

Zentner on Katz (and Zedler, and Hiss)
The Issue of Restorability

I

Restoration, as an attempt to replicate natural landscapes or ecosystems, provokes deeply held feelings about the separation of humanity and nature which have been a part of Western culture for centuries. The environmental movement, from which the field of restoration is at least partly derived, generally postulates a clear separation between humanity's works (although not necessarily humanity) and nature. Restoration challenges this separation, and we will continue to question both the restorationist's ability to replicate natural landscapes and the degree to which purely human objectives should influence restoration efforts until an ethical framework is developed within the restoration movement to resolve this challenge.

Two recent publications, "The ethical significance of human intervention in nature" by Eric Katz (*R&MN* 9:2, pp. 90-96) and *The Experience of Place* by Tony Hiss (Harper & Row, 240 pp.) approach the relationship between nature and humanity and its implications for restoration quite differently. Here I will review both publications in the hope of contributing to the development of an ethical framework for the field of restoration.

II

Eric Katz has written an intriguing and important article which argues that restoration cannot re-create natural landscapes because (in summary):

1. Nature and natural elements are random, disorganized, and the result of relatively slow evolutionary processes. Nature is not goal-driven, and Katz makes a nice point in noting, as an example, that the mountain lion was not *designed* to regulate deer populations.

2. Humanity's works, including restoration, are organized artifacts created to further anthropocentric goals, and they necessarily reflect their non-natural origin.

3. Restoration is, therefore, intervention in the natural landscape through the insertion of goal-driven, organized artifacts into a random, non-goal-driven system. This results in an ethical framework that encourages the domination of nature through its approval of the imposition of anthropocentric elements or systems into natural settings.

Our culture now defines nature and natural elements as separate from humanity and humanity's works (see, for example, Webster's 1991 *New World Dictionary*). Similarly, Katz defines "natural" as "independent of the actions of humanity". The pervasiveness of humanity's influence now would tend to rule out the existence of

anything natural, however. Consequently, Katz also allows Brennan's (1984) definition of nature and natural elements as "objects and processes that exist as far as possible from human manipulation and control".

Brennan's definition necessarily implies a continuum between those elements or processes which are far from human control and those which are not. Katz accepts the continuum between artificial and natural in his article and expands on this concept to create an ethical framework for restoration and other human actions relative to nature. According to Katz, our artifacts are divisible into two categories, those which are "consistent with our evolutionary and biological capabilities" and those which are not. Katz notes, as an example, that both an organic compost pile and a nuclear waste dump are unnatural artifacts, but states that "to claim that both are equally unnatural obscures important distinctions". In other words our works may all be unnatural, but some are more natural than others and, hence, ethically more proper. The compost pile is implicitly consistent with our evolutionary and biological capabilities, while the nuclear waste pile is not.

However, it may be difficult if not impossible to distinguish between humanity's artifacts and natural elements on the basis of evolutionary origin alone. Katz suggests the use of trained evaluators to make this distinction. I am not sure that evaluators could be chosen or trained who could discriminate the natural from the non-natural—or that we would want them if they could be. Consider, for example, the tons of sediment sent into the estuary of San Francisco Bay by hydraulic mining of the Sierra Nevada mountains in the late 1800s. The resulting deposition created as much as 16,000 ha of salt marshes in a very short period; natural forces would have required many centuries to accomplish the same task. These salt marshes, however, are today indistinguishable from adjacent natural marshes. Like the natural marshes, they were created by sediment brought down to the Bay and deposited on the Bay's margins. In fact, as far as we know these newer marshes differ from the nearby natural marshes only in that their *rate* of development was artificially accelerated by human actions.

Such differences trouble Katz who, for example, decries Steve Packard's (1988) use of fire to accelerate the restoration of tallgrass savanna, even though fire is a natural force, and terms this a compromise of the "natural integrity of the system being restored". In both Packard's savannas and the salt marshes created by accelerated deposition of mining spoils, the development of a natural landscape has been artificially accelerated. They are, accordingly, unnatural by Katz's definition. Yet I know of no evaluator who could distinguish the artificial marshes from the nearby natural marshes.

Additionally, Katz is simply wrong in defining nature or

natural landscapes as the result of relatively slow evolutionary processes. The classic picture of succession has been seriously challenged over the past few decades as we observe ecosystems that do not "progress" in the Clementsian fashion, but instead are made up of species that respond individually to environmental cues. These cues are often induced by rapid environmental changes such as increases in predators or herbivores, fires, landslides or other actions that are often the most "natural" forces in our environment.

