

## HOME PLANET

EVERYWHERE  
YOU LOOK

## DEVELOPMENT

*In New Jersey: How much swamp to save?*

**I**t is the most densely populated state in the nation, and per capita the most industrialized. Commerce and development have spread so rapidly in New Jersey that today the state seems a blur of endless turnpike.

Here, as throughout much of the Northeast, acre upon acre of open space is lost to suburbia. Valuable wetlands are infested by exotic plants—specifically the purple loosestrife, which escapes from local flower gardens. Nearby house cats kill birds that inhabit woodlots near housing developments, lowering bird populations. And cars hit more deer because of expanded roads.

“Now we’re worried about our natural resources and contiguous forest land,” says Kerri Ratcliffe, executive assistant, Division of Natural and Historic Resources in New Jersey’s Department of Environmental Protection and Energy. “When you have wilderness parceled and broken up by housing development, you lose a lot of wildlife habitat.”

Since colonial settlement of the state, approximately 39 percent of its wetlands have been destroyed. New York has lost

The environment is no longer a single item among American policy concerns, alongside day-care and unemployment. Environmental problems are overarching. If we don’t solve *them*, none of the others will even matter.

Increasingly, environmental concerns unite political camps. The people on these pages—some in industry and utilities, others in the agencies and your community—consider themselves realists, working through the tough choices. How will humankind continue to meet its vital needs without, in the process, poisoning its only well?

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60 percent, Pennsylvania, 66 percent, Connecticut, 74 percent, and California nearly 94 percent of its coastal marshes and estuaries to development. Many others are stressed by human disturbance. According to Ratcliffe, who received an M.P.A. from SU’s Maxwell School in 1987, “land development has generated non-point-source pollution, such as fertilizer and herbicide leakage from agriculture and salt runoff from roadways.” Scientists say such pollution severely defiles wetlands, especially if it persists for a long period of time.

To protect these fragile areas, New

Jersey has passed some of the strictest laws in the nation for both coastal and freshwater wetlands. Such regulations guarantee much greater protection than even 10 years ago, when builders could cut woodlands and drain and fill wetlands without prior consent. Now they must file for permits when building in such regions, usually providing buffer zones 150 feet wide around a specified wetland.

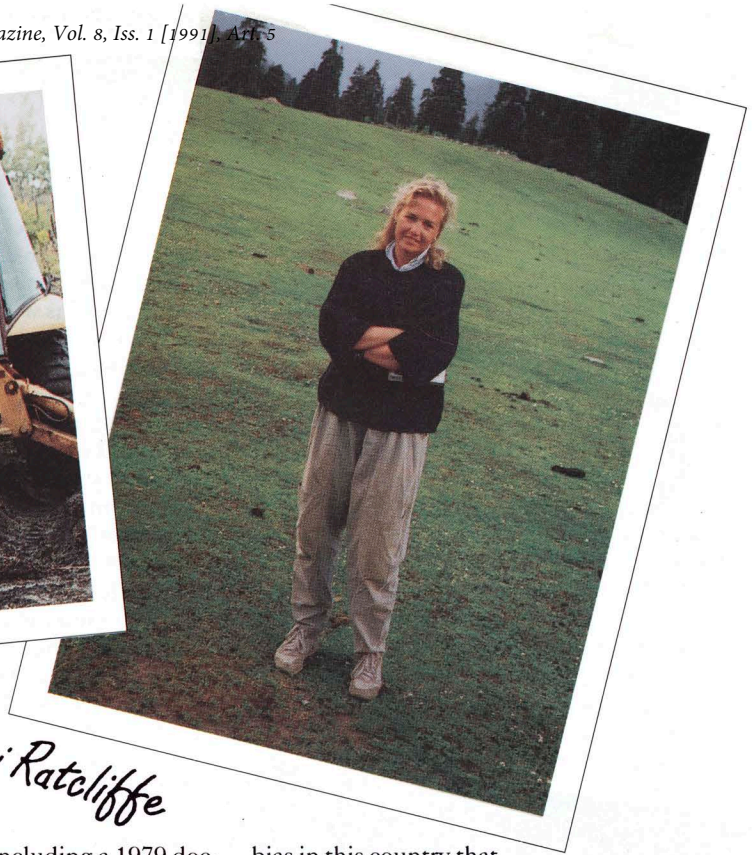
The buffer zones are crucial, Ratcliffe says, “because damage occurs during construction with erosion, when sediment seeps into streams or wetlands. This can have a tremendous impact on the wildlife habitat.”

Environmental planners now recognize that the old American dream—one house per acre, spread out over a township—is the most damaging kind of development. High-cluster, high-density development more appropriately maintains contiguous green space. “By building residences closer to the center of town, you have a surrounding belt or greenway of open space,” Ratcliffe says. Contiguous green space is important in maintaining uninterrupted pathways, which link animal habitats.

Michael Gimigliano works toward the same objectives, but as a businessman. He is a private environmental consultant, working with developers to ensure



*Michael Gimigliano*



*Kerri Ratcliffe*

prudent and gradual environmental change accompanies land use. He works with contractors to assess what impact construction will have on the land, and how developers might mitigate potential problems.

This role places him at the core of the basic conflict between people's needs and ecological realities. "There's a tension between conserving and preserving the land and people's desire to carve a place for themselves. . . . I try to make sure that when the land does change it's as healthy as it can be," he says.

