

WHAT IS ECOLOGICAL RESTORATION and WHY IS IT IMPORTANT?

Gerould Wilhelm
Conservation Research Institute
375 W. First Street
Elmhurst, IL 60126

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What do we mean when we say we want to *restore* the landscape, or restore the *health* of the earth? What is it that needs to be restored? How do we know when the land is healthy? Such questions can be hard to answer for a people who have become so distant, so remote from the idea that the earth is more than “virtually” real, and removed from the idea that their cultural relationship with their earth is integral both to the long-term perpetuation of their culture and the renewability of the earth’s living surface.

One way of approaching the answers to these questions in human societies is to regard a culture healthy so long as it continues to renew itself with each new generation of individuals and families. The health of a culture is dependent upon the behavior of the individuals within it. Each individual is unlike any that has ever lived or will live again. Each is born with a unique combination of genes that the culture has never experienced before, and is born into a time and circumstance that has never been before or will be again. Individuals are reared in the ways of their people by the family within the culture, and draw strength and experience from the knowledge and wisdom of their elders. With an eye toward tomorrow, these elders have tested the knowledge and wisdom of their forbearers, made scarcely detectable modifications in response to their own experience with their people and their land, and passed it along to young ones. In this way, the health of the culture is assured, as the people, utterly respectful of the experience of the past, respond to the subtle vicissitudes of an ever changing earth, that their culture might perpetuate itself and replicate the full potential of human experience with each passing year.

So it is with the ecosystems of the earth with which human cultures interact. The warp and weave of life and human culture on any remnant acre of the earth is unique to the earth. No other complex of genetic expressions has such an experience of the singular geological, historical, and climatic definition of a place as do the organisms that have long residency in it. With each passing season there is a propagation of young with genes that are at once nearly identical to those of their parents, yet manifesting combinations of genes that have never been before. With the inborn “experience” of long-time residency in their habitat, they are at the same time equipped to accommodate subtle shifts in climate, and the gradual changes brought on by

mountains and seas rising and falling. This co-evolution of life forms with the geological meteorological transformations of the earth occurs at a time scale that is inextricably linked with the regular cycles of the earth around the sun, and the time periods necessary for individuals of populations both to transmit the experience of the place to subsequent generations and yet to allow small genetic changes to satisfy subtly new conditions.

Rates of change in human cultures and ecosystems are buffered against catastrophic collapse by an internal diversity that works to protect the whole against the development of exaggerated, untested individual behaviors or genetic malformations. Without such protections, the replication of rapid, system-wide changes can cripple the system's ability to renew itself and conserve its local knowledge of the place. The health of an ecosystem or a culture degrades in accordance with the degree to which it destabilizes or simplifies itself, and there comes a time when there is not enough diversity within the system, with either enough memory of the past nor enough potential for the future, to continue. The evolution of a system so compromised ceases.

Ecological restoration, as a cultural discipline, seeks to discover those places of the earth where evolution has been seriously compromised or truncated, where the earth no longer can renew itself. In such places restoration ecologists seek to replenish the biodiversity of species native there, along with any abiotic processes and human cultural relationships upon which such complexes of species depend. The extent to which the genetic diversity of the place can coalesce into a self-sustaining, self-replicating system is the extent to which the health of the system develops. Ecological restoration is the process by which humans relearn the realities of the place, the importance of acquired wisdom and knowledge, and the relationship that the resident human culture must develop with the place, and its biota.

Let us examine an example of a place on the earth that has lost the capacity to renew itself: the suburban lawn. By defaulting the "undeveloped" lands around us to a single species of grass, the unique qualities of the place where it is planted must be erased and suitable conditions created for the grass. Instead of 100 species of plants, their pollinators, seed dispersers, mycorrhizae, etc., singularly adapted to the site, the horticulture of the one species becomes paramount. The site, whatever its original condition, must be transformed to accommodate the nutrient, soil, and moisture requirements of the grass monoculture. In most circumstances, this remediation requires exaggerated translocations of nutrients and water, and inputs of pesticides to discourage infestations of disease. The human relationship with such lands becomes one more akin to a handmaiden than that of a coinhabitant. The land's ability to inform the resident humans about its uniqueness is eliminated. The human inhabitants become peculiarly aware of, or oblivious to, any consequent impacts, however real and threatening they may be.

