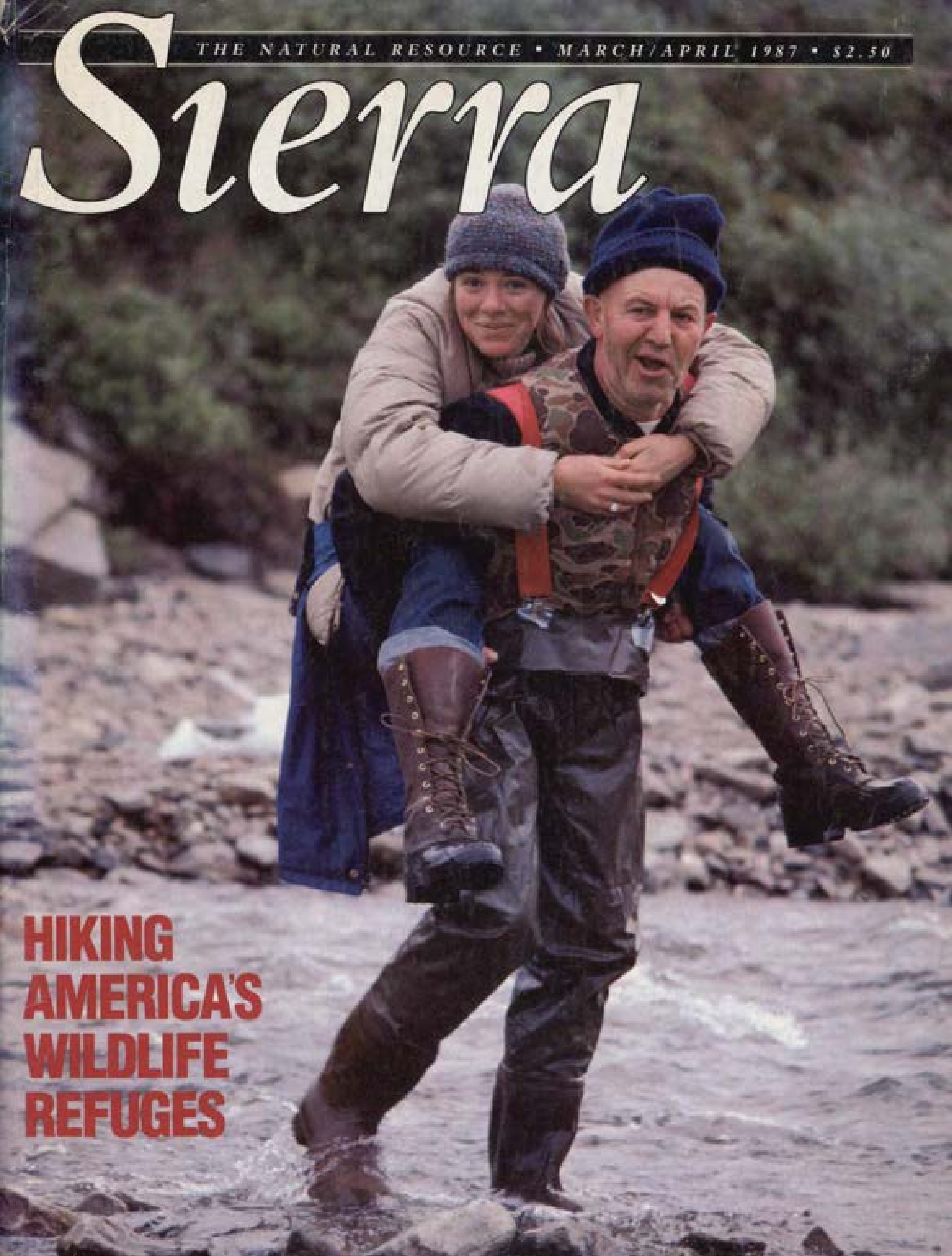
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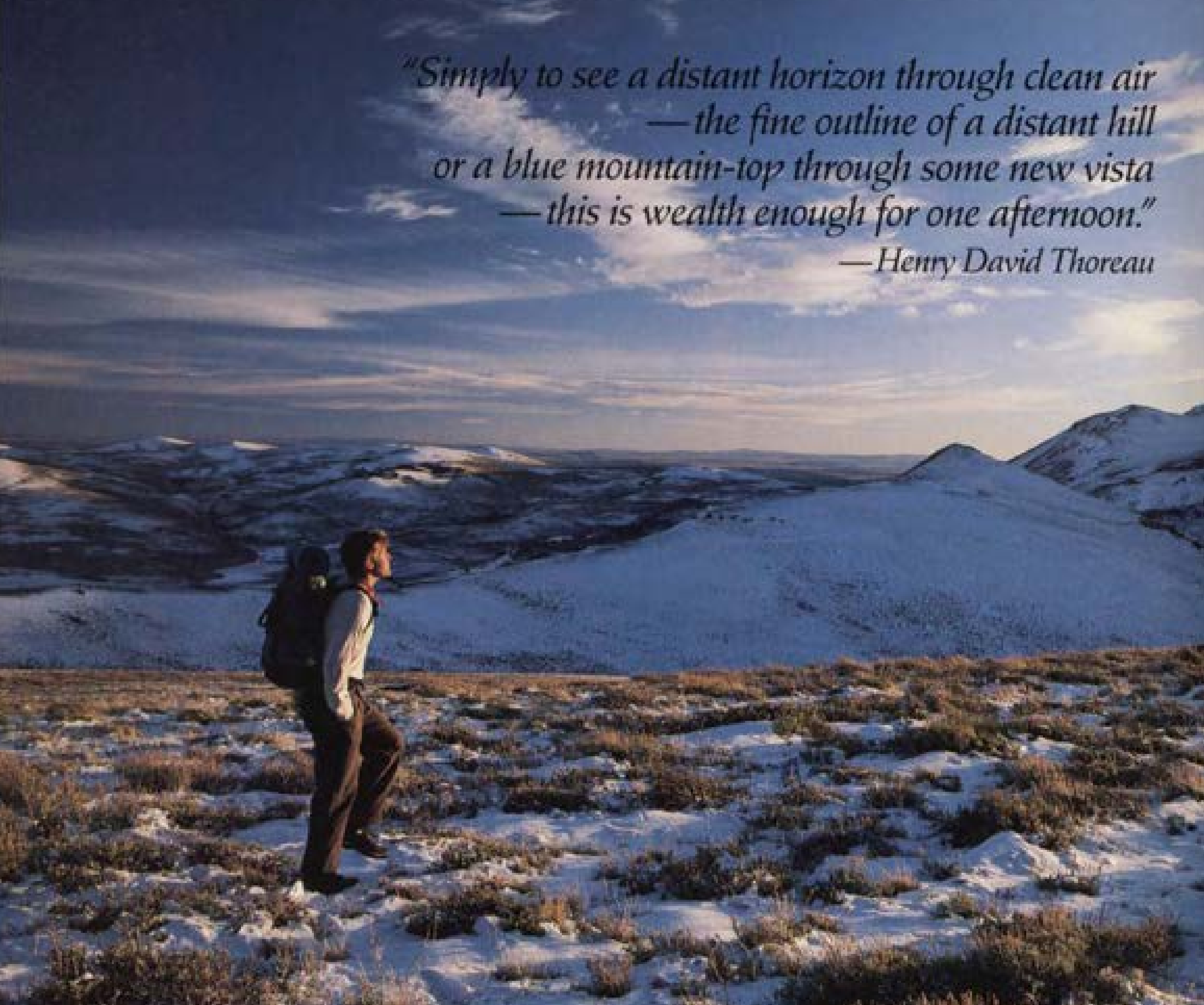