Ratcliffe says developers are becoming more aware of and sensitive to environmental efforts, and some are eager to work with the state to engineer less damaging development sites. By merging development with town centers, state and local officials hope to gain both economic and environmental benefits. "The state encourages the revitalization of cities and towns. We are trying to funnel development into an already existing infrastructure, rather than disturbing more land," she says.

"Years ago people didn't know any better. They followed the laws of the time," says Gimigliano. "It's a learning process."

In recent decades country dwellers have learned that human and wildlife cohabitation carries great demands. This puts a strain on the provincial setting for all inhabitants, from deer trampling and eating farmers' crops to gophers living in backyards.

"People want the country life without the hazards and with all the conveniences," says Gimigliano, who holds

three SU degrees, including a 1979 doctorate in geography.

"Human beings are part of the ecological equation," he says. "They're acting out of self-interest, but they do care. To keep them environmentally sensitive is difficult with regulation on top of regulation, when it often takes six months to two years to be granted a permit to build a garage."

Ratcliffe defends land-use regulations. "Historically," she says, "there's been a

bias in this country that if you hold a piece of land, you're entitled to do what you want with it. And most people want to maximize the profit of property." She points to farmers who sell premium open space to developers.

"We have an obligation to protect and maintain our natural environment," says Ratcliffe, "and not allow the land to degrade further for the sake of commercial or economic development."

The battle has just begun. Despite alarming statistics showing more than half of coastal wetlands in the lower 48 states have been destroyed, developers still seek estuarine wetlands for residential and resort housing and marinas.

Across the country, wetlands, shorelines, and farmlands are sacrificed to development or closed to public access at the rate of one to two million acres a year.

"These are resources, no matter where they are, that are public domain," says Ratcliffe. "The key is balancing public trust with resources and property owners' rights." She emphasizes the threat of development and the need for people to become more aware of the consequences of their actions. "We all have to give up our rights for the public good, and one of them is doing whatever we feel like on our property."

"The hard reality," Gimigliano says, "is that society is growing and land use is incompatible with total preservation. There will always be loss." The challenge, he concedes, lies in compensating for these losses more sensibly and protecting the land when we can.

—THERESA LITZ

**I**n August, the Bush Administration released a plan to change the federal wetland protection program. Revisions would open up wetlands for a variety of uses, including development, and redefine a wetland by extending its saturation period (from seven days to 21 days) or require a region to be ponded for 15 days.

Scientists say defining wetlands at the ground surface as opposed to the root zone is not technically sound. Wetland indicators in forest areas and on the great plains may appear less obvious, but year-round functions merit protection of the region.

Reregulation also would weaken New Jersey's wetlands protection laws. Forest wetlands would be reclassified as upland, possibly reducing the state's protected regions 30 to 40 percent.

## RAW MATERIAL

### *Reynolds Recycling: Making new from old*

Corporate America is waking to the need—and perhaps advantages—of materials reclamation. Signaled by the dilemma of the country's solid waste stream and overflowing landfills, companies are learning to bring back old metals and glass and to reuse them. Until recently, only a few prescient companies acted upon the dangers of a contaminated environment and took steps to alleviate it.



HENRY J. AMANN JR.

*Charles Rayfield*

One was Reynolds Aluminum Recycling Company, which buys aluminum cans from the public and recycles them. The idea to recycle cans began with David Reynolds, son of the founder of Reynolds Aluminum, and predated the first Earth Day by two years. At the time, most cans were made of steel,

which weren't recycled but which do, at least, rust away over time. Reynolds's plan met with resistance because of a fear that the cans would not be returned and, because aluminum doesn't rust, that they would become eyesores along roadsides.

Recycling the cans, Reynolds reckoned, could itself be a marketing tool: the company and the public made money, the aluminum was reused, the highways cleared of debris.

The first recycling center opened in Los Angeles in 1968. During the first year, the company recycled a million pounds of aluminum. Today there are 700 such centers, where consumers sell Reynolds their aluminum by the pound. Shredded cans are shipped to a plant in northern Alabama, where they are melted down and cast into ingots. The ingots are rolled into sheets, shipped to can plants around the country, then printed for customers such as Pepsi and Miller for refilling—a six-week process. The company recycles a million pounds a day, or as many cans as it sells, achieving a 100 percent recycling rate.

"Recycling wasn't in the dictionary in 1968," says Charles Rayfield, a 1963 graduate of the School of Management and vice president of operations for Reynolds Recycling. "We were the first company to establish recycling centers and to offer the public money for containers. It's very much in vogue now, but it certainly wasn't in those early days. We pioneered the idea of aluminum recycling in the United States."

Reynolds's trailblazing work is all of a piece with the new efforts many industries are making to clean up their acts. "This organization is a nationwide reverse-distribution system," Rayfield adds. "Instead of selling, we're buying. What we sell is money. We're a retail business, out there on the corner, offering the public an opportunity to recycle aluminum and get money for it."

Aluminum recycling works because scrap value merits the cost of an elaborate collection network. Competition for aluminum cans is fierce. In Houston more than 120 centers vie for aluminum, which currently sells for about 23 cents per pound. However, the price has risen

as high as 50 cents a pound. Reynolds and its competitors advertise prices in newspapers and on television and radio. Even though Reynolds has the largest network of recycling centers, its share of the market is just 20 percent.

