

# Ecological Restoration in the United States

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**Abstract** Though various forms of environmental rehabilitation and the imitation of nature in gardening have been practiced in many parts of the world since ancient times, the idea of actually returning a landscape or ecosystem to its “original” or historic condition has emerged only recently and seems to be a peculiarly American idea. The earliest American experiments in ecological restoration were carried out early in this century, and many now consider a project begun at the University of Wisconsin Arboretum in Madison in 1934 to be the first such project carried out systematically and in a scientific setting. Many agencies, environmental organizations and individuals in the U.S. now carry out restoration projects to expand and improve existing natural areas and to create new ones. Restoration is also gaining recognition as a way of learning about nature and developing a closer relationship with it.

**Key words:** Restoration, Ecological Restoration, United States, Arboretum, Performing Art.

## I. America’s Seitaien—The University of Wisconsin–Madison Arboretum and the origins and development of the craft of ecological restoration

There is a long history, both in the West and in the East, of attempts by humans to rehabilitate ecologically degraded landscapes, by tree-planting, for example, or the improvement or even replacement of degraded soils. The purpose of such efforts, however, has usually been the rehabilitation of the landscape for human purposes—to restore its beauty, for example, or to bring back a particular species or a function of special interest to humans—game animals, for example, or trees for fuel or building material.

This is different from attempts actually to restore entire ecosystems or ecological communities, modeled on those that existed at some time in the past. Attempts to do this are quite recent. In the United States a few early attempts were made around the beginning of the 20th Century. The well-known landscape architect Frederick Law Olmsted, for example, included a re-created tidal marsh in a project he carried out in Boston during the 1890s (Egan, 1990; Zaitzevsky, 1982). Also, during the early years of the

century, there was great interest in gardening with native plants in the U.S., and a number of landscape designers in the Midwest began creating landscapes that included plantings inspired by the native prairies of the area. Projects like these, though often influenced by other considerations (such as beauty, or an interest in a particular function), and in some ways ecologically crude by today’s standards, really were restoration efforts because they were an attempt actually to re-create a particular natural or historic system (Egan, 1990; Jensen, 1939; Grese, 1992).

These attempts were carried out mostly by landscape designers, however, and were not conceived in the context of the science of ecology, which was then very young. In 1932, however, the University of Wisconsin in Madison began acquiring land on the edge of the city for an arboretum. The committee responsible for planning the project decided to concentrate their efforts not on creation of a collection of plant species, but on a collection of whole ecological communities representing those native to the area. Since some of these no longer existed on the site, they decided to try to re-create them (Jordan, 1988; Sperry, 1989).



**Fig. 1.** CCC (Civilian Conservation Corps) Plant Watering Detail, Summer, 1936. Courtesy Erv. Mimier.

They began with experiments to re-create pine forest and tallgrass prairie in 1934. Since then that work has continued, and the Arboretum staff and UW faculty members have also begun attempts to restore other kinds of ecological communities. Today the Arboretum's collection of restored and partly-restored ecological communities covers about 160 hectares and includes examples of all the major ecosystems native to the area. This is widely regarded as the oldest collection of restored ecosystems in the world, and we believe it is still the largest and most extensive.

As I mentioned above, this was not the first attempt at ecological restoration—attempts to rehabilitate ecosystems have a long history. Several things set this project apart, however. One of these was that it was conceived explicitly as an attempt to re-create whole ecosystems, as defined by the science of ecology. In addition this was carried out systematically and over a long period of time—now nearly 60 years. The project was carried out in a highly self-conscious way. It was aimed at the creation not of just one but of many kinds of ecosystems. And the planners clearly articulated the idea of restoration—to bring back or re-create—specific historic eco-

systems—and then systematically reduced this idea to practice, as an inventor does. This is why the UW-Madison Arboretum project is now widely regarded as the earliest real restoration project—the Kitty Hawk, I sometimes say, of ecological restoration, after the place in North Carolina where the Wright Brothers flew the first successful airplane.

In more recent years, restoration has developed further in the U.S., and attempts to restore the tallgrass prairies of the Midwest have played a leading role in this development. In concluding this part of my talk I will briefly discuss some of these more recent developments and a few of the major issues currently being discussed by restorationists and environmentalists in the United States and Canada.

