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Conference Abstract

Assessing invasion impacts through ecosystem condition: an evidence synthesis of European forest ecosystems

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Abstract

Invasive alien species are widely recognised as a major driver of biodiversity loss and ecosystem change. Their ecological impacts are expressed as measurable changes in ecosystem properties across levels of organisation, from genes to ecosystems, and vary in both direction and magnitude depending on social-ecological context. While this context-dependency is essential for understanding impacts within specific systems, it limits the extent to which findings can be synthesised, generalised and used in broader decision-making frameworks. As a result, large-scale ecosystem assessments have largely focused on quantifying and mapping invasion pressure, while a critical gap remains in capturing how this pressure translates into interpretable patterns of change in ecosystem state (i.e., quantifying the impact).

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Ecosystem condition provides a relevant framework to address this gap by characterising ecosystem integrity through the state of its biotic and abiotic components and their interactions, and can be assessed across dimensions of composition, structure, functioning, and supporting abiotic and landscape characteristics. Framing invasion impacts as patterns of change in ecosystem condition therefore enables the identification of comparable effects across ecological contexts.

We present an evidence synthesis, combining a systematic review and meta-analysis, of empirical studies on the effects of invasion by alien species on forest ecosystem condition across Europe. Extracted metrics were classified into the six condition classes of the SEEA EEA Ecosystem Condition Typology (physical abiotic, chemical abiotic, composition, structure, functioning, and landscape) and analysed across invasive species groups, forest types, and biogeographic regions. We identify condition metrics that show consistent patterns of ecosystem response to invasion across contexts and evaluate their potential as impact indicators for large-scale assessments.

We argue that this approach advances the integration of invasion impacts into large-scale ecosystem assessments and provides a basis for incorporating them into ecosystem service and natural capital accounting frameworks.

Keywords

biological invasions, impacts, ecosystem condition, forests, woodlands, Europe.

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Conflicts of interest

The authors have declared that no competing interests exist.