Rayfield admits a large part of the rationale for recycling is economic—resource recovery simply pays off. But the marriage of economic and environmental advantage is ideal. Each time aluminum is recycled, 95 percent of the energy originally used to make aluminum from bauxite ore is saved. The recycling process, which can be repeated over and over again with no loss of quality, results in enormous savings of energy and natural resources. Metals account for five or six percent of municipal solid waste, of which aluminum represents about two percent. Sixty-four percent of aluminum cans are recycled in the United States.

Nine states, including New York, have passed bottle bills requiring a deposit on each container, proof that David Reynolds's vision of materials recycling continues to flourish. Ironically, deposit laws effectively drive Reynolds Recycling and its competitors out of business, assuming the materials collection business as a governmental function. It's a trend that Rayfield, as a businessman, must watch carefully. In the meantime, he shares the company's pride over having foreseen this trend.

"This has been a lot of fun for me," he says. "I never would have dreamed I would be involved in recycling. We love to see this blossoming of environmental awareness and the green movement. It makes our customers aware of the benefits of what we do." —GEORGE LOWERY

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**SINCE** 1968, Reynolds Aluminum Recycling Company has recycled 120 billion aluminum cans. In 1990 alone, 9.3 billion cans were recycled, bought at 625 manned locations and 100 automatic can-recycling machines.

With recycling companies and government-run outlets included, there are about 10,000 recycling centers in the United States, serving six million can-recycling customers per year. During the 1980s, 375 billion cans were recycled nationwide.

**POWER**

*In Florida: Our appetite for the almighty watt*

It's Christmas Eve. Tree lights glow in every home. Many houses, too, are trimmed with colorful blinking lights. The furnace is turned up just a tad higher than usual, as there's a cold front coming through. Suddenly everything is black—a massive power failure, brought on by overtaxing of the entire system.

The above scenario actually happened in Florida during Christmas 1989. The writing had been on the wall for some time and Florida Power Corporation (FPC) was already forging ahead with plans to build a new power plant, though it won't be complete until 1998.

The need for energy grows constantly. And despite recent concerns about energy conservation, per customer use of electricity has increased. More people are using more appliances. Fewer and fewer homes are built without central air conditioning. Our heavy reliance upon modern conveniences appears to be permanent.

It is clear we all need energy, but it doesn't come without a price for the environment. Utility plants emit such air pollutants as sulfur dioxide, nitrogen oxide, and carbon dioxide by the thousands of tons. Today, the need for power must be balanced against its detrimental impact on the environment. In Florida, this is the concern of Kathleen Small, FPC's environmental project manager. Currently working on licensing a new plant, she says, "My job is to answer the question: Will the new power plant exist with nature in a peaceful and positive way?"

The new plant will, according to the 1979 Maxwell School graduate in geography. The facility will use a two-step generation technology, in which combustion turbines are fired by natural gas, and waste heat is then recovered in a steam generator. This provides a more efficient use of raw resources.

If necessary, the facility may also be fueled by coal using a coal gasification process. By using high quality, low-sulfur coal, annual sulfur dioxide emissions will be in check, though this may increase customer rates.

According to Small, who spent eight years with New York State Electric and

Gas Corporation before heading south, the process of creating a new power plant is a lengthy one, involving environmental studies and a complex regulatory approval process.

A good two years was spent on site selection for the plant FPC now plans to build. The company evaluated environmental factors, socio-economics, human impact, and engineering feasibility.

"There are just some places that we would not build a power plant," says Small. "We're not going to go down to the Keys and build a power plant, or in the middle of a city, state park, or national forest." Vegetation and animal impact is taken into account also, she adds.

For the new plant, FPC chose a site in central Florida's Polk County. The 7,000-acre area had previously been a phosphate mine. From the mining days, holes and irregularities were left in the ground. These basins will store water for the power plant's cooling and recirculating processes.



DAN JURGENS/PEPPER ROSE PRODUCTIONS

*Kathleen Small*

**THE** average American household uses 8,930 kilowatts of energy per hour. In Florida, the average is 12,319 kilowatts per hour.

Texas leads the nation in per capita electricity consumption at 783.6 million BTUs. (One BTU equals 3,412 kilowatt hours.) Alaska is lowest with 14.1 BTUs and Florida comes in fourth with 472.4 million.

Overall electricity consumption in the U.S. during 1990 almost doubled that of 1970.

The total number of Florida Power Corporation customers in 1990 was 1,157,966. In 1990, there were a total of 28,888 new customers, for an average of 79.1 new customers per day. The average residential energy use in 1990 was 12,319 kwh, a 2.2 percent increase from 1989.

"What the mining companies left was, in fact, a good situation for us," Small explains. "We wound up with a location that attempts to make the best use of an already disturbed piece of land, so we felt this was a good environmental step."

Currently FPC is designing studies and field investigations to test the quality of the existing environment. A year will be spent monitoring air quality, conducting inventories of the wildlife and natural habitat, and studying the ground water composition. Land use compatibility will also be examined. These tests are implemented to establish a baseline against which FPC and the regulatory agencies can judge impending impact.

After the tests are completed, regulatory agencies will review the power plant's application, and with approval FPC can begin construction. In November 1998, after almost a decade of preparation, 200,000 homes in central Florida will reap the energy benefits from this project, and breathe easier in doing so.