This cultural obliviousness leads to an inability to recognize certain realities of the landscape, realities that are peculiar to each particular landscape. Airplane pilots know, for example, that if a plane has a stall speed of 100 mph, and they try to bring it in for a landing at 95 mph, they are going to fail. They would not fail because they are morally bad. They would

fail because they ignored a reality, they broke a real rule. Certainly, they didn't mean to break such an unforgiving rule, but they did.

One of the real rules that we seem frequently to ignore in the landscape is that landscapes are outdoors and water falls on them. Actually, it falls everywhere, not just in wetlands or in places designated by engineers and ecologists. In the Chicago area, precipitation amounts to about 37 inches, or about 1 million gallons of non-compressible fluid per acre per year. When it falls, two things can happen. It can infiltrate and manifest itself as an asset to local life, or it can run off and become a liability to life downstream, leaving the place where it fell bereft of water.

Some cultures regard landscapes as little more than living rooms to be designed only with attention to the vagaries and vicissitudes of the design aesthetic of their day. But water is a real thing. It is non-compressible, and it flows downhill. The more of it there is, the greater the volume; the greater the volume, the greater the potential flow energy. The greater the energy, the more resources it can carry with it. Water is one of the few resources that wind up on the top of the hill free, as a result of evaporation and condensation, rain, dew, or snow. Other resources, such as nutrients and soil, are less easily restored to the top of the hill. Generally, the energy required is not sunlight energy, which mediates water restoration, but some other energy source, and usually one that involves money and labor.

Resources that flow downhill with water leave the top of the hill bereft of resources, and render the bottom of the hill surfeited with them. The same force that brings water free to the top of the hill, enforces evaporation potentials such that, in the Chicago area, about 1 million gallons of water are evaporated from each acre per year. The first principle of our contemporary culture seems to be: *get as much water out of sight as fast as possible*. Depending upon local ordinances, this disposal can range from almost immediately, to 0.15 cfs/acre to 0.05 cfs/acre, but all must leave. Just how downstream neighbors handle it is their problem.

In order to achieve this underlying goal, the landscape must take on a certain morphology. The topsoil is removed, the underlying clay is compacted, and a thin layer of sod is rolled out over it. Such sods commonly consists of Kentucky Bluegrass, *Poa pratensis*, which is not native to Kentucky or even the Americas. The root system is but a couple of inches deep, and the whole layer represents little more than a rug with an exaggerated floor pad. Water cannot penetrate the clay floor, but will sit in the root system and kill the rug. The solution to rug killing is to tilt all portions of the landscape at no less than 2% slope. There are usually local ordinances requiring this. The more expensive designs include bumps or berms placed artistically through the landscape, and usually include storm drains so that water will arrive at detention basins with all deliberate speed.

This contrived "living" *rug* phenomenon has lead to a curious infrastructural aesthetic: no other living thing is acceptable on the *rug*. Only certain shrubs, planted in artistic groupings of 5's and 7's, and only even-sized, lollipop-shaped trees planted in rows are allowed. Expensive

plantings include huge clumps of mulch placed in small rings at the bases of the trees and shrubs. Trees growing in clay holes on bumps commonly do not live long, partly because the holes have either too much water in them, or not enough. The relevant point here is that such trees and shrubs are not really alive in the sense that they are members of a community and participate in the annual replication of that community. Other than mowing, fertilizing, and pesticing, the only human involvement in such a landscape consists of workers who replace dead trees.

Bearing in mind that it really does rain, water that falls on such landscapes begins its course downhill, carrying with it herbicides, extra fertilizer, and anything else. Designers of such landscapes have contrived huge holes in the ground that are placed tactically to receive such waters and any pollutants or unused nutrients. There the water sits, its volume and any dissolved or suspended components being metered into the nearest stream. Waters from such landscapes throughout the watershed accumulate in massive storm surges, filling the rivers with filthy water, passing the waters along to the Gulf of Mexico.

