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Special Section

Nature's example

Learning through ecosystem management

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At its heart, modern society is a quest for convenience.

Bigger, smaller, cooler, warmer, faster, slower...as long as it boosts our personal comfort, it will do. Through the deliberate manipulation of our environment, we have tempered the harshness of the elements, the hunger of empty stomachs, the constraints of space and time.

Still, we're not quite as comfortable as we'd like to be. Nature keeps getting in the way -- and nature is plain inconvenient. It keeps changing: solid as granite one moment, fluid as lava the next. Bountiful with the soil's fruits some years, stingy with the harvest in others. Nature can be amazingly resilient against our greediest needs, yet frustratingly fragile in response to the least of our movements. We mold it to our desires and then discover it has stubbornly adopted a different shape.

We aren't especially comfortable with nature, because as creatures of habit we aren't especially comfortable with change. We have set ourselves as a species apart from all others, only to learn from the hard lessons of extinction and degraded landscapes that we're not as fully in control as we thought. The driver's seat is occupied; we are but passengers in that vehicle otherwise known as life on Earth.

As the passengers capable of reading the map, we do know this much: Birds gotta fly, fish gotta swim -- and people gotta live. But how do we live in reasonable comfort without destroying the very world that sustains us?

Two words, ladies and gentlemen: *Ecosystem management*.

Sounds good. Now tell me what it is.

If you're looking for a convenient definition of ecosystem management, save your eyes and stop reading now. You won't find it here. Encapsulating the idea in a single sentence would do injustice to its many and varied parts.

You will discover that, like an ecosystem itself, the concept of ecosystem management encompasses the variety of life. In applying it, we can more fully explore and understand the human role in nature. By carefully monitoring the natural world, and by closely examining -- together -- our personal motives, traditions, needs, laws, even fears in relation to nature, we begin a journey of discovery that will never end.

If you must call it something, call ecosystem management a more comprehensive way to look at and adapt to natural change, a means to pursue human convenience without causing major discomfort elsewhere, an opportunity to regain something lost, a personal challenge to leave behind a place worth cherishing for those who have yet to come.

A full-circle view

Several decades of environmental regulation have helped alleviate some of our most obvious and specific human/nature problems. Prompted by law, large industries cut back on the amount of polluting wastes pumped into the air, rivers and lakes, helping clear the skies and waters. Recycling legislation gave individuals the nudge, and now nearly 97% of Wisconsin households participate by reducing waste, repairing and reusing useful items, and recycling glass, plastic, paper and metal. Protected by law, populations of threatened species such as the bald eagle got a boost back up to healthy numbers.

The law underpins many an environmental success story, but over time it has become apparent that the wielding of the legal stick just isn't enough. Our seemingly benign actions outside the scope of law have done damage of a more insidious kind: Landscapes chopped up by scattered development leave only fragments of habitat for other species, sending many into decline and eliminating some altogether. More people intent on using lakes, parks and forests for a variety of recreation strain the resources and compromise the outdoor experience. In manipulating natural resources like timber, soil or ore for survival and for economic gain, we've made some errors that may be difficult to correct.

The scientific view of nature has evolved from the separate study of resources like fish, wildlife and forests to a broader understanding of the interactions in an ecosystem. Like it or not, the evidence is clear: We are part of, not separate from, nature. Like other species, we are both actors -- and the acted upon -- within ecosystems.

That's a very important piece of knowledge. It signals a shift in thinking, an adjustment in previous attitudes of control. It means, in essence, that we must calculate nature's losses as our own.

No one likes to lose, and the process of ecosystem management aims to make winners of all the players in an ecosystem. It recognizes that natural areas, urban communities and managed properties such as farms and timber lands all add value and quality to life. It acknowledges the two-way link between thriving natural resources and a thriving economy. It provides an opportunity for citizens to work with government in a balanced, common-sense approach to environmental protection. It encourages integration and collaboration among diverse interests, responsibility and involvement from individuals.

Think *community*. Think *environment*. Think *economy*. Now think of them all together, and you'll have the scope of ecosystem management.

Thinking through a problem, thoroughly

Consider a typical environmental problem: A lake with a declining perch population. Anglers are unhappy because there are fewer fish to catch; resort owners on shore are unhappy because fewer anglers are staying at their cottages. The solution: Have the Department of Natural Resources stock the lake, year in and year out.

Now, take a look at an ecosystem management approach to this issue, with the help of eight themes to guide your thinking:

Context: Using ecosystem management, resource managers wouldn't see this problem as a single-species issue. Realizing that a focus at any one level -- genes, species, populations, ecosystems, landscapes -- would not be enough, they adopt a "systems" perspective, seeking connections to the problem at all levels. What about the health of other aquatic species in the lake? How's the water quality in the watershed, the air quality in the region? What's happening to similar sport fish populations in other parts of the state, the Midwest, the nation, the world?