—ANDREA C. MARSH

## RECYCLING

### *The home front: Saving our bottles and cans*

Christmas trees were the first to go. Then paper, glass, and aluminum. More than 20 years ago in the town of Manlius, east of Syracuse, Barbara Lipe spearheaded curbside recycling in Onondaga County. A comprehensive recycling program was adopted in 1989, and most county residents now separate household trash and place it in ubiquitous blue bins for collection.

"After Christmas in 1970, we invited people to recycle their Christmas trees and take home the mulch," Lipe says. "It was a huge success. People in Manlius were very conservation-minded. They liked the idea and were glad to have a place to go."

That place was Lipe's dairy store. Following the successful tree drive, a nearby barn became Manlius's first full-time recycling center. "We just put a sign up and people left their glass, aluminum, and paper," Lipe says. "Because people were very tuned-in to the issue, they responded well."

The grassroots efforts of volunteer heroes like Barbara Lipe are beginning to mushroom nationwide. Manlius was at the leading edge of communities who seeking to reduce their solid waste stream and minimize resource depletion by way of recycling. In Manlius, solid waste has been reduced 41 percent by recycling.

The Manlius story is a happy one partly because Lipe found a means of harnessing volunteer power. She approached the board of a local scholarship program (of which she was a member) and "asked them if they would like to provide us with some help in exchange for the money we took in," Lipe says. "We married the recycling center to the program. They needed money, we had the resources to sell, so they provided the labor every Saturday, year-round. After that, activity increased so much that we needed a pool of regular volunteers committed to this work."

The barn's equipment consisted of a few barrels until the scholarship program gave money to purchase a glass crusher. "That's all you need for a recycling center," Lipe says. The Town of

SEVEN

different separations are made in the kitchens of Japanese homes, which recycle 50 percent of all household waste.

While Japan has been recycling for 50 years, Americans are trying to catch up. All but two states—Idaho and South Carolina—enacted some type of recycling law in 1990. Thirty-three states (and the District of Columbia) have comprehensive laws requiring detailed statewide recycling plans and/or separation of recyclables and at least one other provision to stimulate recycling.

Manlius agreed to transport the recyclables, and the center's intake continued to grow. Paper went to the Rescue Mission, aluminum to the Boy Scouts.

Volunteers ran the center until the town took it over 15 years later. Since then, Manlius has expanded its recycling activities. A school bus was converted into a mobile collection unit. A redemption center in the village accepts returnable containers. Farmers buy newspaper to use as bedding for livestock.

A 1948 graduate of SU's College for Human Development, Lipe chairs the Onondaga County Environmental Management Task Force, which she organized. "Recycling has been integrated into municipalities all over the country," she says. "It's become part of government. Environmental advocacy is being done on a larger scale."

"When you live in a suburb or a rural area, it's much easier to do the things I'm talking about," says Lipe. "If you live in a very crowded, urban area it's more complicated. It's easy to be critical of the cities, but they have more to deal with. Not everyone can compost."

On her rolling acreage in Manlius, Lipe lives her philosophy, using a long feeding trough to compost vegetable matter like corn husks, lemon peels,

grass clippings, and coffee grounds. "Composting just seems natural: it enriches your soil, cuts down on the stuff you throw away," she says. "I use it as a soil supplement. It's another way to use a resource and a sensible way of looking at the environment."

Many people in the environmental movement are motivated by their interest in preserving land and water sources. Lipe attributes her interest in recycling partly to growing up during the Depression. "Everyone was a recycler then. We didn't throw so much away, and the idea of saving resources was ingrained. Things became easier to throw out until we were faced with a major trash problem and the cost of hauling it away," she says.

"If people demand that products come in recyclable containers, manufacturers will respond," Lipe adds. "Batteries and tires will have deposits and go back to manufacturers. Wherever the problem is the biggest, people are most aware. If your trash bill goes up, you want to know why. If they want to put a landfill next to you, you'll examine what can be done." —GEORGE LOWERY



*Barbara Lipe*

STEVE SKOTON

**SPECIES**

*Northwest forests: Cancer and the cost in ecosystems*

**T**he lanky Pacific yew tree is at the crux of a volatile issue. Its bark produces taxol, now a proven component of an anti-cancer drug.

Targeting the disease with a natural product is good news for cancer patients, but the yew tree grows in protected territory. Because the compound is so chemically complex, a commercially available synthetic version is probably 10 years away.

A year ago the Environmental Defense Fund, a New York City public interest group, and several cancer associations filed a formal petition to list the Pacific yew as a threatened species—one group acting on behalf of nature and the others on behalf of humanity.

It's Len Carey's job to reconcile the needs of environmental interest groups, industrialists, and, most recently, the National Cancer Institute (NCI). He is a public affairs specialist for the U.S. Forest Service in its Wildlife and Fisheries programs.

"You have two committed groups

with conflicting interests; both want the yew continually available for different reasons," says Carey, a 1972 graduate of the College of Environmental Science and Forestry. "Both sides fear we'll run out."

Medical researchers say tens of thousands of trees need to be cut to meet the soaring demand for taxol. And in truth, those trees exist: A Forest Service survey of 11 million acres in Oregon and Washington showed that there are an estimated 23 million yews large enough for taxol extraction. But to date, less than one percent have been harvested, because yew trees are found in ancient forests west of the Cascade Mountains.

