

## Thinking like a community



*Ecosystems that have not been disturbed for long periods of time (whether by humans or by natural disasters) tend to reach a state of dynamic equilibrium which ecologists call a climax phase, meaning that organisms have adapted themselves to one another in such a way as to maintain relatively constant population levels, to avoid direct competition, to keep energy flow-through to a minimum, and to recycle available energy and nutrients as completely as possible. They have formed, to use an anthropomorphic term, a community. — Richard Heinberg, *The Party's Over**

As I write this column I am a few days away from heading to my farm in North Dakota for my annual two weeks of “working vacation.” I always long for this time of year when I can actually “be there” on the farm. It is like rejoining a community I have missed.

And, as I have learned over the years, our farm truly is a “community.” The crops, animals, wildlife, native and introduced species (and the farmers) – even the soil microorganisms – form an interdependent set of relationships. Wastes from one organism become food for another, and all tend to adapt themselves to each other. From my perspective it isn’t always benign, but it is a community.

Such relationships have real value. Wendell Berry once told me that the sheep on his farm have adapted to the place (the hilly landscape and unique grasses that are native to his area) such that they would be less valuable in another landscape. To be as productive elsewhere, they would have to go through a process of adaptation that would require energy – a cost to the animals and no doubt to the farm.

Some time later I asked a retired animal scientist friend of mine if this was true. He said, “Oh yes. In fact in Scotland an animal always was considered more valuable when it was sold with the farm than when it was sold separate from the farm. When it was sold with the farm it already was adapted to the place.”

There are clues in this kind of ecological thinking that may be important for us to keep in mind as we attempt to deal with impending constraints such as peak oil, climate change, diminishing groundwater resources and other challenges. We tend to try and solve these problems by inventing novel technologies, without attending to their potential ecological consequences for the biotic community.

In past months the news media have been featuring the prominent role that “synthetic biology,” the science of rearranging an organism’s entire genetic code, can play in solving our energy crisis. (See Nicholas Wade’s column, “Genetic Engineers Who Don’t Just Tinker,” in the July 8 *New York Times*, and John Carey’s “On the Brink of Artificial Life” in the June 25 *Business Week*). Synthetic biology promises to bring us an entirely new generation of organisms that can replace the goods and services currently provided by fossil fuels.

We, of course, already have learned (sometimes painfully) that the introduction of non-native species to an ecosystem can cause major, unanticipated disruptions, and that the loss of a species can produce extensive and unanticipated desolation, both of

which can have serious economic consequences. Just ask North Dakota ranchers about the cost of invasive leafy spurge.

Having learned these lessons, ecologists like Kevin McCann now caution us that there is only one way to proceed: “If we wish to preserve an ecosystem and its component species then we are best to proceed as if each species is *sacred* . . . species removals (that is, extinction) or species additions (that is, invasions) can, and eventually will, invoke *major shifts in community structure and dynamics*” (emphasis mine). Thinking like a community is critical, and it seems that such thinking is in short supply as we attempt to deal with the challenges that confront us.

Our present ecosystems provide farmers with incredible free ecosystem services: pollinators, nitrogen-fixing organisms, predator/prey relationships that keep pests in check. Creating our imagined synthetic nature may not be a viable substitute for the nature we already have!

We still know so little about the nature we have; consequently, we could easily destroy vital ecosystem services without knowing it. Research recently conducted at McMaster University in Canada showed that plants can recognize their kin, suggesting that gardeners could inhibit root growth by placing plant siblings near each other and encourage root growth by placing strangers close to one another. (It seems that strangers compete while siblings do not.) What else are we missing because we know so little about our biotic communities?

None of this is to suggest that we humans have no role to play in disturbing nature or introducing innovations. Controlled burns can reinvigorate grasslands. Cross-breeding can revitalize plants and animals. We are part of nature and we can do our part. But we must think like a community and use ecological screens to help us decide which technologies to introduce and which to forego because they may cause major shifts in the community’s structure and dynamics. And we should do what we can to enhance the community’s capacity for self-renewal (as Leopold advised), rather than introducing novel organisms for the sole purpose of serving our own immediate needs without attending to the potential damage they could do to the health of the rest of the community.

It is unlikely that we can do well unless the community does well. We are, after all, “plain members and citizens,” as Leopold so eloquently put it.