Boundaries: The context helps determine the ecological boundary in which the problem will be addressed. In addition to examining this particular lake, managers might want to look further, at the watershed as a whole. Administrative boundaries -- townships and counties, for instance, or the scope of action of another state or federal agency -- need consideration as well. Using ecological boundaries requires greater cooperation among all interested parties, institutional or private.

Integrity: The idea here is to protect the patterns and processes contributing to the natural diversity of life in an ecosystem. If soil runoff from the watershed is harming the reproduction of zooplankton, the microscopic aquatic animals fish feed on, and encouraging the growth of lake weeds, which are smothering native aquatic plants that provide habitat for fish and birds, and muddying the waters of a favorite sandy swimming beach, then it's time to address that issue with ecosystem management.

Data: Careful research and data gathering provide one of the bases from which an action can proceed. Besides conducting their own research, DNR managers would collect information from other institutions, organizations and individuals before forming a plan of action. In the case of our lake, the U.S. Forest Service manages a quarter of the acreage in the watershed and The Nature Conservancy owns a four-acre wetland adjacent to the lake; both groups would likely have data on a variety of natural resource concerns. Plus, the local angler's group has kept a record of the lengths and weights of all trophy fish caught in the lake for the past 10 years, a company planning to build 40 new condominiums in the township has recent soil samples, and the resort owners have tallies of the number of angling guests who stayed at their establishments going back 20 years. All this information could prove useful in plotting a course of action.

Monitor: It's necessary to track the results of any action to evaluate its success or failure. Monitoring creates a feedback loop of vital information. For instance, lake property owners in the watershed could help by creating "lake watch" groups to take regular samples and track water clarity as an indicator of runoff.

Adapt: Scientific knowledge isn't written in stone. Ecosystem management is a flexible process, able to adapt in response to previous actions. It allows for uncertainty. If the information collected and analyzed on a planned activity indicates movement in the wrong direction, we can adjust mid-course. It's a continual process of plan - do - check - act, with all partners, stakeholders and interested or affected parties included in the reevaluation. If curbing runoff in the watershed isn't helping sport fish populations bounce back as much as hoped, it's time to consider other alternatives.

People: People are a part of the ecosystem management process. Goals are shaped not only by scientific knowledge, but by human values; decisions made with citizens, rather than for them, are likely to be more successful. On our lake, the need for resort owners to make a living and the desire of anglers for recreation will not be ignored -- nor will they be addressed as the only issues worthy of attention.

Change: Resource management organizations will change internally to fully implement ecosystem management. The reorganized DNR, for instance, is now based on watersheds rather than human-designated boundaries. Environmental science curriculums offered in schools and universities must take a more interdisciplinary approach to prepare students for the many-layered issues they will encounter throughout their careers.

Individuals will need to change, too. It's time to accept personal responsibility for using natural resources as caretakers, not just consumers.

Is the ecosystem management approach more complex than traditional resource management techniques? Absolutely. But, by incorporating a variety of opinions and desires, integrating research, and remaining open to options for adaptation and change, ecosystem management can offer long-term solutions to problems at a number of levels.

Ecosystem management doesn't promise a quick fix. It will produce decisions a greater number of people can live with and support.

Part of the team

If much of this sounds familiar, that's no surprise: The Wisconsin Department of Natural Resources has used different aspects of ecosystem management on many occasions in the past. Now the agency is making a commitment to more fully engage in ecosystem management in all of its activities. To that end, the Department has established Geographic Management Units (GMUs) in each of its five regions.

GMUs are based mostly on the state's major river basins, and most staff will be assigned to a GMU. This new structure brings together teams of employees with different types of expertise to take an interdisciplinary approach to issues.

The teams will conduct their work with the assistance of citizens who want to become more involved in natural resource and environmental issues. Citizens can help shape goals and priorities, assist in gathering and sharing information, be at the table when plans are charted and options weighed. They will help resource managers explore incentives to prompt appropriate action, rather than relying on more laws to force compliance.

Sounds good. Now tell me -- again -- what ecosystem management is.

It's you. You with a 360-degree view of the world. You, working with family, neighbors, colleagues, government and elected officials to protect the integrity of the ecosystem and provide the goods and services humans need. We now know environmental regulation can only go so far. For years people have been demanding less government, more voice, and a cleaner environment. Now the time has come to work together and find the incentives that will bring out the steward in all of us.

Ecosystem management in action

Clean agriculture

Agriculture is a necessity of human life resulting in a major alteration of the environment. Can we grow our food using methods that benefit, rather than disrupt, natural processes and still allow farmers to make a profit? A team of interested people called the Agricultural Ecosystems Research Group aims to find out.



