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Neocreationism and the Illusion of Ecological Restoration

by Peter Del Tredici

It's easy to enumerate hot button

issues in contemporary American culture: gun control, abortion, globalization, sprawl, climate change, gay marriage, terrorism, and illegal immigration are just a few. One thing that the debates about these issues have in common is that they are highly polarized, with neither side paying much attention to what the other is saying. Another is that they often have an overarching moralistic tone that pits absolute good against absolute evil. How our society will to actually move forward on these issues remains unsolved.

Within my own narrow field of expertise, plant ecology, the use of exotic versus native species in designed landscapes is an issue that seems to bring out the worst in people, not unlike the debates over gun control or abortion. As a representative of the Arnold Arboretum of Harvard University, I am a member of the Massachusetts Invasive Plant Advisory Group, a voluntary collaboration of nursery professionals, conservationists, land managers, and representatives from various government agencies that reports to the state's Executive Office of Environmental Affairs (EOEA). Over the course of the past two years, the group has produced a list of species that are invasive in "mini-

mally managed" habitats and is in the process of developing a strategic plan for how best to deal with the problem. On the national scale, researchers have determined that invasive species are an ongoing threat to rare and endangered species (thus also to biodiversity) and the cause of economic losses totaling approximately \$137 billion annually.(1) From the perspective of the Federal Government, invasive species need to be controlled both to fulfill the legal requirements of the Endangered Species Act and to save money. Proposals on the table (put forward in President Clinton's 1999 Executive Order on invasive species) recommend, among other things, the creation of rapid response "swat" teams that could go into the field and eradicate potential invasions while they are supposedly still manageable.(2)

Implicit in the proposals that call for the control and/or eradication of invasive species is the assumption that the native vegetation will return to dominance once the invasive is removed, thereby restoring the "balance of nature." That's the theory. The reality is something else. Land managers and others who have to deal with the invasive problem on a daily basis know that often as not the old invasive comes back following eradication (reproducing

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from root sprouts or seeds), or else a new invader moves in to replace the old one. The only thing that seems to turn this dynamic around is cutting down the invasives, treating them with herbicides, and planting native species in the gaps where the invasives once were. After this, the sites require weeding of invasives for an indefinite number of years, at least until the natives are big enough to hold their ground without human assistance.(3)

What's striking about this so-called restoration process is that it looks an awful lot like *gardening*, with its ongoing need for planting and weeding. Call it what you will, but anyone who has ever worked in the garden knows that planting and weeding are endless.(4) So the question becomes: Is "landscape restoration" really just gardening dressed up with jargon to simulate ecology, or is it based on scientific theories with testable hypotheses? To put it another way: Can we put the invasive species genie back in the bottle, or are we looking at a future in which nature itself becomes a cultivated entity?(5)

The answer to this question lies in an understanding of the concept of ecological succession, the term used to describe the change in the composition of plant and animal assemblages over time. In the good old days (prior to World War II), ecologists tended to view succession as an orderly process leading to the establishment of a "climax" or steady-state community that, in the absence of disturbance, was capable of maintaining itself indefinitely. I refer to this as the Disney version of ecology, stable and predictable, with all organisms living in perfect balance. Following World War II, a younger generation of ecologists began challenging this static view, eventually formulating the theory of patch dynamics, which viewed disturbance as an integral part of a variable and unpredictable succession process.(6) The key concept here is that the nature, timing, and intensity of the disturbances are critical factors—along with climate and soil—in determining the composition of successive generations of vegetation. From the contemporary perspective, the apparent stability of current plant associations is an illusion; the only thing we know for sure is that they will be substantially dif-

ferent in fifty years.(7)

If one defines disturbance broadly to include human-caused disturbances such as urban sprawl, acid rain, and global warming, it becomes clear that there is no place on earth that does not experience some form of human disruption.(8) Indeed, the scary thing about huge disturbances like global warming is the uncertainty about how they will play out over the next hundred years. The absurd idea that climate change has not been "proven" grows out of the idea that people have the capacity to understand how the world actually works. When and if scientists get around to predicting precisely the effects of pumping massive amounts of carbon dioxide into the atmosphere, it will be far too late to do anything about it.

To assert that planting native species will restore the balance of nature is just another way of ignoring the problem. Native plants are great, but without ongoing care and maintenance, they will die just like all the other plants we try to cultivate. The concept of implementing ecological restoration in an urban or suburban context is particularly problematic. With all that pavement, road salt, heat build-up, air pollution, and soil compaction, the urban landscape is an inhospitable place for plants. The critical question facing landscape architects in these situations is not what plants grew there in the past but which will grow there in the future. The successful design of urban landscapes calls for a careful analysis of the conditions that prevail on the site, followed by a determination of what species are best able to tolerate these conditions. The issue of where a given plant comes from must be secondary to the issue of its future survival. Again, the sad thing about the debate over native versus exotic species is that it has become so polarized. At its most simplistic level, native is equated with good, exotic with bad. This dichotomy ignores the fact that many plants—such as lilacs, daylilies, and hybrid rhododendrons—are neither native to eastern North America nor invasive. It also ignores the fact that some native species—such as poison ivy and ragweed—can be both highly invasive and highly toxic.