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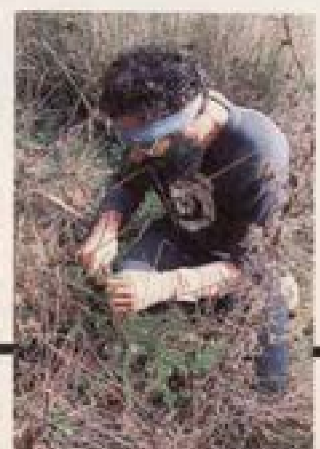

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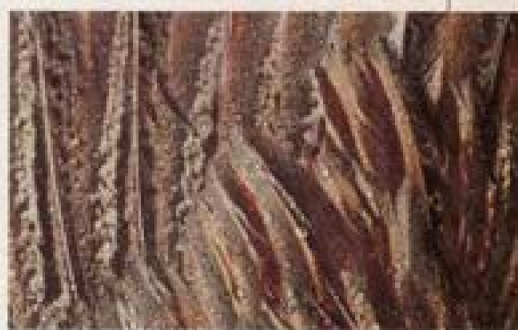

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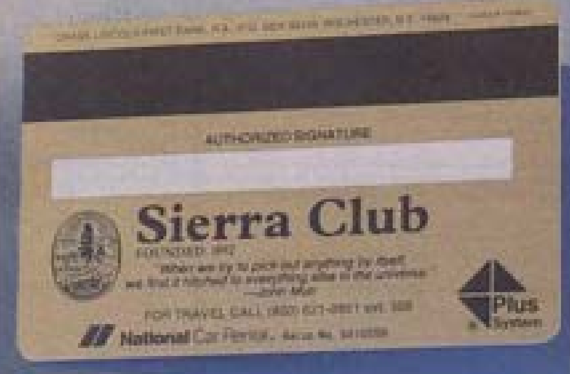

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Street Address | City | State | Zip

☐ Own ☐ Rent | Monthly Pymt. $ | Years There | Home Phone ( )

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Nearest Relative Not Living With You | Relationship

Address

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Employer | Position | Years There

Address | Business Phone ( )

Previous Employer | Address

FINANCIAL & CREDIT INFORMATION

Gross Annual Salary $ | No. of Dependents | Other Income* $

Source of Other Income*

Checking Account Bank Name | Account No.

List all outstanding obligations. Attach additional sheet if necessary.
PAYABLE TO: | Address

Original Amount or Credit Limit | Unpaid Balance $ | Monthly Payment $

PAYABLE TO: | Address

Original Amount or Credit Limit | Unpaid Balance $ | Monthly Payment $

PAYABLE TO: | Address

Original Amount or Credit Limit | Unpaid Balance $ | Monthly Payment $

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X ______ Date ______

SIGNATURE OF JOINT APPLICANT

X ______ Date ______
(Joint applicant agrees to be equally responsible for all charges made with this Card.)

LETTERS

KEEPING TABS ON NUKES

In this renaissance of Cold War mentality, I found it heartening to read "Gaining Ground Zero" by Leslie Lin ("In Depth," January/February 1987). Dr. Thomas Cochran and his colleagues at the National Resources Defense Council should be honored for finding a way to finance and put into operation at least part of a plan by which American and Russian scientists can jointly operate seismographic laboratories to keep tabs on nuclear explosions.

Plants, animals, and ecosystems do not know the difference between Russian and American missiles, poison gases, and other devices of war. We must plead with the Congress to facilitate Dr. Cochran's plan. It is still not too late for us to pull the planet back from its final destruction.

Elizabeth Schiller
N. Providence, R.I.

VIEW FROM A CHAIRLIFT

Ernest Beck, in his article "Cracks Appear in the Magic Mountain" (January/February 1987), mentions no positive features of mountain development.

On many trips to the Swiss Alps I have noted the tremendous use of these glorious mountains by both Swiss citizens and foreign visitors, who enjoy and respect the natural beauty of these mountains throughout the year.

In contrast, minimal access to America's mountains exists in part from the efforts of the Sierra Club. Where access does exist, the areas are extremely overcrowded. The elderly and infirm have little chance to appreciate alpine beauty because of restricted access.

The article could have praised the Swiss for their mountain development, which interferes little with the ecology. I personally know of no more beautiful scene than mountains graced with snow-covered trees, viewed from a ski lift.

The Sierra Club thwarts its objectives by being so one-sided in its positions. I recommend a more balanced approach by the Club. This would allow many of its positive objectives to be fulfilled, yet open use of the mountains to those unable to hike long distances.

James Carriel
San Marino, Calif.

THE BANKS AND FOREIGN AID

I want to congratulate Patricia Adams ("All in the Name of Aid," January/February 1987) and the Sierra Club for raising a crucial question: Is all aid abroad beneficial? True, people's intentions are usually good. Time after time we have seen large projects, conceived in Washington or other foreign capitals, coming into an area to help. But too often those who set up these projects fail to ask of the poor, the peasants, the farmers what *they* want, what *they* need.

Development, in order to work, needs to be an open process. We must listen to those who are to benefit from a project so that they can have some control of the process. And we must listen to donors and provide accountability.

Oxfam America stands for small-scale, grassroots projects that promote self-sufficiency and local control. In the U.S. we raise issues of environmental destruction in our educational and media campaigns.

For instance, in December 1986 Oxfam America organized a historic first meeting between a group of South American Amazon Indian leaders and Barber Conable, president of the World Bank in Washington, D.C., followed by a press conference. The Indian representatives cited the infamous Polonoreste project as a deadly threat to the environment and to the indigenous cultures of the Amazon rainforest.

"All in the Name of Aid" compellingly links U.S. environmentalists with effective aid-giving efforts abroad.

John C. Hammock, Executive Director
Oxfam America
Boston, Mass.

I have been an observer of and participant in foreign aid projects since 1962, so I read Patricia Adams' article "All in the Name of Aid" with a great deal of interest. She is quite right that projects financed by multilateral banks at times

IN SPECIAL MEMORY

The Sierra Club is saddened by the tragic loss of Sally Ann Smith, a valued employee who worked at the Club's national headquarters in San Francisco. She was on her way to work on December 18, 1986, when she was struck by a vehicle and sustained fatal injuries.

Sally, 26 years old, had been employed by the Club's Accounting Department for four and a half years.

She graduated from the University of California at Davis in 1982, with honors in managerial economics. She then brought her expertise to the Sierra Club's complex accounting needs for its books, catalog, and bookstore sections.

Sally was a naturalist and altruist. She loved hiking, camping, and backpacking. Her special interests included playing piano and an appreciation of all music and the arts. She was very active in medieval studies, creating elaborate costumes and foods for special events celebrating that era.

Sally exemplified the dedication of the Sierra Club staff to the organization. She was admired for her superb talent and warm, helpful manner.

Sally will continue in the memories and hearts of all who worked with and knew her. A special memorial fund has been established to create a commemorative piece that will bear Sally's name and will be placed in the William E. Colby Memorial Library at Sierra Club headquarters.

She is survived by her parents, William and Patricia Smith of Oakland, three brothers, and her fiancé Guy Cox.

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end up as environmental or other types of disasters.

The root of the problem is that these aid institutions are *banks*, and as such they are controlled by financiers, who in turn are advised by economists. The social scientists and environmentalists on their staffs have almost no influence. The financiers and economists seem to think money is always a positive good that can at least ameliorate, if not solve, all problems.

What they seldom realize is that money more easily distorts situations. Unless it is spent wisely, money tends to exacerbate bad conditions—and it is not easy for developing countries to spend money wisely. All the developing countries in which I have worked have had administrative problems. It was difficult for them even to spend well the funds they derived from their own tax systems. The funds from bank loans simply added to their difficulties in adminstering programs and managing monies.

These loan funds need to be spent creatively and thoughtfully. But the larger the amounts to spend, the more difficult it is to be creative and thoughtful. Banks and other donors to developing countries are concerned with the present and have little ability to foresee the future ramifications of their projects. Long-term concerns (such as those of environmentalists) receive much less attention than they should.