Several private farmers, a natural landscape consultant for private business, and representatives from the Department of Natural Resources, the University of Wisconsin, the Department of Agriculture, Trade, and Consumer Protection, the Public Service Commission, Madison Audubon Society, Fox-Wolf Basin 2000, Aldo Leopold Foundation, Viterbo College, U.S. Fish and Wildlife Service, National Biological Survey and Natural Resources Conservation Service serve

on the team. Other people come and go as the agenda interests them. Some of the organizations were specifically recruited to join the group; others heard about it, and just started attending. Anyone is welcome, as the team seeks a spectrum of opinions and experience.

The ad hoc group advises researchers, sharing information and ideas on issues to address. The merits of specific research projects or data collection methods are debated, with the ultimate goal of finding a solution to problems. "Our private farmer members are very important members of this group," says DNR's Jerry Bartelt. "Often they provide the 'touch of reality' that is needed to make sure our results will be useful and accepted by other farmers."

Currently, the group is working on four studies involving grasses and grazing. One way to control nutrient and pesticide runoff into surface waters is to have grass buffer strips planted along streams and ponds. Wildlife use the strips, but the unproductive land represents a loss of income to the farmer. In southwestern Wisconsin, team members are investigating how rotational grazing could allow farmers to use the strips without damaging water quality or habitat for fish, aquatic insects, birds, small mammals, herptiles and native vegetation. Team researchers are also looking at ways to manage switchgrass for biomass energy and wildlife habitat; comparing native warm-season grasses to determine which species and genotype are the most productive in Wisconsin and which could be used for pasture or to produce biomass energy; and comparing sorghum types to determine the best variety for wildlife food plots.

Shoreline development

Ecosystem management methods can be used to broach long-standing, seemingly unsolvable problems. In northern Wisconsin -- home to 12,000 of the state's 15,000 miles of shoreline -- the touchy issue of lakeshore development has been raised in public forums hosted by the Department of Natural Resources and the Governor's Council on Natural Resources. The topic, formerly guaranteed to spark heated debates over property rights, government regulation, and personal vs. public lake use, received a thoughtful airing.

The rapid pace of change up North prompted the forums. With a sharp increase in the number of permanent residents, scarce lakeshore property and greater demand for all forms of water recreation, the "ribbon of life" (the slice of land from the ordinary high water mark to 500 feet upland providing critical habitat for numerous plants and animals) is in danger of disappearing altogether on many northern lakes.

Lakeshore property owners, lake users, developers, local government officials, conservation group representatives and other forum participants discussed ways to protect the very things people treasure about the North: natural beauty, outdoor recreation, peace and quiet. Some participants went on to join task teams and map out strategies for action. It's the beginning of a long journey toward a common goal shared by a diversity of people and organizations.

Prairie & wetland restoration

Landowners are helping the Department of Natural Resources bring back prairies and wetlands by placing land in conservation easements. In the Glacial Habitat Restoration Area (GHRA) of east central Wisconsin, the goal is to restore 11,000 acres of drained wetlands and 38,000 acres of grasslands across a 530,000-acre area. By purchasing small parcels and easements strategically located within a larger region, the Department is piecing together a patchwork of habitat for ducks, pheasants, meadowlarks and other species that can thrive side-by-side with agriculture. Property owners involved in the GHRA are learning about landscape restoration and gaining a greater appreciation of land stewardship. About 6,000 acres have been placed in easements or purchased in the GHRA since 1992.

Shallow lake recovery

Formerly a shallow lake in decline, Fox Lake in Dodge County today has excellent prospects for recovery due to citizens active in the Fox Lake Protection and Rehabilitation District and the Dodge County Land Conservation Department. In 1995 the interested parties joined with staff from the Department of Natural

Resources to begin discussing the lake's problems. Years of nonpoint source pollution, drained wetlands, and intense recreational boating and fishing pressure had nearly destroyed what was left of Fox Lake's natural amenities.

The result of their effort was the Fox Lake Restoration Plan, a blueprint for future action notable for its emphasis on ecosystem management. The plan makes clear that to restore and maintain the public benefits Fox Lake is capable of providing, three elements are necessary: First, lake residents, lake users, local governments and other stakeholders must understand how the lake "works" -- that is, they must learn more about shallow lake ecosystems in general and Fox Lake in particular. Second, there must be an ongoing examination of the causes and disturbances responsible for changing the lake's condition. Third -- and perhaps the most critical -- if those disturbances are caused by human actions, the community must adjust its working relationship to the lake and act to restore key ecosystem processes.

A lake drawdown, careful water level management, wetland restoration, "zoning" the lake for different activities, and fishing and boating regulations are a few of the tools mentioned in the plan for restoring the lake. Interested citizens have held open houses to explain the plan's points and to solicit ideas and opinions. For the plan to succeed, lake residents and users need to be patient and must be willing to cooperate in the best interests of the lake. By participating in the restoration in some way, whether as part of a group or simply through their own actions as individuals, stakeholders in Fox Lake can turn around their community's most valuable natural asset.