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Editorial

Impacts of Nonnative Species on the Health of Natural and Planted Forests

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Abstract: Despite conservation efforts, most forest ecosystems worldwide are affected by biotic invasions; however, the specific impacts vary across different geographic regions and forest types. The relative contributions of the main drivers such as propagule pressure (e.g., due to human population, travel, and trade), climate, land use, and habitat invasibility remain uncertain. The special issue "Impacts of Nonnative Species on the Health of Natural and Planted Forests" was organized to facilitate timely communications among scientists and managers in different regions and to assist in attempts to improve forest health and maintain long-term sustainability. The special issue addresses broad issues related to forest invasions, including the impacts of nonnative species in various forest ecosystems (e.g., natural vs. urban) and the contributions of land use (e.g., fragmentation), human activity, and climate change to invasion. The new findings include identifying hotspots of potential invasion impacts and their causes, which can help inform policy makers as they develop effective strategies for prevention, early detection or eradication, and forest management.

Keywords: cross-trophic invasions; natural vs. planted forests; invasion hotspots; invasion control and management; pest

1. Introduction

The special issue includes eight original contributions that cover diverse subjects on invasive species in both natural and urban forests. Three studies dealt with the complexity of cross-trophic plant–pest relationships (two in the US and one in Europe), and three examined the invasions of nonnative plants (two in the US and one in China). One study adopted a modeling approach, and one study investigated an urban plant invasion in Europe.

2. Contributions in Brief

To overcome issues related to uncertainty and stationarity, Cook et al. [1] used iterative distribution models to direct early detection of invasive European gypsy moth (*Lymantria dispar dispar* L.) in the United States. They concluded that incorporating human-assisted pathway predictors can greatly improve early detection of invasive species. Sardaro et al. [2] conducted the first damage assessment of the effects of red palm weevil (*Rhynchophorus ferrugineus* Olivier) on Canary palm (*Phoenix canariensis* Chabaud), one of the most distinctive landscape elements in the City of Bari, Italy. The study offers important information for decision making and proper preservation measures for important urban green resources in urban settings.

Fiala and Holuša [3] investigated the distribution of the small cypress bark beetle (*Phloeosinus aubei* Perris) on common juniper trees (*Juniperus communis* L.) in the Czech Republic. They found that the

beetle, which is considered an invasive pest in much of central Europe, mainly attacks older, damaged trees with stem diameters > 3 cm, and predicted that the beetle population density could increase on weakened and damaged trees even in protected areas and gardens. Using data from more than 132,000 Forest Inventory and Analysis (FIA) plots across the conterminous 48 US states, Potter et al. [4] summarized 339 of the most serious insect and disease threats for 419 native tree species and assigned a severity rating for each of 1378 combinations of tree host and insect or disease agent. They found greater impacts of current exotic pests in the eastern United States than in the West, and noted that such impacts could be greatly magnified across the East if these agents are able to reach the entirety of their hosts' ranges. Guo et al. [5] examined similar data and found significant effects of forest fragmentation and type of forest edge on nonnative pest invasions across the conterminous 48 United States, either in combination (all pests) or by separate guilds or species groups (i.e., generalists vs. specialists, insects vs. pathogens).

Using data from 82,506 FIA plots, Riitters et al. [6] compared the current exposure of protected vs. unprotected forests to nonnative plant invasions in the eastern US. They concluded that any protection is better than none, and public ownership alone is as effective as some types of formal protection. In another study on plant invasions, Feng et al. [7] examined the dynamics of invasion by smooth cordgrass (*Spartina alterniflora* Loisel.) and subsequent replacement by Sonneratia mangrove (*Sonneratia apetala* Buch.-Ham.) on soil organic carbon. They found that both *S. alterniflora* and *S. apetala* enhanced soil carbon pools but had significantly lower soil carbon content than mature native mangroves, and recommended ecological replacement with native mangrove species as a way to increase long-term carbon storage in *Spartina*-invaded ecosystems in China. Yang et al. [8] investigated the effects of prescribed fire, site factors, and seed sources on the spread of invasive Chinese tallow (*Triadica sebifera* (L.) Small) in a fire-managed coastal landscape in the southeastern US. They reported that tallow invasion risk decreased with the distance to seed trees and shrub coverage, and with the time since the last fire if seed trees were remote (>300 m), but increased with time since the last fire if seed trees were close.

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