The World Bank does need to examine its whole operation so that the loans it makes actually assist rather than deter development.

Charles B. Green
Malibu, Calif.

As someone who has lived and worked for years in the Third World, I was excited to see that your most recent cover article dealt with foreign assistance. However, I was deeply disappointed by Patricia Adams' essay.

First, Adams implies that one World Bank project caused the 1984 Ethiopian famine. Besides being patently untrue (the project mentioned was not even a major factor in the famine), it is the height of insensitivity and arrogance to accuse the bank of killing its intended beneficiaries.

Second, Adams simplifies the problem of environmental degradation in the developing world to the point of absurdity. Multilateral development banks certainly play a part in this degradation, but there are other, arguably worse culprits. What about the dumping of subsidized agricultural products on "needy" countries? What of simple population pressure? How about aid that is tied to inappropriate and environmentally damaging technology? What role do host-country policies, like agricultural price controls, contribute to environmental degradation and famine?

Finally, Adams and the Sierra Club suggest that the solution to the alleged excesses of the World Bank *et al.* is greater pressure by the United States government and public on the multilateral banks to be environmentally conscious. That may well be, but external pressure on developing countries is emphatically *not* the solution to any part of the Third World's environmental problems. On the contrary, pressure of this sort will undoubtedly be interpreted and resisted by aid recipients as the latest in a long series of attempts to impose our standards on them.

The real answer lies in working *with* Third World countries, trying to make everyone see their common interest in environmental protection. But before we can do that we must understand their needs and constraints as well as their problems.

Jeff Miotke
Santo Domingo, Dominican Republic

COLD COMFORT

In your January/February 1987 "Questions & Answers" column there was a question regarding the availability of an all-season sleeping bag. You answered that there is none.

Let me tell you my solution. I have a fine goose-down bag (barrel-style). Its baffles run continuously around the bag, from zipper's edge to zipper's edge. There is no baffle wall separating the topside filling from the bottomside filling.

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Russ Handfus
Campbell, Calif.

ENGENDERING CONTROVERSY

I have lately rejoined the Sierra Club after a hiatus of several years. It was delightful to read *Sierra* again and enjoy its stimulating blend of natural beauty and political reality.

I appreciated Tom Hill's informative article on the fight for water quality in Vermont ("Priorities," November/December 1986). The subhead, however, reflected some stereotyped thinking about women that I'm sure you didn't intend.

The word "spunky," with which you described Gov. Madeleine M. Kunin, is an admiring but condescending term applied to the plucky powerless: traditionally women, children, and old people. Would you refer to Mario Cuomo as "spunky"? George Deukmejian? *Any* male governor? Gov. Kunin's gender, I'm afraid, determined your diction.

Fred Small
Cambridge, Mass.

THE JAMES RIVER—STILL CURVY

I was disappointed when I read "Old Boondoggle, New Problems" by Peter Carrels ("Priorities," November/December 1986). Carrels presents a slanted view of activities on the James River, several specifics of which have no basis in fact.

South Dakota's position on the Garrison Diversion Unit is simple and straightforward. What North Dakota does within its borders is North Dakota's business, except as it affects South Dakota. Contrary to Carrels' article, none of the Garrison Diversion Unit development scenarios that have been considered thus far involve channelization of the James River in South Dakota.

The "Garrison Extension" is a concept being explored by South Dakota to ascertain whether the state could benefit from the delivery of additional water to South Dakota, using authorized Garrison Diversion Unit facilities during periods other than peak demand. Until the operation plan for the Garrison Diversion Unit is established, the Garrison Extension remains a concept.

It appears that Carrels has confused the Garrison Diversion Unit with another project under study for the James River in South Dakota, the James River Improvement Program. This program was recommended by the five-member South Dakota Garrison Study Management Board, regardless of whether the Garrison Diversion Unit was ever constructed. The project involves development of the James River's recreation potential, protection of critical wildlife and natural areas, removal of logjams, possible modification of low-head dams, and possible channel restoration in selected areas where flow is now restricted below historic levels.

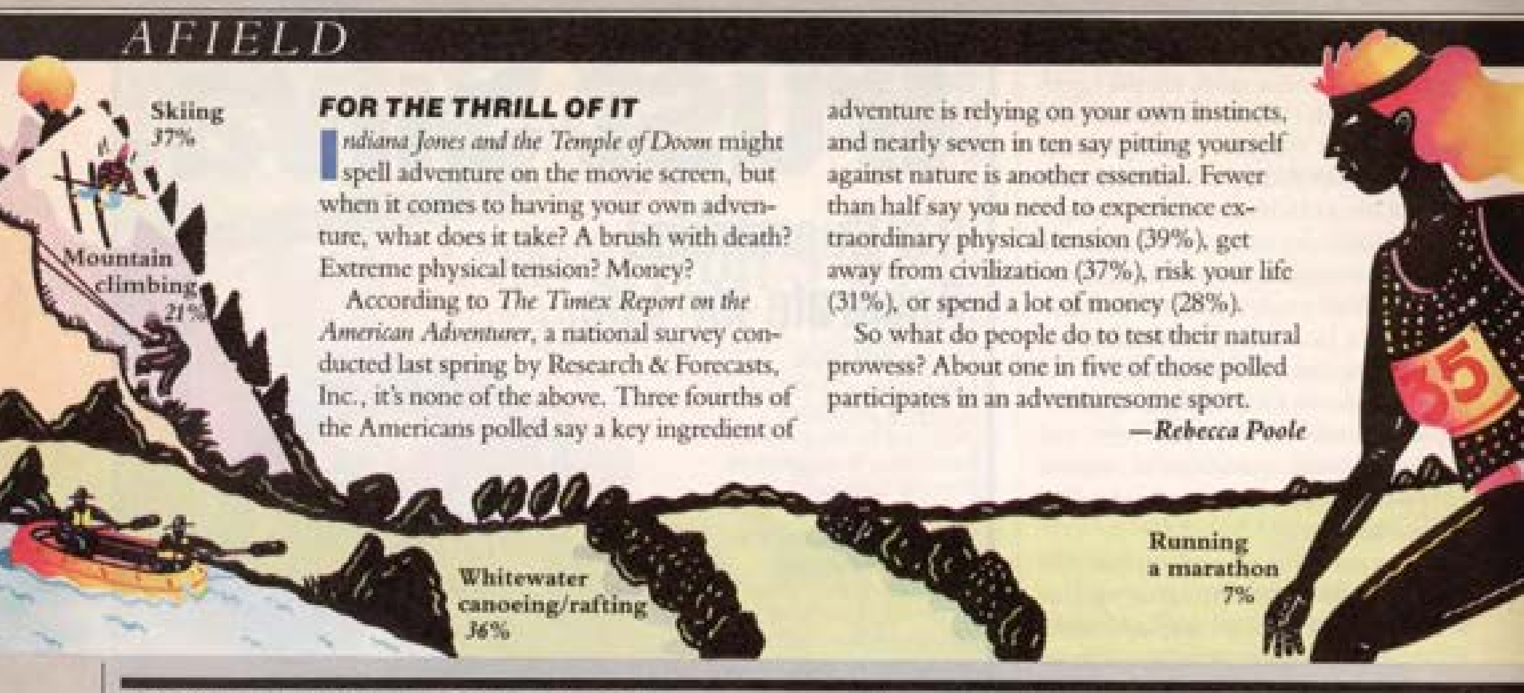
A portion of the research on that program involved the testing of various dredging and dredge-disposal techniques to determine whether an environmentally and economically sound method of mechanical channel restoration could be found. The research is now concluded after having dredged two miles of the James River. All channel work was confined within the natural banks, and the attendant studies have shown that the environmental impacts were minimal to nonexistent. In fact, they may have been beneficial in some respects.

