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Forest Restoration: Looking back on four long-term projects

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While forest restoration has a long history and often enjoys wide public support, it also faces challenges that other types of restoration such as wetland restoration, prairie restoration or aquatic habitat restoration do not. Forests are often dominated by long-lived species that take a long time to reach maturity. While other types of restoration can usually be carried out by seeding, this technique rarely works for forest restoration because of competition with weeds, predation of shoots by herbivores, and rodent damage to seeds. In addition, forests usually have several layers of canopy, each of which requires a different set of conditions under which it prefers to be established.

The authors of these four papers chronicle the long-term restoration of very different forest communities in Wisconsin (Northern United States), Florida (Southern United States), Southwest Australia, and the North and South islands of New Zealand. They have all dealt with the questions of how to restore the forest to its pre-disturbance state after a variety of disturbances, including clearcutting, strip mining and artificial flooding. Each found that the restorations they studied were successful to some degree and imparted lessons that future restorationists will be able to use.

Berger compared two very different approaches to reforestation used in New Zealand. The method used on the North Island used 46 different native tree and shrub species, planted at intervals of several years, in order to mimic the natural successional pattern found in nature. The South Island site's method simply relied on a single "nurse" tree species that encouraged the growth of other native woody plant species under its canopy.

The results in both cases were impressive. Berger found that there was higher species diversity and more native species on the planted site on the North Island than there was in a nearby control plot. She also found that the site on the South Island that had been planted with only one species of nurse shrub had a species diversity almost identical to that of a nearby control plot after 46 years.

Seiser also looked at restoration methods "down under". Seiser studied restoration in the jarrah forest of Southwest Australia, a forest which, according to Seiser, rivals that of the forests of the Northwestern United States in size and age. The jarrah forest area of Australia has been and continues to be mined extensively for bauxite ore by the Alcoa Corporation. Seiser investigates the methods used to restore native plant communities by Alcoa to return the areas to forest after significant disturbance by strip mining.

Seiser follows the recolonization of the mined areas by ants and by birds in order to better understand the success of restoration efforts there. He describes the methods used to ensure successful seed germination, such as "smoke treatments" and the decompaction of the soil where heavy machinery has seriously compacted the soil, and offers comments on the success and usefulness of each of these methods.

The Pine Barrens of Northwestern Wisconsin are remnants of a unique ecosystem, of which less than 1% now remains. Most of the area which had previously been Pine Barrens is now densely planted in rows of pulp-producing tree species. Maki studied the methods being used to return the Pine Barrens of

Northwestern Wisconsin to its pre-plantation state, and looked at the effects of controlled burns and clearcutting.

She found that, though controlled burns were necessary to allow Jack pine (*Pinus banksiana*) to regenerate, burning more often than every 5 to 10 years would cause the area to be less than ideal habitat for certain species. She also found that clearcutting tended to produce some of the effects of a canopy fire, but would not necessarily provide the habitat benefits that fire would. Her paper showcases several methods used commonly in forest restoration and gives a good overview of North American forest restoration practices.

Vaughn focuses on two species in her look at the restoration of areas with sandy soils in Northern Florida. The species focused on were wiregrass (*Aristida latifolia*) and longleaf pine (*Pinus palustris*), two species native to the area. She found that while the project was hindered by a lack of funds, the restoration of longleaf pine was very successful- almost too successful for the land manager conducting the restoration. Density of pines in the restored stands was found to be over 10 times the density of pines in nearby old-growth areas. Overly dense initial planting, the vigor of the pines and the abundant supply of propagules in the area were given as reasons for the very high densities.

The restoration of wiregrass was a more difficult matter. Wiregrass was found to be difficult to establish, and particularly so after a thick pine canopy had been established. At the end of the project, the land manager on site concluded that if he were to try the restoration again, he would focus on the restoration of wiregrass almost exclusively for the first year or two. After wiregrass was established, he would allow the pines to naturally recolonize the area.

One conclusion that could be drawn from these papers is that careful evaluation of the site and potential species should be done before beginning a project, and care should be taken to not over-manage a species that will gladly restore itself without much help. Many of the projects showed that overly zealous management of certain aspects of the restoration did not necessarily bring better results. Good examples of this abounded. Fire was occasionally overused in the Pine Barrens. Planting 46 species did not seem to be necessary to restore a native community in New Zealand. Longleaf pine was able to recolonize without much help in Florida. Aspects of all of these projects had been overmanaged, and probably would be done differently in the future.

Rather than seeing this as an excuse to not do forest restoration however, this should be a call to allocate resources more wisely. Channeling more money and time into evaluation of the site before restoration begins, and focusing more attention on the restoration of understory species are two ways in which these restorations could have been better focused.

Another conclusion that can be drawn is that forest restoration is effective. None of the restorations studied could be considered failures, and some were very successful. Because of the sites' climatological characteristics, each site probably would have eventually reverted to forest anyway, but likely would have largely consisted of non-native or "weedy" species.

These papers have a great deal to say about forest restoration and the lessons that can be learned by studying the successes and failures of past restoration efforts. While forest restoration is a much longer-term prospect and requires a longer period of active management than prairie, wetland or aquatic restoration, it seems to be a successful and rewarding endeavor when it is attempted. Hopefully these papers will serve as a helpful guide to those attempting to do forest restorations of their own.