In particular, I would like to make the following points:

1. The emphasis on restoration—the active re-creation of historic or “natural” ecosystems—as opposed to “rehabilitation” or “revegetation” in a more general sense, is to some extent a distinctively American, or New-World emphasis. One reason for this is probably that dramatic changes in New-World landscapes have occurred so recent-



Fig. 2. Soil research, Curtis Prairie, June, 1980. Riley.

ly that examples of historic landscapes quite different from more recent ones still exist. They are a part of public awareness, and they have provided inspiration for restorationists and served as models and sources of seed, species, etc., for their efforts. Thus this emphasis on restoration in the strictest sense may be distinctively American. But the idea of restoring historic landscapes can be applied anywhere.

2. The issue of restorability, or the authenticity or value of restored ecosystems, is a major concern among restorationists and environmentalists generally in the U.S. and Canada. Many argue that restoration in the fullest sense is impossible, and that even if it were possible to make a perfect copy of a natural ecosystem, complete in species composition, structure, dynamics and functioning, the result would still be of less value than the original—less “authentic,” less beautiful, perhaps, even less “real.” (For a recent overview of this issue see Cowell, 1993.)
3. Restorationists and environmentalists are also deeply concerned about the use of restoration to compensate—or “mitigate” for environmental damage. This is an increasingly common practice for wetlands, and many environmentalists fear that restored wetlands created to replace natural ones destroyed by activities such as construction or mining will not be of comparable quality. They also fear that the promise of restoration may be used to undermine arguments for preservation of surviving natural areas. This is an important

ethical concern for many restorationists (Owen, 1990; Newman, 1988).

4. Despite these concerns, restoration has developed rapidly in the U.S. and Canada in recent years. Thousands of projects have been undertaken in many kinds of ecosystems. No one has any good idea how many, or the areas involved, but projects range from very small gardens to 500 hectares and even more. A project now getting underway in Iowa will involve restoration of several thousand hectares of tallgrass prairie and associated ecological communities (Drobney, 1994).
5. Restoration work is carried out in many ways—by government agencies, by private firms, and by amateurs. Volunteers often play an important role, and there is growing interest in restoration as a volunteer and community activity. I will discuss this in more detail in my second talk.
6. As projects have proliferated, so have restorationists. In 1987 the Society for Ecological Restoration was formed by a group of restorationists in California. Today it has 1,800 members, mostly in English-speaking countries, but some in other countries (four in Japan, including Dr. Nakamura!). Many areas are forming regional chapters. The Society looks forward to expanding in others areas, including Japan. SER holds an annual conference and members can receive two journals, *Restoration & Management Notes* and the peer-reviewed journal, *Restoration Ecology*. For information about membership and publications please contact the Society for Ecological Restoration, 1207 Seminole Highway, Madison, WI 53711; phone/FAX (608) 262-9547.

## II. The importance of ecological restoration

Ecological restoration has developed rather slowly as a craft and as a conservation strategy, in part because ecologists and environmentalists have been uncertain about its value as a way of achieving conservation goals. They have welcomed it as a way of repairing environmental damage, but have been concerned that it might be accepted as an alternative to preservation and used to

undermine arguments for preservation. They have also been skeptical about the quality of restored ecosystems and about prospects for restoration on a scale large enough to be ecologically significant.

What I have to say on this subject is rather personal and is based mostly on my own reflections on restoration and its importance. Remember that I am not a restorationist, but an editor and observer of restoration. I have worked at the UW-Madison Arboretum since 1977, and this has given me a good chance to reflect on the importance and value of restoration. What follows is a summary of my ideas on this subject.

My main point is that restoration has two kinds of value or benefit. It has value for the landscape, obviously. But it also has value for the restorationist. Most discussions and criticism of restoration have concentrated on the first—its value for the landscape—and have ignored the second kind of value—its value to the practitioner, the person carrying it out. For this reason, and also because I think this value is equally important, I will concentrate on it.