This regular movement of huge volumes of dirty waters into the estuarine regions of the Mississippi River delta, is contributing to a catastrophic decline in the productivity of the spawning grounds of the Gulf of Mexico. The fishery economy of the region is heavily impacted by waste water from the hinterland. Meanwhile, having sent our rain water out of sight to remote areas, we no longer have our rain water here. Since 24-hour days really exist, and since sunlight energy really exists, water continues to evaporate or transpire from everywhere in the landscape. The absence of local precipitation, it having been shunted to the Gulf of Mexico, renders our landscapes soon dry and sear, often within hours of the last rain. Our culture's solution inevitably has been to install expensive irrigation networks in order to mine water from deep within the ground, the largess of a landscape far away that actually infiltrates and stores water in net amounts.

The cultural aesthetic makes it important to maintain the height of the Kentucky Bluegrass as low as is physiologically possible and still have something that looks like a green rug. This requires virtually constant mowing, lest grass blades here or there get taller than others. Mowing, of itself, might be relatively harmless if it did not use fossil fuel in unremediated internal combustion engines. For every gallon of gas burned, about 15 pounds of carbon dioxide (and other worse things), which the ecosystem of the earth has not seen since the Paleozoic, are produced and given over to our atmosphere, potentially contributing to the phenomenon known as "global warming".

Since it is culturally important to grow Kentucky Bluegrass short, it must be fertilized regularly, which makes it grow fast, so that it must be mowed often. Inasmuch as no other living things are allowed in the landscape, the full aesthetic requires the application of as much broad-leaf herbicide and pesticide as the landscape maintenance budget will permit. Unused nutrients, pesticides, herbicides, and herbicide derivatives migrate to the detention basin in accordance

with the slope of the landscape, the duration and volume of the next rain, and their residual concentrations.

The aesthetic dictated by the lawn implies a landscape that requires lots of water, yet can never be wet, that must at once be short, yet lives on fertilizer. The landscape is essentially designed to divest itself of water and resources, two input components it needs most. At the end of the day, the culture pays a lot for this infrastructural aesthetic that demands that the outdoors look ever more like a living groom, and inculcates its people to become ever more discomfited with any idea other than that. Indeed, with a “good” landscape architect, the outdoors should become more and more like the lobby of a grand hotel.

It is ironic, because our technology allows us to fly high above the earth and look down upon the scar tissue that once was a living land, a land that could renew itself each year. We can see that it really is the outdoors. We can see white clouds blowing around, turning dark, and raining down upon a blasted landscape, and the brown rivers run their ever straighter chutes to the Gulf. That blessed water that falls graciously to the earth, is turned to filth, and purged.

With each passing generation the culture becomes more distant to reality. Its words take on new meanings in accordance to the real experience of the young. “River.” What image does the word evoke? We picture a long channel, with steep muddy banks, that surges with brown roiling water after the rains, and during the “droughts”, a scarcely wet ditch with shallow pools of gulping carp, abandoned grocery carts, and doll baby heads. The people of the culture no longer can see that there really is such a thing as outdoors, or that it matters.

It is not sufficient simply, once aware of the liabilities associated with the contemporary aesthetic, to stop all the mowing, watering, fertilizing, and pesticing, and “let nature take its course!” There persists the reality that our contemporary landscape has nowhere near the biodiversity to coalesce itself into a self-sustaining, self replicating ecosystem. If current human involvement were simply to disappear, the landscape would not “succeed” into some pre-Columbian Eden. Rather, the Kentucky Bluegrass would go unmowed, fouled by its own mulch, and a few other weeds like Bull Thistle and Dandelion would flourish along with the bluegrass for a few years, giving way to weedy shrubs and trees, such as Buckthorn, Box Elder, Amur Honeysuckle, and Black Locust. The few groundcover weeds would shade out, the soil would erode, and the roots of the trees would become exposed as the last remaining topsoil disappeared and the trees began to topple. There would be few butterflies, birds, or anything else, other than perhaps some roving gangs of Starlings feeding on Box Elder Bugs, but mostly just system collapse. Maybe another brief boom of weeds, then a bust. All the while, water, soil, and other resources run downhill and befoul the rivers.

A contemporary landscape, however clever, ingenious, or attentive to aesthetics of the day, is a lot like the space shuttle. It can be amazing in its seeming complexity, but set it out

behind the hanger, it rusts. It cannot make itself new again. Rather, the contemporary landscape requires continued subsidies of energy and resources to sustain it.