The photograph in Carrels' article is not representative of work done at the dredge research site and bears no resemblance to that reach of the river as completed. Carrels knows this, and his use of this photograph to present a distorted view should cause one to scrutinize his objectivity.

In conclusion, South Dakota does not intend to straighten the James River or conduct any channelization. We intend to protect and, if possible, enhance all of the values of the James River in South Dakota.

John J. Smith, Secretary
South Dakota Department of Water and Natural Resources
Pierre, S.D.

Editor's note: *A Sierra editor substituted the word "straightening" for the author's word, "trenching," in a description of the Improvement Program's dredging work. No straightening was actually done, and we regret this error. But we stand by the rest of the story and the photograph that ran with it.*



FOR THE THRILL OF IT

Indiana Jones and the Temple of Doom might spell adventure on the movie screen, but when it comes to having your own adventure, what does it take? A brush with death? Extreme physical tension? Money?

According to *The Timex Report on the American Adventurer*, a national survey conducted last spring by Research & Forecasts, Inc., it's none of the above. Three fourths of the Americans polled say a key ingredient of adventure is relying on your own instincts, and nearly seven in ten say pitting yourself against nature is another essential. Fewer than half say you need to experience extraordinary physical tension (39%), get away from civilization (37%), risk your life (31%), or spend a lot of money (28%).

So what do people do to test their natural prowess? About one in five of those polled participates in an adventuresome sport.

—*Rebecca Poole*

A NEW TUNE FOR THE GOLDEN HORN

After decades of uncontrolled growth, the city of Istanbul is undergoing an environmental renaissance as a result of Mayor Bedrettin Dalan's determination to reclaim the Golden Horn, the legendary waterway that flows from the heart of Istanbul into the Bosporus.

The five-mile-long horn-shaped finger of water on the European side of the city used to be the playground of Ottoman sultans and their harems, and before that of the Romans and the Byzantines. Magnificent sunsets reflected in its waters gave the channel its name. But industrialization in the 1950s turned the inlet into the most polluted body of water in all of Turkey. Factories built along its shoreline dumped wastes into the channel and often filled in the shallow shores to expand their premises.

Then began the mass rural migration to the city. Shanty towns were built on the remaining green slopes, particularly on the hills that overlook the water. Unpainted concrete dwellings and temporary shelters dominated the landscape. Many had no electricity, running water, or indoor plumbing. As Istanbul's population grew from one million to 3.4 million people, city services failed to keep pace. Raw sewage seeped into ditches that emptied into the Golden Horn.

Mayor Dalan, elected in 1984, immediately requested a mandate from the city council to reclaim the channel. "Cleaning up the Golden Horn has become a matter of honor," he recently told *Time* magazine. An opinion poll taken the year Dalan was elected showed that 84 percent of his fellow Istanbullus agreed.

EARTHSURFACE GRAPHICS

First the amount of pollution entering the channel had to be decreased. The city bought up all property along the shoreline that was outside the public domain; eventually, no commercial and industrial activity will be permitted. Buildings will be razed—3,000 have already been removed—and a greenbelt will encircle the entire inlet.

Next a new Galata Bridge—based on a design proposed to Sultan Beyazit II by Leonardo da Vinci in 1502—will be built across the mouth of the inlet. The new fixed-pier bridge will replace an antiquated pontoon structure that blocks 90 percent of the channel's surface current, adding to

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Deep-sea fishing *32%*

Jungle trekking *1%*

Camel riding *2%*

ANDREA DEZSÖ BACH

its pollution problems.

The final stage of the clean-up will recycle the channel's waters. Pipelines will send 28.2 million cubic feet of sewage per day to a treatment plant on the banks of the Bosporus, then feed the partially treated sewage

WOLFGANG KAEHLER

into the underwater currents, where the Bosporus runs into the Black Sea. City officials contend that depositing Istanbul's sewage into the lifeless bottom of the Black Sea will have little environmental impact.

The first two stages of the plan alone will cost $380 million and will require the relocation of 500 residents and 250,000 workers. Yet Dalan still enjoys full backing from Turkey's central government and from the Istanbullus. And already there are signs of progress: Children once forced to play in the streets now have playgrounds and parks in their neighborhoods, and the narrow shore road on the south side of the channel has been transformed into a wide scenic boulevard.

—G. Lincoln McCurdy

CACTUS RUSTLERS

Cuddly they're not, and one would be hard pressed to call them cute. But "living rocks" are the latest thing for the living room, and the deserts of the Southwest are paying the price.

"Living rocks" is a popular term for the rare and endangered cacti that often look very much like their stony namesakes. These plants are one to twelve inches wide, stand less than an inch tall and, while they aren't as glamorous as some of their larger cousins, are highly prized by European and Japanese collectors for their bizarre shapes and coloring.

It takes the cacti years to reach a barely noticeable size, too long to make domestic propagation cost-effective or practical; it takes no time at all, however, to uproot and sell them. As a result cacti such as the living rock (*Ariocarpus fissuratus*) and Brady's pincushion cactus (*Pediocactus bradyi*) are disappearing from the deserts of Mexico, Arizona, California, Texas, and New Mexico at the rate of more than 20,000 per year. A recent study by Dr. Edward Anderson of Washington's Whitman College showed that numerous species are in imminent danger of vanishing forever.

Efforts to protect the cacti through the Endangered Species Act and the Convention on International Trade in Endangered Species have not always been successful. Dr. Anderson says that part of the problem is a lack of education: The government employs few experts on cactus taxonomy, and there are even fewer accurate, easily comprehensible guidebooks on the hundreds of cactus species. As a result, many dealers can slip these rare plants right by unknowing enforcement agents.

But there is hope. Several dealers who

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were arrested in California recently pleaded guilty to cactus-smuggling charges—a rare victory for those fighting to make sure the living rocks keep on living.

—Lance Frazer

A PLACE TO HANG YOUR BAT

"Holy housewarming, Robin! This makes the Bat Cave look like a candidate for urban renewal!"

Why such excitement from the Caped Crusader? Because Batman's tiny buddies no longer have to hang around in some drafty old belfry—at least not in neighborhoods where folks are willing to spend $30 on a red cedar bat house for the backyard.

The bat house is the brainchild of Dr. Merlin D. Tuttle, a biologist who lobbies on behalf of thse misunderstood creatures as president of Bat Conservation International in Austin, Texas. His contraption, which stands 17 inches tall, with fixed partitions in the interior and an open bottom, is meant to provide safe housing for any of the nation's 40-odd bat species, whose natural habitats (caves, hollow trees, haunted houses) are being rapidly lost to development and deliberate destruction.

Tuttle, a major bat booster, claims that bats have been unfairly maligned and that our fear of these animals is an irrational one, stemming largely from their nocturnal nature (and, one suspects, repeated childhood viewings of *Dracula*). Bats are "gentle, clean, intelligent animals," Tuttle says, and he promises that their extraordinary sonar will quite literally keep them out of their landlord's hair. Bats do much good work as dispersers of seeds, pollinators of trees and bushes, and devourers of insects (the endangered gray bat eats as many as 3,000 bugs a night).

For more information, write to Bat Conservation International, P.O. Box 162603, Austin, TX 78716-9990. Bat houses are $29.95 each, plus $2.75 for shipping. Remember: You can provide shelter for a homeless bat—or you can just turn the page.

—Jonathan F. King

A FOREST GROWS IN MANHATTAN

New York City is not noted for its forests; canyons, yes, but forests, no. It's fair to say that woodland preservation has not been anyone's priority here for several hundred years, if ever. But in the 1960s an urban silviculturalist-artist appeared, and in the spring of 1978 Alan Sonfist began the reforesting of Manhattan Island.