Let's take these values up one at a time:

1. Value to the environment

The benefits of restoration to the environment are obvious: when successful it leads to an upgrading or expansion of habitat for native species, and often to an increase in the native biodiversity of an area. There are questions, however, about the quality of restored ecosystems, and about the feasibility of carrying out restoration on an ecologically significant scale—a scale large enough to provide habitat for animals such as bison, wolves or grizzly bears, for example.

These are important issues. In discussing them, however, we should keep in mind that restoration is not merely an alternative to preservation, but ultimately is essential if we are to conserve natural and historic ecosystems in areas influenced by human activities. Wherever we are, we will influence these systems, and so if we want to preserve them, we have to compensate for our influence. That compensation is actually restoration. Thus the future of the natural landscape really *depends* on

restoration, not as an *alternative* to preservation, but as a way of achieving it.

One thing this means is that, however imperfect our restoration efforts may be, they will ultimately determine the quality of our “natural” landscapes. Our best, most “natural” natural landscapes—that is, those most like natural, historic, or classic landscapes such as coastal marshes or tall grass prairies or the laurel forest or bamboo thickets of Japan—will be restored ones.

This is true everywhere, but it may be of especially urgent importance in a place like Japan, where a large human population has existed for many centuries. Hence the great importance of projects like the Seitai-en project at the Natural History Museum and Institute.

2. Value to the restorationist—and to the “audience”

Restoration is not only a process or technology. Like other processes carried out by humans, it is also an experience and an expressive act, and perhaps the best way to think of it is as a performing art or a form of theater. For this reason it is a way of changing those who participate in it from outsiders into actual members of the land community (Jordan, 1986, 1989, 1991, 1992).

I see this as the greatest value of restoration, because it is a way of ending the detachment and alienation from nature that I believe are the real root of most environmental problems.

I am interested, then, in restoration as a model for a healthy relationship between human beings and the rest of nature, and also as a kind of ritual for achieving this relationship. My thinking about this has led to several ideas related to this, which I will summarize here:

(1) Restoration is a powerful technique for basic research—a way of raising questions and testing ideas about the ecosystems being restored. In 1987 I introduced the term “restoration (or “synthetic”) ecology” to refer to restoration carried out for this purpose (Jordan *et al.*, 1987). The idea here is basically that we can change an ecosystem without understanding it very well,

but to change it back—to restore it—we usually have to understand it pretty well, and also have to understand our influence on it. Thus restoration is a way of increasing our understanding of the natural landscape and our relationship with it. This is a step toward our re-entry or re-inhabitation of the natural landscape.

(2) For the same reason restoration is a valuable way of teaching and learning about the natural environment and our relationship with it. Thus participation in local restoration projects is now providing the basis for many programs in schools and also for public education. An example is the Earthkeeping program being developed by SER and the UW-Madison Arboretum to provide opportunities for ordinary citizens to participate in restoration projects at selected sites as a way of learning about and forming a closer relationship with the natural environment. (As this program gets underway it would be interesting to consider the possibility of developing an Earthkeeping project in Japan.) (Jordan, 1990).

(3) Perhaps the broadest, most useful—and certainly most *ecological* way to think about restoration is to think of it as an expressive act—a performing art, and the basis for a ritual or sacrament for negotiating our relationship with the natural landscape. (I say this is most ecological because ecology is about relationships—that is, about one species registering on, or performing to, all the others.) (Jordan, 1990)

For me this has proved a very fruitful way of thinking about restoration. It has led to the idea of:

- a. Restoration as reenactment of the history of the site.
- b. Restoration as an attempt to reverse history, leading to better understanding of history and change and to a clearer idea of what kinds of change are reversible and which are not.
- c. Restoration as a way of re-experiencing the classic experiences of nature—those of the hunter-gatherer, the gardener or farmer, and also the scientist.
- d. Restoration as the basis for a modern version of world-renewal rituals common to many indigenous cultures.
- e. Restoration as a form of pastoral—the artistic exploration of the relationship between nature and culture.
- f. Restoration as the basis for modern rituals of renewal and reentry of nature.
- g. Restoration as a way of creating representations of natural landscapes. (So it would be interesting to explore its relationship with other forms of nature—representation, such as bonsai.)

