identify recurrent invasion patterns to improve the management of biological invasions

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Abstract

Over the last decades, invasion science has attempted to identify general patterns to explain which alien plant species become invasive, where, and why. However, many of these generalisations have proven inconsistent across spatial and taxonomic scales, leading to the widespread perception that invasions are largely context-dependent and there are no useful generalizations.

We argue that trying to generalise across all invasions is unlikely to be productive, but that there are recurrent invasion patterns, conceptualised as invasion syndromes, i.e. “a combination of pathways, alien species traits, and characteristics of the ecosystem which collectively result in predictable dynamics and impacts, and that can be managed effectively using specific policy and management actions”. This idea is being tested in the Biodiversa+ project InvaSyn and extended through the Spanish national project PRISMA focusing on mountain ecosystems worldwide. Together, these initiatives aim to identify generalisable and useful patterns of plant invasions.

Our approach is structured around three main steps. First, we compile and generate datasets capturing both ecological and human dimensions of invasions. Second, using integrative analyses, we classify invasion events into groups sharing similar ecological and socioeconomic characteristics, species attributes, invasion dynamics, and impacts. This syndrome-based approach allows us to reconcile context dependency with generality by identifying recurrent types of invasions rather than seeking universal patterns across all cases. Third, we identify actionable recommendations by co-developing response options tailored to each invasion syndrome.

The invasion syndromes approach allows us to improve prediction, prioritisation and management of alien plant invasions, while fostering collaboration between researchers, practitioners and policymakers. Ultimately, this research contributes to a more holistic and actionable understanding of biological invasions, providing a basis for more efficient and context-aware management strategies.

Keywords

Biological invasions, human dimensions, invasion science, invasion syndromes, invasive alien plant, invasive species management, macroecology

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Conflicts of interest

The authors have declared that no competing interests exist.
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