Called "Time Landscape," Sonfist's work of art occupies a 200′ × 45′ former trash lot on the southern border of Greenwich Village. Signs affixed to the post-Modernist cyclone fence that encloses Time Landscape introduce it as "an environmental sculpture of a precolonial forest, showing Manhattan's topography and plant life as it would have existed before European settlers came to the island."

At the southern end of the plot is a small open meadow and seedling forest, where during the past nine years many acorns have given birth to tiny oaks. Bittersweet, bayberry, sumac, beech, and other species grow on the restored site. The northern sector is given over to relatively mature trees, including red and white oak, white ash, red maple, tulip tree, and dogwood.

All is not serene within Time Landscape, however. In addition to the question of legal title to the site and the homeless people sleeping in the forest, Sonfist feels that after its initial enthusiasm the public is "more attracted to vegetable plots than to the history of a site. . . . It's a typical situation: the opposition feels the natural forest is too messy." But Sonfist says his detractors don't appreciate the fact that the project is "low maintenance, untouched by humans, drought tolerant, and that the earth is regenerating from falling leaves and branches."

Sonfist, who grew up in the Bronx, has loved forests since his youth, when he befriended the

—Mrs. James S. Brady—

"Help me fight the National Rifle Association."

"Five years ago, John Hinckley pulled a $29 revolver from his pocket and opened fire on a Washington street. He shot the President. He also shot my husband.

I'm not asking for your sympathy. I'm asking for your help.

I've learned from my own experience that, alone, there's only so much you can do to stop handgun violence. But that together, we can confront the mightiest gun lobby—the N.R.A.—and win.

I've only to look at my husband Jim to remember that awful day... the unending TV coverage of the handgun firing over and over... the nightmare panic and fear.

It's an absolute miracle nobody was killed. After all, twenty thousand Americans are killed by handguns every year. Thousands more—men, women, even children—are maimed for life.

Like me, I know you support *stronger* handgun control laws. So does the vast majority of Americans. But the National Rifle Association can spend so much in elections that Congress is afraid to pass an effective national handgun law.

It's time to change that. Before it's too late for another family like mine... a family like yours.

I joined Handgun Control, Inc. because they're willing to take on the N.R.A. Right now we're campaigning for a national waiting period and background check on handgun purchases.

If such simple, basic measures had been on the books five years ago, John Hinckley would never have walked out of that Texas pawnshop with the handgun which came within an inch of killing Ronald Reagan. He lied on his purchase application. Given time, the police could have caught the lie and put him in jail.

Of course, John Hinckley's not the only one. Police report that thousands of known criminals buy handguns right over the counter in this country. We have to stop them.

So, please, pick up a pen. Fill out the coupon. Add a check for as much as you can afford, and mail it to me today.

It's time we kept handguns out of the wrong hands. It's time to break the National Rifle Association's grip on Congress and start making our cities and neighborhoods safe again.

Thank you and God bless you."

"Together we can win."

Dear Sarah,

It's time to break the N.R.A.'s grip on Congress once and for all. Here's my contribution to Handgun Control, Inc., the million-strong nonprofit citizens' group you help direct:

☐ $15 ☐ $25 ☐ $35 ☐ $50 ☐ $100 or $______.

☐ Tell me more about how I can help.

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ANDREA EISENBACH

hemlock grove in the New York Botanical Garden. After his own education he spent five years at the Massachusetts Institute of Technology, where he created a program in environmental art. Sonfist then returned to New York "to create a historical presence through the forest."

The artist-forester hopes to inspire others to do their own natural refurbishing, wherever their city or trash lot. If his basic premise, "to reintroduce historical nature," is impractical, then contemporary nature would be fine, too. His vision is to return the green.

—Patti Hagan

DEBATE AROUND THE COLLAR

State wildlife officials are doing their best to save the endangered Florida panther, but according to one wild-animal expert they may unwittingly be contributing to its demise.

Robert Baudy, owner of The Rare Feline Breeding Center and Savage Kingdom in Center Hill, Fla., says the practice of collaring panthers in an effort to track their movements in the wild may prevent the cats from reproducing.

"During breeding, the male has to bite the neck of the female before ejaculation," Baudy says. "Throughout my career, which spans almost half a century, I very rarely saw a panther conceive cubs with a collar on her neck."

But Robert C. Belden, of

© JENNY WARDEN

the Florida Game and Fresh Water Fish Commission, says Baudy is "the only one in the state with that opinion. We've had two females and five males that have had radio collars on, and we know that one female produced two kittens that she successfully raised to adulthood, and several of our other females have been bred."

Belden says that before the collaring program began six years ago, nothing was known about the panther's habitat preferences or range. "Everything we now know about the panther has come from radio telemetry," he says. Belden estimates that 30 to 50 Florida panthers roam the Everglades in the southern end of the state.

Despite Belden's assertion that more good than harm comes from putting the

NOBLE FOLKS AWARDED PRIZES

One hundred years after Alfred Nobel invented dynamite, Jakob von Uexkull sold part of his stamp collection for $500,000. The Swedish-German philatelist's purpose was to establish a prize that would "honor those trying to empower, uplift, and heal the human spirit." Since 1980 the Right Livelihood Awards, presented in the Swedish Parliament on December 8 each year, have recognized the work of men and women who have implemented practical solutions to the world's problems.

The 1986 winners, who share a cash honorarium of $100,000, were:

- Rosalie Bertell, an epidemiologist who has spent many years researching the health effects of nuclear power and nuclear weapons testing;
- Helena Norberg-Hodge, who helped establish the Ladakh Ecological Development Group in the Indian Himalaya;
- Evaristo Nugkuag, a Peruvian Indian who has organized hundreds of thousands of Amazonians in defense of their land and culture;
- Alice Stewart, a British physician who conducted exhaustive research on the effects of fetal X-rays and concluded that they can cause cancer.

An honorary award was presented to Robert Jungk, an Austrian futurist and writer.

Although the Right Livelihoods are sometimes referred to as "Alternative Nobels," von Uexkull intended his awards to complement rather than compete with the more famous prizes. He asked the Nobel family if they were interested in expanding the existing categories to include one that honored people who worked for Earth. The Nobels were supportive of the idea, but unable to change the terms of Alfred's will. With exemplary dedication to the practical, von Uexkull headed for the stamp shop.

Right Livelihood Award recipients are chosen by an international jury. To nominate people who have been living rightly, contact Lowell Strombeck, Friends of the Right Livelihood Foundation, 8314 Paseo del Ocaso, La Jolla, CA 92037.

—Annie Stine

FIELD NOTES

"The arms race goes against intelligence itself. And not only human intelligence, but the very intelligence of nature, whose end eludes even the clearsightedness of poetry. Three hundred and eighty million years were necessary, after the appearance of life on Earth, that a butterfly should learn to fly; another one hundred and eighty million years, to devise a rose with no other duty than to be beautiful; and four geological eras that human beings, in contrast with our pithecanthropus forebears, should be able to outsing the birds and die for love."

—Gabriel Garcia Marquez

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Anthony Huxley

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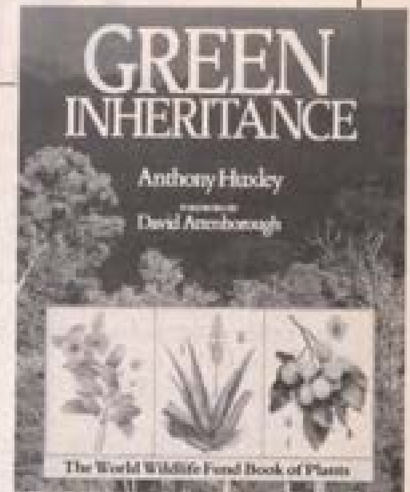

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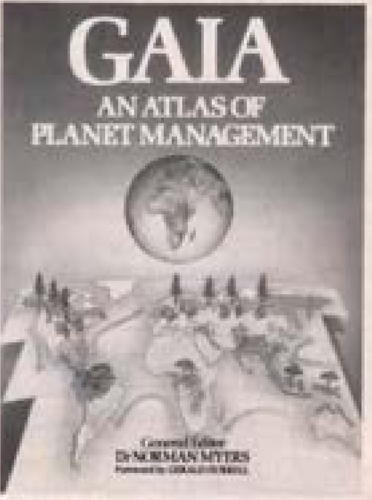

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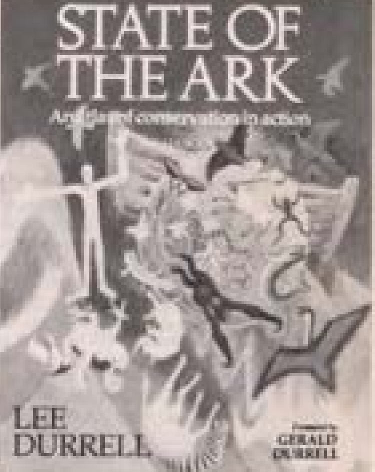

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The chance to make it to 7.