These examples suggest that the evolutionary origin of a landscape may be less important in defining whether it is natural or artificial than Katz suggests—except to support a view of nature as completely separate from humanity's works. Furthermore, defining nature as a system derived solely from slow evolutionary processes is as confining—and as anthropocentric—as assuming that restored ecosystems are automatically natural. The examples provided above, and many others, suggest that landscapes, whatever their origin, become "natural" over time in the absence of human influence. Entropy, "a measure of the degree of disorder in a substance or a system" (Webster's again), appears to be at least as important as evolution in defining landscapes as it works continuously on all elements in a landscape to reduce free energy. In that regard, entropy also seems to come closest to Katz's definition of a nature which is inherently inconsistent with most of humanity's actions. Thus, the organic compost pile will become natural at some point unless maintained. Even the nuclear waste pile will disassemble over time to become a part of the natural environment unless constantly maintained.

"Restoration offers a unique opportunity to create artifacts which surrender to nature and its forces."

Accordingly, the amount of maintenance required to ensure that a created system retains its designed functions provides the best measure of the difference between the natural and the artificial, and offers a basis for an ethical framework for the field of restoration. The boy with his finger in the dike (or the dike itself) are good analogies for many of the actions of humanity relative to entropy and nature; sooner or later the boy (or the dike) will fail unless continuous maintenance is provided. We should not brand nuclear waste dumps as artificial because they are not in conformance with our evolutionary capabilities, but because the waste dump is inconsistent with natural entropic forces. In the case of the dump, an interruption of the maintenance needed to reverse entropy could have horrible consequences. Restoration, on the other hand, is most successful where its products require the least maintenance after establishment.

Thus, while humanity will consistently engage in unnatural acts, humanity's artifacts will, over time, become natural unless constantly maintained. Further, while many of humanity's actions are necessarily anthropocentric and result in the "domination of natural areas" (Katz, p. 95), restoration offers a unique opportunity to create artifacts which surrender to nature and its forces. The design of a truly self-maintaining and ecologically authentic system requires the restorationist not only to understand nature but to allow natural forces to dominate the restoration work.

III

Whether we define the basis for this ethical framework as entropy or some other natural function, I believe that origin is less important in judging the authenticity of a restored landscape than is its behavior or performance. Our goal is to determine whether this landscape acts as our model system did, recognizing that our model system is part of a larger environment subject to significant forces. Consequently, analyzing the rate and means by which artifacts come to resemble natural systems is of utmost importance to the restorationist. The critical test of the authenticity of a restored landscape is neither its pedigree nor its immediate resemblance to the model landscape but its resemblance to the model system at a comparable stage in its development (see accompanying article by Peter Dunwiddie; also see the article by Charlie Newling in *R&MN*, 8(1) 23-28 for a similar point made in connection with the restoration of bottomland hardwood forests). This is why analyses that examine only the differences between newly created landscapes and mature examples of the same type of landscape are often disappointing. Newly created landscapes will differ from mature ones just as children differ from their parents; the question is, are the newly created systems changing in such a way that we can expect that they will approximate the model system within some time period?

Analyses of the differences between seral and mature landscapes do more to highlight the unresolved conflicts between restoration and its environmentalist origins than to discredit the effectiveness of restoration. A case in point is Joy Zedler and Rene Langis' (1991a) comparison of a newly created salt marsh with mature salt marshes on the basis of an index of factors developed by the authors. John Rieger (1991) has since pointed out several of the problems inherent in this approach. The important point here, however, is that despite some clear differences between natural and artificial marshes in their study (many of them, in my view, attributable to the immaturity of the artificial marshes), the data Zedler and Langis present actually do more to illustrate the difficulty of distinguishing natural from artificial on purely functional grounds than to show that created marshes do not resemble natural marshes. Their data, as reported in full by the Pacific Estuarine Laboratory (1990) actually reveal as much variation among mature natural marshes as between natural and artificial marshes—a result consistent with other studies. Furthermore, both their data and work by

Robin Lewis (personal communication) on the same project show that certain natural elements (some species of birds and fish for example) are sometimes more abundant in artificial than in nearby natural marshes, a conclusion also consistent with other work (see Zentner & Zentner, 1991).

Nature, in other words, does not distinguish the natural from the artificial, even if we do—and it is anthropocentric to argue that our perspective on what is natural should reign. If our goal is the creation of an artificial system capable of becoming natural what matters is not the distinction between what is natural and what is artificial but the process by which one system may come to resemble and behave like another. Rather than concentrating on the differences between seral constructed and mature marshes, we should seek to understand which differences are likely to disappear over time and which require remedial action in order to guide the system in the desired direction. Certainly this appears to be what Packard (among others) is trying to do. And, if our goals include a more specific objective, such as restoration of clapper rail habitat, then concentrating on the ways in which that marsh develops as clapper rail habitat and on those functions which relate to that objective is the more germane exercise—a conclusion implicitly recognized by Zedler and Langlis (1991b) in the conclusion of their response to Rieger's critique.