"The tree is not a threatened species, because it is plentiful. But larger yew trees are concentrated in old-growth forests, a refuge for older endangered species like the spotted owl. This makes harvesting the yew an ecological concern," says Carey. Consequently, he adds, "It's been a struggle to keep up with the demand for the bark."

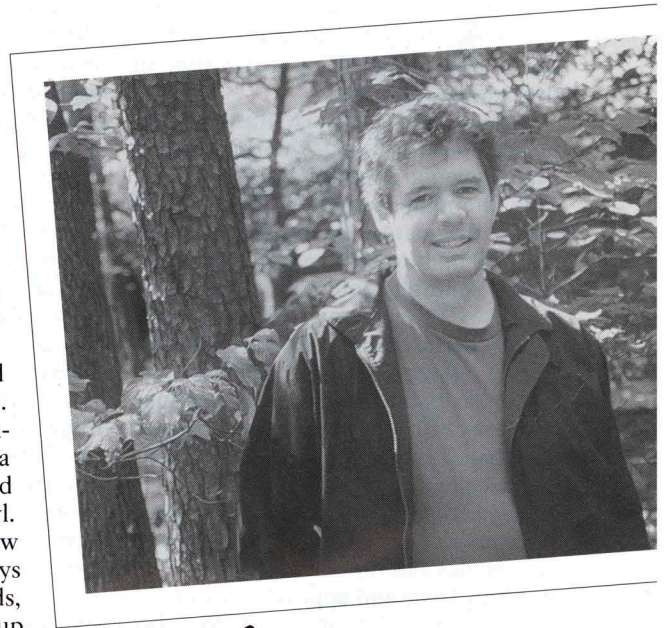
The issue epitomizes the ultimate negotiation between the environment and people's needs. It's a difficult, moral conflict, says Carey, whose job it is to facilitate negotiations and agreements between interested parties such as the National Wildlife Federation, Audubon Society, and National Forest Products Association.

A research program is well underway for a yew tree farm, as well as an artificial derivative. According to Carey, "We're also trying to find other natural sources of taxol, including extracting it from the heartwood of the tree and plant tissues."

The need for forest resources for products like taxol, as well as harvesting timber, arouses concern about the increasing vulnerability of old-growth forests. The spotted owl, which shares its habitat with the yew, is in jeopardy. Can we afford the economic cost of saving old-growth forests, or must we sacrifice the spotted owl?

The owl is an indicator species of many other species that rely on old growth forests. "If we tend to the needs of the owl, other species can be protected. If we lost the owl, the ecological balance would be off," says Carey.

There are calls to invoke what is called the "God squad" on the spotted owl. The committee, which consists of the secretaries of agriculture and the interior, secretary of the army, and administrators in the Environmental Protection Agency, would decide essentially whether the



*Len Carey*

spotted owl will be allowed to become extinct.

Carey explains, "If protections are removed for the spotted owl, its habitat, without legal requirements, could be logged. There could be a loss of population viability and insufficient breeding to maintain populations in the wild. The animal wouldn't survive."

To avoid further the depletion of land, the commitment of people is needed. Money, too. "We need more biologists to monitor species on public and private lands, thereby setting up a system that gives off warning lights when trends for these species change," Carey says.

"The time to address a disappearing species is not when the species is on the brink of extinction, but well before, when it first starts to diminish, when populations are high enough for successful management." —THERESA LITZ

**FROM** Alaska to northern California, spreading eastward into Idaho and northern Montana, yew trees distinguish our ancient forests. Yew harvesting is regulated by the Forest Service, which calls for maintaining the habitat necessary for the survival of spotted owl.

For years timber companies routinely cut and burned yew trees—approximately 90 percent of the original population was destroyed. Estimates of remaining yews range from 1.3 million to 23 million. Since it can take as long as 200 years for a yew to reach a height of just 40 feet, the tree must be managed carefully to preserve its natural life cycle.

Conservationists want large pharmaceutical companies to cultivate yew shrubs or use the yew's needles, rather than harvesting whole trees for the extraction of taxol, a cancer-fighting agent.

## GREENHOUSE

### *Overseas: Developing economies and new problems*

**A**s Eastern Europe and Third World countries develop, they add stress to the Earth's fragile atmosphere, and as standards of living rise, so rises global pollution.

A household appliance illustrates the problem. Only two percent of families in Beijing owned a refrigerator in 1981; by 1987, the figure surged to 62 percent. If these refrigerators are inefficient, more coal will be burned to make more electricity, sending more soot skyward. If they use CFC coolants, the threat to the already battered ozone layer intensifies.

Technology choices are vitally important in developing countries. Increasingly, energy efficiency and environmental responsibility are tied to broader economic concerns.

The Oak Ridge National Laboratory in Tennessee operates as a consultant of sorts to developing industrial bases. It performs basic and applied research on energy and the environment, and also functions much like a think tank, offering technical assistance, energy policy options, and advice to governments.

"I help develop energy strategies that developing countries need for their industrialization and development, while at the same time reducing pressures on the global environment," says



**OAK** Ridge National Laboratory, operated by Martin Marietta Energy Systems for the Department of Energy, is one of the Department of Energy's multi-program national laboratories.

The lab's original mission was to produce and chemically separate the first gram quantities of plutonium as part of the national effort to produce the atomic bomb. Today, Oak Ridge's missions in support of the Department of Energy include energy production and conservation technologies, physical and life sciences, scientific and technological user facilities, and environmental protection and waste management.