Gary Shaw

Because 50 years of experience has taught us that direct handouts are the least effective way of helping children, your sponsorship contributions are not distributed in this way. Instead, they are used to help children in the most effective way possible—by helping the entire community with projects and services, such as health care, education, food production and nutrition.

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two-inch-wide, 20-ounce collars on the panthers, Baudy insists that the collaring method is too risky. "It puts them under stress. And since the Florida panther population is down to a very few animals, a single one can make the difference between survival of the species in the wild and extinction."

—Bryanna Latoof

UNDER PRESSURE

It will be one year ago April 26 that the top of Unit 4 at the Chernobyl nuclear power plant blew apart, exposing numerous countries to large doses of radiation.

According to the Union of Concerned Scientists (UCS), a nonprofit organization that studies the impact of advanced technology on society, the United States is not exempt from the possibility of a similar or even worse nuclear accident in its own backyard.

The UCS compiled a list of 49 U.S. nuclear power plants (below) that share a key design element with the Chernobyl plant: They all rely on pressure-suppression containments.

A containment is a structure surrounding a reactor and its cooling system that is supposed to prevent the release of radioactive material into the environment in case of an accident. A pressure-suppression containment is designed to condense steam released during an accident by directing it into a pool of water (General Electric's design) or through baskets of ice (Westinghouse's design), thereby limiting (suppressing) the pressure inside the containment.

According to UCS Senior Nuclear Safety Engineer and former Nuclear Regulatory Commission reactor engineer Robert Pollard, "There are many more things that can go wrong with pressure-suppression containments than with just a large, dry concrete building that stands alone on its own brute strength."

So why build a nuclear power plant with a pressure-suppression containment? For one reason only, Pollard says: It costs less money.

—Rebecca Poole

SCORECARD

WINS

- In a stunning renouncement of Ronald Reagan's environmental priorities, both houses of Congress overrode the President's veto of the Clean Water Act.
- The endangered palila was granted protection when a federal judge ordered the state of Hawaii to remove the last exotic sheep from the bird's habitat.
- A court of appeals ruled that the federal government —not the state of California —owns the land left uncovered as the waters of Mono Lake have receded. The ruling protects those lands from mining and mineral leasing.

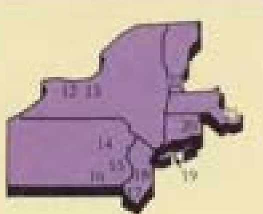
U.S. PLANTS WITH PRESSURE-SUPPRESSION CONTAINMENTS

EARTHSURFACE GRAPHICS

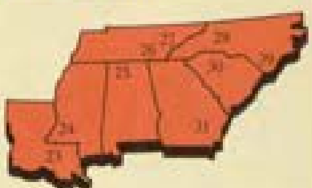
THE WEST

THE MIDWEST

THE NORTHEAST



THE SOUTH



The West

1. WPPSS 2 *Richland, WA*

The Midwest

2. Cooper *Brownsville, NE*
3. Monticello *Monticello, MN*
4. Duane Arnold *Palo, IA*
5. Quad Cities 1, 2 *Cordova, IL*
6. Dresden 2, 3 *Morris, IL*
7. LaSalle 1, 2 *Seneca, IL*
8. Clinton 1* *Clinton, IL*
9. Cook 1, 2 *Bridgman, MI*
10. Fermi 2 *Newport, MI*
11. Perry 1, 2* *North Perry, OH*

The Northeast

12. Nine Mile Point 1, 2* *Scriba, NY*
13. Fitzpatrick *Scriba, NY*
14. Susquehanna 1, 2 *Berwick, PA*
15. Limerick 1, 2* *Pottstown, PA*
16. Peach Bottom 2, 3 *Peach Bottom, PA*
17. Hope Creek 1 *Salem, NJ*
18. Oyster Creek *Toms River, NJ*
19. Shoreham *Brookhaven, NY*
20. Millstone 1 *Waterford, CT*
21. Pilgrim 1 *Plymouth, MA*
22. Vermont Yankee *Vernon, VT*

The South

23. River Bend 1 *St. Francesville, LA*
24. Grand Gulf 1, 2* *Port Gibson, MS*
25. Browns Ferry 1, 2, 3 *Decatur, AL*
26. Sequoyah 1, 2 *Daisy, TN*
27. Watts Bar 1*, 2* *Spring City, TN*
28. McGuire 1, 2 *Cornelius, NC*
29. Brunswick 1, 2 *Southport, NC*
30. Catawba 1, 2 *Clover, SC*
31. Hatch 1, 2 *Baxley, GA*

Note: Locations are approximate
*under construction; all other plants are licensed

INTERNATIONAL POLITICS

One for the Spirits

From the Philippines, the tale of a dictator, a bank, some dams, and the tribal people who fought to save their ancestral home.

Terraced rice gardens, ascending high above the Chico River, are the foundation of life in the Philippine Cordillera. Marcos' government proposed flooding the area to "benefit the entire society."

CHARLES STEINER

Chip Fay

POLITICAL MIRACLES were in no short supply in the Philippines last year. While most were centered in Manila, one took place in a river valley deep in the Gran-Cordillera range, where mountain people have made their homes for centuries.

The story began in 1973 when Philippine President Ferdinand Marcos, prompted by the developing oil crisis, announced a plan to build four large hydroelectric dams and one smaller diversion dam in the Chico River Valley. The project, which on completion was to be the largest hydroelectric facility in Southeast Asia, would have flooded 1,400 square kilometers. Approximately 85,000 people, primarily of the Bontoc and Kalinga tribes, would have lost their homes.

The project's technical feasibility study, financed by the World Bank, included no reference to the social and economic consequences the dams would have for the local people, although it did suggest that these effects be studied before proceeding with the plan. Showing great enthusiasm for the technical recommendations but no apparent interest in the suggested study, the Philippine government moved quickly to secure continued assistance for the project from the World Bank.

The people of the Chico River Valley, particularly the Kalinga, have a deep religious bond with their home. They believe that their well-being depends upon the ongoing collective efforts of the living and the dead. They attribute most illnesses, accidents, and misfortunes to the spirits of ancestors who have become displeased. Should the living allow burial grounds, villages, and rice terraces to be submerged by the dams, the wrath of angry spirits would certainly bring further disaster.

In addition to undermining the spiritual foundations of the Kalinga and Bontoc cultures, the dams would have flooded thousands of terraced rice paddies, the basis of the tribes' self-sufficient economies. As American anthropologist Charles Drucker wrote in a 1984 article in *The Ecologist*, "The terraces dominate the mountain landscape and the lives of [those] who occupy it. . . . Despite cen-

turies of high intensity food production their rice terraces show no signs of exhaustion. For generation after generation they have produced consistently abundant harvests without chemical fertilizers, herbicides, insecticides, or elaborate farm machinery."

