



BLUE PAPER

Ecological Restoration

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An ecosystem is a community of organisms that form thousands of interactions and operate as an **ecological unit**. Our ecosystems in Northeast Indiana formed thousands of years ago, developing complex relationships that support the whole system. As a result, these relationships bring benefits to humans including clean water, clean air, food, medicine, materials, and recreational opportunities. *Living plants* clean the air and filter groundwater; *bacteria* decompose waste; *bees* pollinate flowers and crops; and *tree roots* hold soil in place to prevent erosion. These processes and many others work together to provide us with a clean, sustainable, functional, and resilient habitat.

Why are ecosystems threatened?

Ecosystems function best when they have limited outside disruption. Nearly two-thirds of all ecosystems worldwide have been degraded by human activities. These degraded ecosystems are less likely to provide the benefits we require to live. Since 1780, 85% of our wetland ecosystems have been lost, more than 90% of our prairie and savanna ecosystems are gone, and 80% of our forests have been cleared.

In addition to the loss of natural areas, the quality of these natural spaces is declining. To perform all the functions above, many different species of plants and animals are needed. Native species, naturally occurring in a specific region, are the species required for optimal ecosystem function. As of 2020, 44 of Indiana's native plant species are no longer found in the state. An additional 246 plants are endangered (at risk of extirpation from Indiana) and 192 are threatened (on the brink of becoming endangered) at the state level. Species loss is driven by decreasing habitat and the takeover of invasive species.

Invasive species are non-native species that become established in natural plant communities and wild areas. They grow quickly and replace native vegetation, sometimes removing native species entirely. Invasive species degrade our ecosystems by reducing biodiversity, limiting habitat, reducing ecological interactions, and diminishing beneficial ecosystem services.

How do we improve ecosystems?

Ecological restoration is the process of assisting the recovery of an ecosystem that has been degraded, damaged, or destroyed by restoring the ecosystem that would be found naturally (without outside disruption). Ecological restoration applies science-based research to in-field practices. Many Land Trusts use restoration processes like invasive species removal, native tree planting, prairie seed collection and seeding, prescribed fire, tree thinning, herbaceous planting, ecological monitoring, and plant inventories. A combination of these techniques may be used together to restore biodiversity, improve ecosystem services, and protect water quality.

Restored prairie at Clear Lake Nature Preserve



What type of ecosystem restoration happens at Clear Lake?

The Clear Lake Nature Preserve has undergone multiple years of restoration within the prairie and Brennan Woods. Restoration efforts at the prairie have included field preparation mowing, invasive plant species removal, and seeding a diverse mix of native prairie plants. Continued work is essential to control new growth of invasive species and support the native plant species to establish dominance. Additionally, prescribed fire is used to boost the decay of dead plant material, allow light to reach the soil-level seed bank, and reduce woody plant invasion. While much work has been done to restore the ecosystem, the strength and persistence of today's invasive species require annual monitoring and maintenance to protect the naturally occurring plants.



Native plantings for improved groundcover at Waterfield Preserve

The Waterfield Preserve is a mixed hardwood forest ecosystem dominated by tall mature hardwood trees, a medium shrub layer and an herbaceous groundcover. These three layers function differently to improve the diversity of the ecosystem. Restoration work on this property focuses on all three layers: removing invasive Norway maples from the hardwood layer, removing autumn olive from the shrub layer, and removing garlic mustard and Canada thistle from the groundcover layer. This restoration work will improve all three layers, resulting in a healthier, better functioning mixed hardwood forest ecosystem. As a bonus, the project improves recreational aesthetics by bringing more wildflowers and grasses to the groundcover layer.

How can we be part of restoring Clear Lake's ecosystems?

Ecological restoration benefits both nature and the community. Healthy ecosystems improve air and water quality, support wildlife, protect soil health, provide educational opportunities, and create beautiful natural spaces for people to enjoy. We are all connected to the Clear Lake ecosystem and play a role in shaping its future. By preserving and restoring these natural areas, we help ensure that future generations can continue to benefit from a healthy and thriving environment.

Resources:

[National Wildlife Foundation](#)

[Restoration Ecology The New Frontier, Edited By Jelte Van Andel & James Aronson](#)

[Lindsay et al. 1965, Indiana Geological Survey 2001](#)

[Indiana University Midwest Center for Biodiversity](#)

[Invasive Plants of the Upper Midwest, Elizabeth J. Czarapata](#)