Thomas Wilbanks, corporate research fellow and manager of developing country programs at the laboratory and a 1967 graduate of the Maxwell School. "That used to be a back-burner issue because world oil prices had leveled. But in 1987 or 1988 concerns rose about global environment change and U.S. economic competitiveness in world markets. Then people rediscovered the importance of developing countries."

The competitiveness issue is important at the laboratory, where supporting environmentally responsible technology overseas is seen also as a commercial opportunity. America wants to stay ahead of energy/environment priorities sweeping industry.

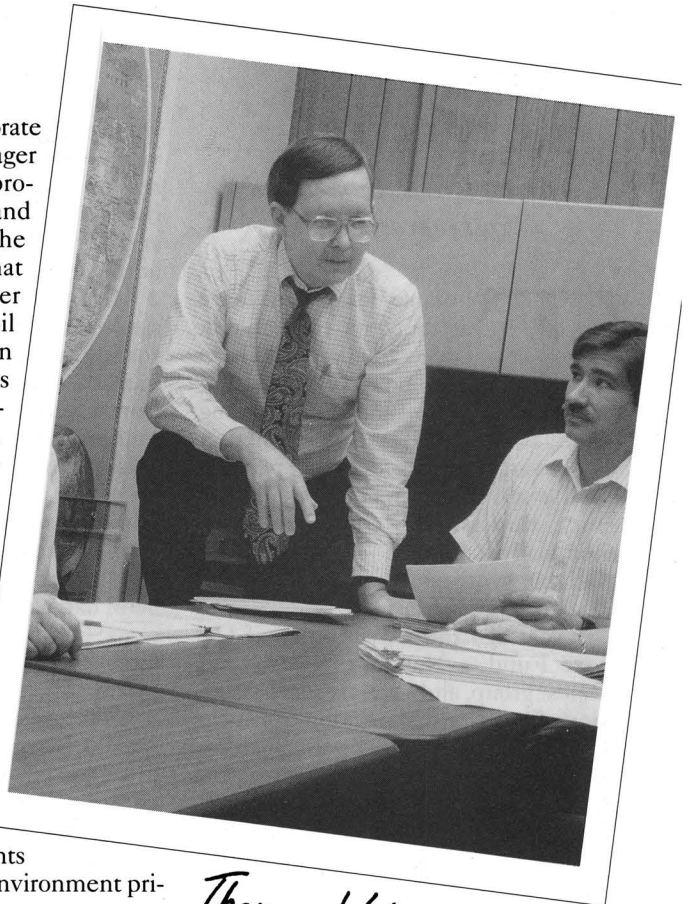
Over the past six years, Oak Ridge staff members have worked on 50 projects in 30 developing countries in Asia, Africa, Latin America, the Caribbean, and the Middle East, dealing with every energy technology, except nuclear power.

A \$200,000 project to develop a national energy strategy in Liberia during the mid-eighties resulted in a \$15- to \$20-million annual saving, equivalent to two percent of Liberia's gross domestic product. In Pakistan, Haiti, and Madagascar, where wood is used for fuel but deforestation is a problem, the laboratory recommended use of clean-burning charcoal briquets.

Raw coal, a sizable source of greenhouse gas emissions, is also widely used in Eastern European industry and for home heating, producing smoke, sulfur dioxide, oxides, and nitrogen.

"A characteristic smell of Eastern Europe in winter is smoke from poor-quality coal," Wilbanks says. "By comparison, briquets emit carbon monoxide, but little sulfur dioxide or soot, which goes into ash. They can be used to dramatically reduce regional and local air pollutants."

Oak Ridge and other institutions recently presented the Global Energy Efficiency Initiative (GEEI) to Congress.



*Thomas Wilbanks*

If implemented, GEEI recommendations to improve energy efficiency would reduce capital requirements for providing energy to developing countries by more than \$2 trillion and reduce the growth of greenhouse gas emissions by 50 percent—more evidence that environmental and positive economic implications are tied.

"I believe the concentration of greenhouse gases in the atmosphere is going to continue to increase for some time yet," Wilbanks says. "But given enough time, most countries with enough resources can adapt to impacts of climate change."

"People instinctively feel the survival of humanity is at stake," he adds. "When I talk to university and elementary students, they think it's an important issue. They're more convinced in some cases than the scientists." —GEORGE LOWERY

## ECOSYSTEMS

*On the plains: Prairie dogs and black-footed ferrets*

Picture this: miles of arid land surrounded by granite cliffs and lodgepole pines. A mound of earth moves and up pops a prairie dog. A biologist observes the vermin with delight. For the first time in decades, scientists view the prairie dog as a hero not a menace. In a controversial move, the Bureau of Land Management (BLM) has dedicated 12,000 acres in central Montana to the preservation of prairie dog towns.

"We're trying to reintroduce the black-footed ferret, and prairie dogs are the prey base," says Dan Lechefskey, a land-use specialist for the U.S. Bureau of Land Management and a 1972 graduate of the College of Environmental Science and Forestry. "Five years ago there

**SINCE** the turn of the century, ranchers have applied control measures to reduce prairie dog populations, the black-footed ferret's primary prey. With the demise of the prairie dog, however, came the virtual extinction of the ferret.