For the Kalinga and Bontoc, as for many tribal societies, the concept of relocation is meaningless. To force them off their land would mean the disintegration of their societies.

In February 1974 a survey team from the Philippine National Power Corporation (NPC) entered the Cordillera to begin construction. From the moment the workers arrived they were confronted with a storm of protest from the Bontoc and Kalinga, who had never been consulted on any aspect of the plan to build the dams.

Initially determined to reason with the government, the tribes sent five delegations to Manila in 1974 alone. President Marcos met with the tribal leaders once, but dismissed their grievances as excessively sentimental. He called on them to relocate willingly and to make sacrifices on behalf of the nation, and assured them that they would be properly compensated.

After exhausting conventional means of protest, the Bontoc and Kalinga began a highly organized, militant campaign to defend the valley. In 1975, 150 tribal leaders met and formed an alliance of noncooperation, and soon local people began dismantling the NPC work camps.

In 1976 the Kalinga began to receive assistance from the New Peoples Army, the armed wing of the Communist Party of the Philippines. President Marcos assigned more than 700 combat officers to the area; free-fire zones were created and strict curfews enforced. Later that year the military arrested more than 150 Kalinga and Bontoc leaders, detaining many for up to eight months.

At the forefront of the local opposition was Macli-ing Dulag, a Kalinga village leader. Following a long meeting in Manila—during which the government had been unsuccessful in convincing him to give up the fight—Macli-ing was handed a thick envelope. In a response that became famous throughout the Cordillera, Macli-ing said, "This

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can be of no use to me, for there are only two things that can be in an envelope—a letter or money. Since I cannot read, it cannot be a letter; as for money, it is given to someone who has something to sell. I have nothing to sell."

In April 1980, Macli-ing was assassinated in his home by soldiers of the Philippine Army. Like most martyrdoms, the killing served only to strengthen an already uncompromising opposition, and brought further international pressure on the government to cancel the project.

By the end of 1980 the World Bank had withdrawn its support for the four large dams, limiting its involvement to the smaller, less controversial irrigation dam. In 1981 the NPC's five-year plan made no mention of the dams; later that year Marcos announced a ten-year moratorium on the project.

Corazon Aquino came to power in February 1986, and that September she traveled to the Cordillera to sign a truce with one of the nationalist groups that had been fighting the central government. During the ceremony she announced that the Chico River Basin Development Project was officially canceled.

The story of the Cordillera people during this brief period is nothing short of remarkable. The Bontoc and Kalinga not only won their battle against one of the world's most repressive governments but also confronted the World Bank, challenging the development policies that contribute to the destruction of tribal societies.

Unfortunately, the World Bank is still a long way from reassessing those policies. It publicly professes consideration of the peoples and cultures affected by its projects, but one of the bank's senior legal experts announced to a group of development experts last September that the institution's published guidelines are not, in fact, those it observes; its real policy on the development of tribal areas is confidential.

Were the World Bank to consider the rights and wishes of tribal people, it would likely find that, like the Bontoc and Kalinga, most of them have nothing to sell.

CHARLES STEINER

When negotiation failed, this 61-year old rice farmer joined other mountain people in armed resistance to the Chico dams.

CHIP FAY *is Southeast Asia Projects Coordinator at Survival International U.S.A., a non-profit human rights organization.*

WILDLIFE

Firewood Gathering Hits a Snag

As Americans harvest unprecedented amounts of timber from the national forests, wildlife habitat is going up in smoke.

Michael Kantor

FEW ACTIVITIES in America's national forests seem as wholesome as gathering firewood. A trip to fill the pickup with logging debris and other dead wood gets folks outdoors, and may even save some precious fossil fuels.

A number of bird species nest in dead trees, of course. But in most places national forests have provided enough standing dead trees, or "snags," to allow families to have their fuelwood and birds to have their shelters, too.

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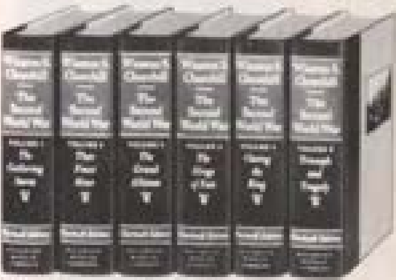

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sell Balda of Northern Arizona University. "With the intensive forestry we now have, trees are cut at earlier ages and few snags can develop. If you add this to a heavy firewood demand, it can push the resource over the brink."

To say that firewood cutting has increased is putting it mildly. The Forest Service reported a 12-fold rise in the amount of firewood removed from the national forests between 1972 and 1982. Woodstoves are selling briskly: Americans bought 800,000 new ones in 1986, according to the EPA.

Meanwhile, 85 species of North American birds that nest in cavities are "very vulnerable," says Balda. "In many areas we're putting the more snag-dependent species at risk." Several woodpecker species have shown evidence of decline; since 1975, red-headed, hairy, and Lewis' woodpeckers have appeared regularly on the Audubon Society's early-warning "blue" and "special concern" lists, with firewood cutting mentioned as a contributing factor.

While the problem is cropping up all over the country, national forests in the Northwest have been among the areas most affected by the upsurge in wood cutting. The Idaho Panhandle National Forest's Fernan Ranger District experienced a 2,680-percent increase in demand for fuelwood between 1973 and 1982. With the imposition of user fees in 1983, the number of permit requests fell, but authorities say the total volume of wood harvested has probably increased. "We're cutting more than we ever have," says Lee Cook, the district's resource administration assistant. The district predicts that firewood demand in Fernan will exceed supply by 1994.

When planners in the Idaho Panhandle calculated how many dead trees should be left for cavity nesters, they assumed that snags more than 200 feet from forest roads would remain standing. But as the more accessible areas get picked over, firewood gatherers are moving into zones where snags are supposed to be reserved. "We're losing them," warns Paul Harrington, a wildlife biologist for the Idaho Panhandle. "People are going 500 to 600 feet off the roads."

Perhaps most alarming are the practices of commercial firewood dealers.

Because wood is increasingly difficult to find, many people no longer want to take the trouble to cut their own, and commercial operators with the means to venture far beyond the 200-foot zone are flourishing. "They use complex cable systems and can go up to 1,500 feet from a road to get a big tree," says the Panhandle's Harrington.

Unfortunately, Forest Service officials seem less than eager to face the problem. "I wish I could say that we've received direction from above that this is a significant issue," says a Forest Service biologist who requested anonymity. "But we haven't. We try to save snags in planning timber sales. Then in two years we come back and they're gone."

Despite dangerously high levels of firewood removal, neither the Idaho Panhandle nor the Lolo National Forest, just across the border in western Montana, has taken the steps necessary to solve the problem. Their permits still allow most gatherers to decide where to get their wood, and forest planners still assume they will go no farther than 200 feet from a road, thereby underestimating the number of snags that commercial timber operators should be required to leave undisturbed. Forest officials not only leave roads open that should be closed to protect snag habitat, they are allowing roads to proliferate—at least 5,500 new miles are slated for the Idaho Panhandle—opening even more of the forest to woodcutters.

Local conservation groups have responded by challenging the Lolo National Forest Plan. In a July 1986 appeal, the Montana Wilderness Association, the National Wildlife Federation, and the Five Valleys Audubon Society charged that the plan fails to give snag-dependent wildlife its due: no cavity nesters are listed as official "sensitive species"; commercial timber operators are not required to leave enough large snags, which are especially valuable to wildlife; and designated old-growth areas, which are shielded from commercial cutting, are left unprotected from firewood gatherers. The old growth was originally set aside to provide optimal habitat for cavity nesters, especially the pileated woodpecker.

Conservation groups also filed an appeal in Colorado, where surging de-

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A great gray owl ensconced in what foresters used to see as clutter—a standing dead tree. Now such trees are highly valued as habitat for dozens of bird and mammal species.

mand for firewood has left some accessible national forest lands almost completely devoid of snags. The Sierra Club and the American Wilderness Alliance challenged fuelwood gathering practices in two Colorado national forests, calling for more careful planning of future sales and the closure of certain areas and roads.