IV

If restoration projects are capable of becoming natural, how much should other objectives, such as flood control, water quality, or aesthetics, influence the design and implementation of these projects? Much of current restoration practice involves the creation of landscapes, especially wetlands, to mitigate for residential development projects (see Kusler and Kentula, 1989). I recently conducted an informal survey of several restoration consultants and concluded there may be between 2,000 and 3,000 such projects in the coterminous U.S. The typical mitigation project seems to be the construction of a 25-ha wetland with an upland (often wooded) border in the middle of or adjacent to a residential subdivision. How much should the needs and desires of these residents affect the restoration design? Or should restoration designs consider and include only natural (non-human) elements?

In my view, accommodating human interests in ecologically acceptable ways may ultimately be one of the most important factors in the success of these types of restoration projects. If the restored landscape is to become a significant part of the human environment (which may now include most of our world), then restoration goals will need to recognize human needs and to factor our thoughts and feelings into the design and implementation of restoration projects.

For this reason, I recommend *The Experience of Place* by Tony Hiss, a book written for a broad public, which should specifically include restorationists. Hiss provides a wealth of generalizations, but also presents specific results and observations describing how some

places make people feel peaceful, happy or productive, while others leave us feeling uneasy, unhappy or simply empty. He cites examples from Chris Alexander's classic *A Pattern Language* to illustrate the importance of sunny places, recognizable landmarks, and pedestrian pathways. Hiss's description of several designers' work with public spaces and ways of drawing people into those spaces helped us solve an access problem in a recent project. Hiss also describes many standard practices from landscape architecture: paths that seem to disappear and thereby provoke feelings of mystery and invitations to wander, features that shield areas from outside traffic or disturbance, and landscapes that balance important elements such as stands of trees, open grasslands, or waterways.

Many of these concepts are applicable to restoration work, and I recommend this book to restorationists because it will encourage them to pay serious attention to the role of humans in the restored landscape and might help resolve common design and implementation questions. What role can or should people play in a specific project? How can they be encouraged by the design of the project to participate in the long-term survival of the project? And, how can the resulting landscapes accommodate human wishes without sacrificing ecological authenticity? These matters are as important—and as ecologically significant—as purely technical questions about slope and soil condition, and certainly more significant than questions about where to draw the line separating human beings from non-human nature.

Quite simply, people occupy and influence virtually all the landscapes in which we build or maintain restoration projects. As noted in the discussion of Katz's article earlier in this letter, a clear separation between nature and humanity's actions or works is no longer possible because of the pervasiveness of humanity's influence. Ignoring that influence is ecologically no different, therefore, than ignoring physical parameters such as rainfall or soil fertility, and bodes ill for both the success and the long-term survival of a project.

Does this imply the abandonment of our attempts to better define natural processes and our commitment to restoring nature? No. It means that restoration exists and will grow as a field because people feel that the restoration of nature is important and because the act of restoration is, as Higgs (1991) notes, a "healing art" and that it is, joyful, rewarding work. Its constituency will increase to the same extent that we are able to show that this is so and that restored landscapes have a value commensurate with that of natural landscapes. Our challenge is to build a field that recognizes the power of this art while continuing to construct ecologically authentic projects, recognizing with humility that the most successful projects will be those that invite Nature to modify our artifacts into natural works.

REFERENCES

- Brennan, A. 1984. The moral standing of natural objects. *Environmental Ethics*. 6:41-44

- Higgs, E.S. 1991. A quantity of engaging work to be done. *Restoration & Management Notes*. 9(2):97-104.
- Kusler, J. and M. Kentula, eds. 1989. Wetland creation and restoration: the status of the science. Vol. I-II. U.S. EPA/7600/3-89/038. U.S. Environmental Research Laboratory, Corvallis, OR.
- Lewis, Roy (Robin) R. Personal communication. May, 1992, San Francisco CA.
- Packard, S. 1988. Just a few oddball species: restoration and the rediscovery of the tallgrass savanna. *Restoration & Management Notes*. 6(1):13-22.
- Pacific Estuarine Research Laboratory. 1990. *A manual for assessing restored and natural coastal wetlands with examples from southern California*. California Sea Grant Report No. T-CSGCP-021. La Jolla, CA.
- Rieger, John. 1991. San Diego Bay mitigation study: a response. *Restoration & Management Notes*. 9(2):65-66
- Zedler, J.B. and R. Langis. 1991a. Authenticity: comparisons of constructed and natural salt marshes of San Diego Bay. *Restoration & Management Notes*. 6(1):21-25.
- Zedler, J.B. and R. Langis. 1991b. Response to letter by John Rieger. *Restoration & Management Notes*. 9(2):67-69
- Zentner & Zentner. 1991. Laguna Creek stream corridor: third year monitoring results. Report to the City of Sacramento, CA.

John Zentner is with Zentner & Zentner, 925 Ygnacio Valley Road, Suite 250, Walnut Creek, CA 94596, (510) 947-6888.