In my view these benefits to the restorationist will also benefit the environment as well, since people educated and transformed by the experience of restoration will make better citizens of the biotic community. Such citizens will demand the conservation of nature, and they will be willing to pay for it, not only with money, but with their work and talents as well.

In closing I would like to say that we welcome visitors at the Arboretum, and would be delighted to have Japanese visitors who are interested in restoration or in the historic ecosystems of North America. You may visit any time. The Arboretum is open every day from 7 a.m. to 10 p.m. Our visitor center is open 9 a.m. to 4 p.m. weekdays and 12:30–4 p.m. weekends (closed holidays). But we do encourage you to call for special arrangements if you are visiting from far away. To do this call 608-262-2746; FAX 608-262-5209; write: UW Arboretum, 1207 Seminole Highway, Madison, WI 53711.

## References

- Cowell, C. M. 1993. Ecological restoration and environmental ethics. *Environmental Ethics* 15(1): 1932.
- Drobney, Pauline 1994. Walnut Creek National Wildlife Refuge: Restoring the Tallgrass Prairie and Savanna Ecosystem in Iowa. *Restoration & Management Notes* 12: 1.
- Egan, D. 1990. Historic initiatives in ecological restoration. *Restoration & Management Notes* 8(2): 83–90.
- Grese, R. E. 1992. *Jens Jensen: Maker of Natural Parks and Gardens*. Baltimore: Johns Hopkins Press.
- Jensen, J. 1939. *Siftings*. Chicago: R. J. Seymour.

- Jordan, W. R. *et al.* 1987. Restoration ecology: ecological restoration as a technique for basic research, Cambridge University Press, Cambridge.
- Jordan, W. R. 1987. Restoration and Management as Theater, Restoration & Management Notes 5(1), p. 2.
- Jordan, W. R., 1988 IN Biodiversity, E. O. Wilson, Frances M. Peter, editors, pp. 311–316 National Academy Press, Washington, D. C. 1988.
- Jordan, W. R. 1989. Restoring the Restorationist, Restoration & Management Notes 7(2), p. 55.
- Jordan, W. R. 1990. Earthkeeping: A Realization. Restoration & Management Notes 8(2), p. 70.
- Jordan, W. R. 1990. The Reentry of Nature. Chronicles August 1990, pp. 19–22
- Jordan, W. R. 1991. A New Paradigm, Restoration & Management Notes 9(2), pp. 64–65.
- Jordan, W. R. 1992. Standing With Nature, Restoration & Management Notes 10(2), pp. 111–112.
- Newman, V. 1988. Reinventing the swamp. IN Proceedings: National Wetlands Symposium, Mitigation of Impacts and Losses. New Orleans, Louisiana, U.S.A., Oct. 8–10, 1986. Edited by J. A. Kusler, M. L. Quammen, & G. Brooks, pp. 32–33. Berne, New York, Assoc. of State Wetland Managers, Inc.
- Owen, C. 1990. Wetland mitigation: Is it working in Wisconsin? Our Wetlands 13(5): 3, 6–7.
- Sperry, T., 1989. IN Proceedings of the 1st Annual Conference, the Society for Ecological Restoration, Society for Ecological Restoration, Medi-

son, Wisconsin.

Zaitzevsky, C. 1982. Frederick Law Olmsted and the Boston Park System. Boston: Belknap Press of Harvard University Press.

## アメリカ合衆国の生態学的自然復元

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昔から庭園づくりにおける自然の模倣や自然環境の修復など、各地でさまざまな形の自然復元が行われてきた。しかしながら、ある地域の自然及び歴史的観点において、本来の生態系や景相（景観）を復活させるといった思想は、ごく最近アメリカ合衆国でわきあがったものである。アメリカ合衆国で最初に生態学的自然復元の実験が実施されたのは今世紀の始めのことであった。現在その中で科学的に系統づけられた自然復元として認められているものは、マディソンのウイスコンシン大学アーボレータムで1934年から実施されたプロジェクトである。現在アメリカ合衆国では、政府機関やその他の団体、個人によって、自然環境の改善や新たな自然の創出に向けたさまざまな自然復元プロジェクトが実施されている。自然復元は、自然そのものについて学び、また自然と人間とのより親密な関係を作り上げるための一方法としても重要なものになりつつある。