

After the Invasion: Invasive Exotic Plants Present Critical Ecological Restoration Issues

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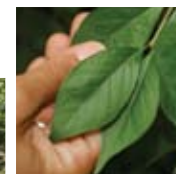
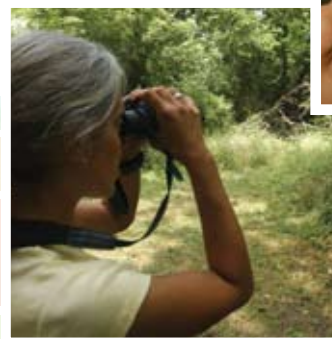
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Exotic plants can profoundly alter ecosystem structure and function and are serious threats to native biodiversity. Most ecosystems will be influenced to some degree by exotic plants as the frequency and severity of invasions continue to rise with increasing fragmentation and changing land uses. Consequently, eradication and control of exotic plants are common elements in most ecological restoration efforts. Effective restoration of invaded sites is seriously compromised by our poor understanding of the ecological mechanisms responsible for the impacts of exotic plant invasions.

The focus of this research was Amur honeysuckle (*Lonicera macckii*), one of the most problematic invasive plants in forests of the eastern United States. Studies have confirmed that honeysuckle negatively impacts native plants, including spring wildflowers, understory shrubs, and tree saplings. Honeysuckle may modify carbon and nitrogen cycling in woodland litter and soil, thus contributing to its own survival.

More recent work shows that animal communities may be negatively impacted by honeysuckle, both through habitat modification and alteration of predator-prey interactions. For example, birds nesting in honeysuckle experience higher rates of nest predation than birds nesting in native plants. Even less understood are the impacts of honeysuckle on recreation and public safety, which includes higher incidences of bicycle accidents along bike paths lined by dense honeysuckle. For these reasons, control of honeysuckle is a critical forest management and ecological restoration issue.

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This project sought to understand the mechanisms by which Amur honeysuckle successfully invades an ecosystem and modifies plant community structure; identify how honeysuckle impacts carbon and nitrogen cycling; determine the impacts of honeysuckle on avian populations and interactions between birds and nest predators; and develop tools to promote sound decision-making by understanding individual judgments about ecological restoration options.

Working in eight study grids in riparian forests along the Olentangy River in Columbus, Ohio, scientists combined observational and experimental approaches to understanding the impact of honeysuckle. Honeysuckle vegetation was completely removed on four experimental grids, whereas on four paired controls, vegetation was not manipulated. Seedlings were planted underneath, at the edge of, and away from honeysuckle canopies. Initial results confirmed that the presence of honeysuckle negatively affects survivorship of herbaceous understory species. Preliminary data also suggested that honeysuckle has the potential to impact carbon and nitrogen cycling, with leaves of the honeysuckle accounting for 16 to 19 percent of the leaf litter biomass and 13 to 15 percent of the total litter biomass. Post-treatment data collection on plant survival and carbon and nitrogen cycling is currently underway.

Surveys of the avian community indicated that the presence of honeysuckle facilitated greater densities of certain resident and short-distance migratory species, such as the Northern Cardinal (*Cardinalis cardinalis*) and American Robin (*Turdus migratorius*). Scientists also found that predation rates were greatest for nests in honeysuckle, especially early in the season when only 14 percent of nests survived in honeysuckle compared to 24 percent of nests in other substrates.

Research on individual judgments about ecological restoration options suggests that the success of initial restoration efforts has the potential to affect subsequent decision-making of stakeholders. After failed restoration efforts, subjects reported feeling helpless and took fewer risks as they related to future decisions. As part of this research, multi-stakeholder workshops related to climate change and invasion biology were held. Decision aids developed for these workshops have proved useful in helping stakeholders to clarify issue-specific concerns, design restoration plans, and address complex trade-offs. As scientists move forward with this research, continued progress is expected to improve the linkages among the ecological and social research components.

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