National recovery goals call for establishing at least 10 free-ranging ferret populations, spread out over the widest possible area, with 30 or more breeding adults in each. By the year 2010, biologists hope to have 1,500 ferrets in the wild.

were only 30 black-footed ferrets left in the wild, and they were put in a captive breeding program that brought the population up to 500." The BLM is about to release this experimental population into the wild just south of Billings, Montana.

Such undertakings call for careful land management so that human livelihood and wildlife diversity can be protected, and possibly improved. Without proper management, the fear persists that prairie dogs will continue to compete with cattle for vegetation. For as long as there's been ranching in the west, there has been a flagrant desire to squeeze the small burrowing animal out of the ecosystem.

Scientists have long known what farmers and ranchers are slowly learning, too: The prairie dog plays a significant role in the ecosystem. By disturbing and mixing soil the prairie dog improves the quality of forage produced on this land. Since a variety of plants colonize prairie dog mounds, species diversity increases. It's been shown that buffalo preferentially graze on mounds.

Ferrets and prairie dogs share their fate with cottonwoods, shrubs, and cattails for which the BLM also has launched a major nationwide initiative. For the past five years they've been restoring the lush streamside (riparian) territory of the northern great plains. "By improving grazing management, riparian areas are coming back," says Lechefskey.

These regions enhance species diversity in a dry, often harsh environment.

"Riparian areas attract wildlife from big game animals to song birds," he explains. "But because of the available water and lush forage, it tends to get trampled and overgrazed, especially by livestock. Given sufficient time the land heals itself."

In some cases, Lechefskey says, "We use rest-rotation grazing—a system where cattle are only allowed in the area maybe once every three years. This gives the area two years to recover."

Simple management practices can ease the effects of human land use on wildlife. Limiting off-road vehicle use, restricting logging in fragile areas, and imposing strict guidelines for road construction help expand grazing grounds for wildlife and maintain habitat equilibrium. "We're responsible for seeing that wildlife has some security against environmental changes," says Lechefskey.

The question remains: With numerous ecosystems becoming increasingly unbalanced, does wildlife depend on humankind to govern its habitat? Land use and human impact have set in motion the chain of cause and effect; humans destroy the land, only to attempt to revive it. But it may well be incumbent upon humans and not nature to manipulate the ecosystem.

The BLM oversees 200 to 300 million acres of land, mainly in the 11 western states and Alaska. "What we are most concerned about," says Lechefskey, "are water quality in the west, preventing erosion, and maintaining economic stability of rural western areas, which depend on grazing and forestry, and, to some degree, mining," he says.

If ferret and prairie dog reintroductions are successful on the appropriated land, ranchers wonder if more land will be used exclusively to propagate endangered species rather than feed cattle. "People are afraid," says Lechefskey, "because they've never had to deal with this before. The land-use plan may mean, in the long run, some ranchers will not be able to raise as much livestock."

While people display a sensitivity toward the value of wildlife, the scenery, clean water and open space, he says, "ranchers, loggers and miners, outfitters, and others closely tied to the land depend on it first for their livelihood."

—THERESA LITZ

ROBERT ALLEN/BUREAU OF LAND MANAGEMENT



*Dan Lechefskey*



## THE SOIL

### *Down on the farm: Dirt as a starting point*

In the days of the dustbowl, they were called black blizzards: dust storms so severe railroad cars and farm houses were mired in great dunes of windblown dirt. Then, water and wind erosion was a phenomenon restricted to the West. But decades of poor management and millions of acres of depleted farmland make erosion a nationwide concern.

"Agriculture has been pinpointed as one of the major contributors and producers of non-point-source pollution," says Ann Carey, associate deputy chief for technology for the Soil Conservation Service (SCS). In many cases, pesticides and fertilizers add to the problem.

Soil erosion is one of the more unobtrusive environmental problems we face, but its effects are far-reaching. Runoff from the land carries sediment,

**THE** annual price tag for erosion damage in the United States is estimated at billions of dollars, and a quarter of the nation's cropland exceeds acceptable erosion rates.

Erosion is the greatest threat to the nation's soil productivity and the largest source of pollutants in our waterways. On-land farm damage from erosion includes lower yields of crops and forage and higher fertilizer use.

Water causes about two-thirds of the erosion of our agricultural land. Lush grasslands are reduced to scrub and gullies from overgrazing by livestock, which stimulates erosion. Dredging sediment from rivers and reservoirs choked by algae and mud are as costly as removing harmful chemicals from the water supply.

fertilizers, and pesticides into streams and lakes. Research by the Conservation Foundation estimates that sediment and related pollutants may cause \$6 billion in damage each year. Of this, cropland-related pollutants are responsible for more than \$2 billion.

Every U.S. farmer produces enough food to feed 129 people, a phenomenally large quantity that is dependent on herbicides, insecticides, and fungicides. Unfortunately, though, says Carey, a 1972 graduate of the College of Environmental Science and Forestry, "farming practices that evolved years ago encourage farmers today to continue to add that extra 50 pounds of

nitrogen or pesticide to try to improve the quality of the crop."

Erosion and long-term accumulations of sediment and pesticides stimulate weed and algal growth that damage vital marine resources. Nationwide, waters are

unfit for fishing, swimming, and drinking, which adds millions of dollars annually to the cost of water treatment.