What I find particularly depressing about the "native species only" argument is that it ends up denying the inevitability of ecological change. Its underlying assumption is that the plant and animal communities that existed in North America before the Europeans arrived can and should be preserved. The fact that this pre-Columbian environment no longer exists—and cannot be recreated—does not seem to matter.(9) Many landscape professionals have a strong desire to restore habitats to the way they used to be, even after the original conditions that produced these assemblages of plants and animals have long since disappeared. To deny the inevitability of ecological change or to pass moral judgment on it is to deny the reality of organic evolution.(10)

The facts are that plants from around the world have been brought together in our cities and that some have flourished and reproduced. In many cases, these plants are actually performing significant ecological functions, such as absorbing excess nutrients from polluted waterways. A good example is the common reed, *Phragmites australis*, native to both Europe and North America and occupying brackish wetlands up and down the east coast, most dramatically in the meadowlands bordering the New Jersey Turnpike west of Manhattan. While *Phragmites* is often portrayed as the ultimate invasive species, it is mitigating pollution in such sites by absorbing a great deal of nitrogen and phosphorous.(11) From the functional perspective, the presence of invasive species in the landscape can be interpreted as *symptoms* rather than *causes* of environmental degradation.

Regardless of how one feels about the unique assemblages of plants that grow in our cities, they are the forests, fields, and wetlands of the future, and their diversity and spontaneity mirrors that of the society at large. Indeed, the very same processes that have led to the globalization of the world economy—unfettered trade and travel among nations—have also led to the globalization of our environment. The main difference between the two, however, is that the environment is more complicated and harder to control than the economy.

So what can landscape architects, designers, and contractors do about these impending changes? My advice is simple: don't limit your planting designs to a palette of native species that might once have grown on the site. Imposing such a limitation on diversity not only reduces the aesthetic possibilities for the landscape, but also its overall adaptability. As a graceful way out of the native versus exotic debate, I recommend using sustainability as the standard for deciding what to plant. According to my definition, sustainable landscape plants: can tolerate the conditions that prevail on the site; require minimal applications of pesticides, herbicides, and fertilizers to look good; have greater drought tolerance and winter hardiness than other plants; and do not spread aggressively into surrounding natural areas. From this perspective, *invasiveness* is but one of several criteria that should be used when selecting plants for a given site, and *sustainability* means that the final planting list is based on a realistic evaluation of site conditions rather than on a romantic notion of the past.

Notes

1. David Pimentel, Lori Lach, Rodolfo Zuniga, and Doug Morrison, "Environmental and Economic Costs of Nonindigenous Species in the United States," *BioScience* 50 (1), 2000, 53–65.
2. William J. Clinton, "Invasive Species," Executive Order 13112, February 3, 1999, *Weekly Compilation of Presidential Documents* 35 (5), February 8, 1999, 157–210.
3. In 2003, the Limahuli Garden on the island of Kaua'I in the Hawaiian Islands was spending approximately \$30,000 per acre on removing invasive species and replanting native vegetation. How successful this treatment will be remains to be seen.
4. Peter Del Tredici, "Nature Abhors a Garden," *Pacific Horticulture* 62 (3), 2001, 5–6.
5. Daniel Janzen, "Gardenification of Wildland Nature and the Human Footprint," *Science* 279, 1998, 1312–1313.
6. Michael G. Barbour, "Ecological Fragmentation in the Fifties," in *Uncommon Ground*, ed. William Cronin (New York: W. W. Norton, 1995), 233–255.
7. Jean Fike and William A. Niering. Four Decades of Old Field Vegetation Development and the role of *Celastrus orbiculatus* in the Northeastern United States. *Journal of Vegetation Science* 10, 1999, 483–492.
8. See Bill McKibben, *The End of Nature* (New York: Random House, 1989).
9. Shepard Krech III, *The Ecological Indian: Myth and History* (New York: W.W. Norton, 1999).
10. Steven J. Gould, "An Evolutionary Perspective on Strengths, Fallacies, and Confusions in the Concept of Native Plants," *Arnoldia* 58, 1998, 2–10.
10. Craig S. Campbell and Michael H. Ogden, *Constructed Wetlands in the Sustainable Landscape* (New York: John Wiley and Sons, 1999).

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