The real, evolving world works in a different way. It is alive. It is alive not in the sense that there are numerous living species growing in eclectic assemblages, but alive in the sense that each acre is inhabited by a community of species interlinked in time, space, and genetics, with a vital adaptive memory of the place. With 800 to 1000 native vascular plants in any particular Midwestern county, a given tract of tall-grass prairie might have as many as 100 species of vascular plants per acre, and no one acre would have the exact combination of species present in any other acre.

These plants and their associates have lived in their place for thousands of years, adapting to the unique aspects of various acreages, husbanding water and recycling resources. For thousands of years, the landscape has experienced a relationship with human beings that nurtured and stewarded the plants and animals known to have been present at the time of aboriginal “removal”. Just as it is an artifact of the region’s reality today that contemporary human beings are an integral aspect of the places where they live, and foster the habitat for contemporary inhabitants.

So, what are the prospects? What must we do to re-establish or restore a sustainable covenant with a living earth? Our culture is inexperienced, but we do know that the root systems of a complex native species can increase the water-holding capacities of our soils by an order of magnitudes in a relatively short period. For example, land in the Conservation Reserve Program, after just a few years, can store a great amount of water that falls on it, and also can accumulate a ton or more of fixed carbon per acre, per year. A clue.

We could look at our landscapes and ask ourselves, why must it look like an industrial rug punctuated by smallish, perfectly shaped, lollipop trees, ringed at the base by tiny, perfectly engineered saucers of mulch? Would it be so wrong, so unattractive, so heretical, such an anathema to our culture’s aesthetic, to look out upon, and walk within a landscaped inhabited by a profusion of native grasses and sedges, replete with comely perennials, infused with flowering shrubs, and dominated here and there, such as along the north and east faces of tall buildings, by groves of trees with futures. Would it be so radical to propose that trees be free to grow branches however their habitats permit, and to grow broad, expansive root systems with a diversely populated rhizosphere rich in water and mycorrhizal fungi? Would we be so unable to countenance clean streams and rivers with healthy base flows that flourish with fish and mussels?

Some cultures have chosen to ignore the realities of water, and the transient tendencies of water-borne resources. Others have taken a more proprietary approach. Those cultures that lay waster to their landscape, divest it of water, compact heavily the soil, and import excessive amounts of nutrient, now live in a landscape nearly without other living things, save a very few

weeds that have become highly adapted to such landscapes. These landscapes are so inherently unstable that few organisms can reside long enough to establish long-term, resource-recycling systems. Evolution effectively stops, the biodiversity being so depauperate as scarcely to exist, replaced instead by steel, tar, concrete, vast rows of monoculture, and a few weeds living more or less independent, disconnected existences, without community or future.

Other cultures have chosen not to ignore the realities of water and the transient tendencies of other resources. They have taken a more stewardly approach to their landscape. Those cultures find value in a panoply of living things, connected and interconnected in resource-recycling systems. Such cultures have seen that there are advantages in fostering ambient life systems in which the broader community of organisms is sustained. Such communities provide the long-term stability that allows each new generation, each with a new combination of genes that the earth has never seen before, to respond to an earth that has never been before. The species of such systems rely heavily upon the ancient wisdoms of their parents to inhabit the community of their birth, yet are sustained by their ability to manifest change and to continue to evolve.

Some cultures have drawn strength from yesterday, gloried in today, and ensured tomorrow; others have ignored yesterday, endured today, and forsaken tomorrow. It matters. We who wield a kind of hegemony over the landscape must be attentive to the fact that it is a landscape that receives the rain. It is our responsibility to treat landscapes not as mere canvases upon which we are wholly free to “express ourselves,” but as actual acreages of the earth’s surface, receivers of the rain and deliverers of “milk and honey”, to borrow from an ancient metaphor.

The lawn is but one of many landscape applications in which our culture must examine its default behaviors. Similar examinations must occur with agricultural land and all aspects of the developed urban and suburban environment. Ecological restoration is our culture’s recognition that there are physical realities relevant to sustained living on the earth and an appreciation that such realities can limit or liberate a culture’s development. The goal of the restoration ecologist is to apply our technologies to the revitalization of every aspect of our culture’s relationship with the earth, that both might continue to renew themselves and accrue the wisdom to sustain.