"To receive commodity payments and technical assistance from the United States Department of Agriculture (USDA), farmers had to work with SCS to come up with management practices to reduce erosion on their property," Carey says. The farm bills of 1985 and 1990 subsidized soil management practices such as grass waterways, terraces, or laid-out strips of grass that hold rain water. "If the farmer will put in certain contour or grass strips the service will provide 25 percent or so of the cost of conservation measures on property," says Carey.

While advanced farming practices may work, they don't guarantee acceptance by the indigenous population. "There are a lot of sociological aspects to adopting farming techniques and practices," says Carey.

The local agricultural organizations still have yield contests for farmers to produce more bushels per acre. "At state fairs, fertilizer companies and distributors encourage optimum production. Slowly people are realizing this may not be the way to go, but it's hard to get away from tradition," Carey says.

Some farmers work the way their granddaddys did and are not using technology to its full capacity. "Savvy, college-educated farmers want to find out how much of this research is on database so they can access it from their home computers. Low-income farmers, on the other hand, have limited capability to carry out practices, because of high labor costs and the shrinking size of families. There are not as many people to do the work."

The USDA does not favor federal regulation to solve this problem, according to Carey. An ideal combination, she says, would be state and local regulation. Today farmers are beginning to accept that. Farmers and ranchers are becoming aware that what they do on their land affects the overall environment.

"This has made them more amenable to realizing if they don't do something themselves and can't encourage their colleagues to do something," Carey says, "the only way to control the problem is regulation." —THERESA LITZ



*Ann Carey*

## COASTLINES

*New England: Worse than tea in the Boston Harbor*

Few bodies of water have attracted more attention than the outrageously befouled Boston Harbor, whose grimy waters George Bush used to discredit former Massachusetts Governor Michael Dukakis during the 1988 presidential campaign.

For 14 years so far, the state has failed to comply with the Clean Water Act of 1971, which required secondary treatment of sewer effluent, by applying for variances.

Across the country, municipalities built appropriate sewer treatment facilities, even as Boston Harbor grew ever more fetid and rank. In 1985, the Environmental Protection Agency (EPA) joined with other groups to sue.

Such horror stories have prompted a growing concern for an awareness of our waterways. From Maine's Casco Bay to Long Island Sound, reversing the degradation of New England's coastline is a top priority for Julie Doren Belaga, regional administrator of the EPA.

At the helm for the past year and a half, Belaga, a 1951 graduate of the School of Education, has directed almost 800 federal employees from her Boston office. She is charged with overseeing the implementation of the Clean Water and Clean Air acts, which embrace a daunting range of environmental laws.

The suit against Massachusetts succeeded. "With the help of a very tough-minded judge," Belaga says, "we helped craft a calendar of events that Massachusetts is required to live up to." The EPA monitors the state's compliance with mandatory clean-up measures, and writes a monthly report to the courts.

Today, Belaga says, the EPA "works very cooperatively with Massachusetts to see to it that this project moves forward."

The turnabout will be boosted by a \$3.7 billion investment in harbor clean-up, with a sewage treatment facility now rising on Deer Island, whose design and construction has EPA input. "We are moving forward," Belaga says, "building secondary wastewater treatment plants, looking at their combined sewer overflow, and getting the scum and sludge

out of the harbor on a tight time schedule. It's been a very long process."

The harbor is part of the Massachusetts Bay Estuary, one of five New England waters—Casco Bay, Buzzards Bay, Narraganset Bay, and Long Island Sound—in a federally designated estuary program designed to identify and rectify health and environmental risks, such as degraded beaches and unusable public parks.

Working collaboratively, the EPA, state governments, environmental groups, and volunteers develop management plans. Following study and analysis, with data in hand, an "action plan" is put in place to clean up the estuaries.

After five years of research, recommendations for Buzzards Bay are about to be implemented. "Buzzards Bay was one of the first estuaries studied," Belaga says. "A series of actions is coming there, including land-use planning."

The sources of pollution have changed. Pipes spewing clandestine toxics—"point" sources—into rivers persist, but today's pollution more often originates at municipal sewer treatment facilities and non-point sources.

"We have cracked down on industry," Belaga says. "But storm water runoff onto parking lots and roads sweeps gasoline products into coastal waters, and there is agricultural runoff. We have a multifaceted problem, and it's tough to get a handle on it."

**I**N 1985, the EPA filed suit forcing the clean-up of Boston Harbor. By December of this year, all discharges of sewage sludge to the harbor will end.

By 1995, the construction of a primary treatment plant handling 1.2 billion gallons per day of sewage and a nine-mile outfall pipe for treated waste water will be completed.

Construction of the secondary treatment facility will be ready for operation by 1999.



*Julie Belaga*

Among its efforts to correct these ills, the EPA works with states on land-use legislation, and with farmers to educate them about appropriate fertilizer and pesticide use. The agency often becomes aware of environmental abuses when citizens and groups complain. A staff of 65 lawyers enforce laws against violators.

A former teacher, Connecticut state representative, and television commentator, Belaga is not discouraged by New England's complex environmental woes, and she is upbeat about Boston Harbor's future. "We're on the tip of a real success story. It was so badly neglected, but we think we're finally turning it around," she says. "It's never too late for the environment."

"Things will eventually turn around. We've spent the last 20 years in an end-of-the-pipe mentality. Now we've got to take a very different look."

—GEORGE LOWERY