In response to the groups' appeal, the supervisor of the Pike and San Isabel national forests agreed to do environmental studies of new fuelwood cutting areas and to rehabilitate old cuts. He also said that the agency should emphasize wildlife protection rather than wood gathering in certain key areas. Among them was the Union Creek drainage southeast of Leadville, which is prime winter habitat for mule deer.

Satisfied with these changes, the environmental groups withdrew their appeal in February. But they will continue to watch for firewood-gathering abuses in key wildlife areas in the state.

"More than 75 percent of the timber being cut in Colorado is being cut for fuelwood," says the groups' attorney, Anthony Ruckel. "It's an enormous problem."

The problem is so widespread that a 1983 snag-habitat-management symposium in Flagstaff, Ariz., attracted delegates from 17 states and a number of federal and state agencies. Even eastern hardwood forests are not immune. In Massachusetts, for instance, firewood cutting consumed half the total annual growth of all the state's forests (most of which are privately owned).

"Firewood gathering can be a real problem," says John Finn, a research ecologist at the University of Massachusetts in Amherst. "But some cutting doesn't hurt if people know which trees to cut and which to leave in the woods." Finn recommends leaving large, standing trees and concentrating on small snags or on wood that has fallen to the ground.

Balda, a pioneer in research on cavity nesters, agrees that education is important, but adds that the Forest Service must also "begin enforcing regulations that are on the books. Illegal cutting is rampant." He says that Forest Service policy must be altered to require closing roads in critical areas, aiming for more than minimum population levels of cavity nesters, and protecting the larger snags.

"Particularly in the West, the fate of cavity-nesting birds lies largely in the hands of the public land agencies," says

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Balda. "They must begin realistic and comprehensive management programs. We have to appreciate the intricacy of the system. If we eliminate these birds, we will destroy the natural diversity and health of the forest itself."

MICHAEL KANTOR *is a freelance nature writer who lives in Missoula, Mont.*

HAZARDOUS WASTES

No Peace on the Pueblo

One culture worships the land; the other, technology. Can the two of them co-exist in the birthplace of nuclear weapons?

Tom Arrandale

FIVE CENTURIES AGO the Tewa people came down from the mesas of New Mexico's Pajarito Plateau to live by the Rio Grande. On the river's east bank they established a thriving community and called it P'o-woge —"where the water cuts through." They grew corn and squash, and often crossed back over the river and climbed the canyon walls to hunt, gather medicines, and worship on the pine-clad apron of volcanic rock draped around the Jemez Mountains. Spaniards who later settled New Mexico renamed the settlement Pueblo de San Ildefonso.

In 1942, nuclear physicist J. Robert Oppenheimer took over the Los Alamos School for Boys atop the Pajarito Plateau. His classified mission was to build the world's first atomic bomb. Oppenheimer's elite team worked in the school's log buildings and hastily built wooden laboratories. Today the Los Alamos National Laboratories sprawl across 43 square miles on fingerlike mesas dissected by canyons that drop 500 feet down to the river. Los Alamos scientists design warheads, test explosives, and conduct Star Wars and basic nuclear research at 33 technical sites, some tightly fenced and guarded, secluded in the plateau's pinyon and ponderosa pine forests.

One deadly by-product of this intensive research and development process has been a huge quantity of dangerous wastes, from a tremendously wide variety of sources. "They've had everything imaginable up there, from chemical solvents to plutonium," says Karl Souder, groundwater protection specialist for New Mexico's Environmental Improvement Division (EID).

In their adobe and cinder block homes down by the river, the residents of Pueblo de San Ildefonso are worried. "Los Alamos tells us that the chances of something going wrong are one in a million," says Gilbert Sanchez, a tribal leader and the pueblo's former governor. "But that millionth time could totally devastate our gene pool."

Los Alamos' Health, Safety, and Environment Division employs 436 people and spends nearly $4 million a year to sample local air, soil, groundwater, crops, rodents, and honeybees for signs of radioactive contamination. "From what we're doing and what we measure, we don't see any risk to anyone offsite,"

Washington State

A child of the Pueblo de San Ildefonso at the kiva stairs on Feast Day. He will inherit the traditions of his people—and perhaps the residue of decades of atomic weapons research.

says radiation biologist Wayne R. Hansen, deputy director of the division.

This monitoring system has not always been in place, however; in the laboratory's early years, scientists overlooked the dangers of the wastes they created. Waste disposal practices tightened up in the 1960s, but for 20 years the lab piped plutonium, cesium, strontium, tritium, and other radioactive substances directly into nearby canyons. Over the course of 40 years, laboratory workers have buried an estimated 300 million pounds of contaminated solids in landfills dug into the mesas. For the first two decades, no records of waste burial sites were kept; today, many of these sites may still be unknown.

Twenty miles downriver from San Ildefonso, the Cochiti Dam backs the Rio Grande into a reservoir that lies within a few miles of the lab's boundaries. Los Alamos analysts have found elevated levels of plutonium in Cochiti Lake sediments. But lab scientists contend that this plutonium is not necessarily linked to the lab's operations.

Since 1951, the lab has treated its liquid wastes to remove most of the contaminants. The remaining effluents are released into Mortendad Canyon, a normally dry channel that cuts through pueblo lands. The plant's radioactive solids are put in concrete casks and taken to a landfill on Mesita del Buey, a narrow mesa on laboratory grounds.

Los Alamos geologists are confident that the volcanic rocks that form the plateau will isolate those wastes from the Rio Grande system. Lab officials claim that the 900-foot thick layer of Bandelier tuff laid down when the Jemez exploded 1.1 million years ago

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The Rio Grande meets Los Alamos Canyon at Otowi Bridge. In the 1940s and '50s untreated radioactive wastes were dumped into the canyon, which is still contaminated.

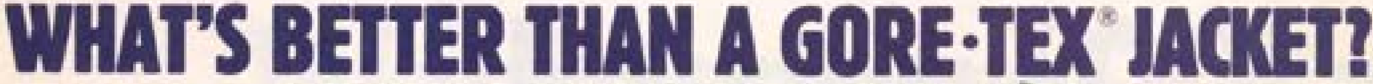
acts as a gigantic sponge that keeps surface water from reaching the groundwater 850 feet beneath Mesita del Buey.

State officials who monitor hazardous chemical wastes at Los Alamos are not entirely convinced, however. The tuff contains fractures, plugged with clay near the surface, that conceivably could transmit vapors or liquids downward. "Unbroken tuff has a low potential for letting anything through," says New Mexico's groundwater specialist Souder, "but the tuff isn't all unbroken. Monitoring is needed to confirm the expectation that the potential for contamination is low." The agency has required that the laboratory install a monitoring system in the tuff adjacent to hazardous waste storage areas on Mesita del Buey.

The Los Alamos laboratories are a facility of the U.S. Department of Energy and are administered by the University of California. Like other DOE installations, Los Alamos regulates its own radioactive wastes. Although the EPA and the state government are authorized to regulate nonradioactive air and water pollution and hazardous wastes at Los Alamos, EID officials complain that the lab, citing national security, refuses to spell out exactly what hazardous wastes their classified research projects produce. The lab also has been resisting those agencies' authority to monitor chemical wastes that have been mixed with radioactive materials.

Given Los Alamos' self-regulatory status, outsiders find it difficult to judge how safely it handles radioactive materials. "Generally speaking, the lab is pretty good on environmental protection," says former Sierra Club President Brant Calkin, who once worked as a Los Alamos technician. "But they tend to think that they're the best in the world at everything. And they tend to think that every risk has a technological safeguard."

Up to now, San Ildefonso has quietly accepted the changes brought by a facility that employs pueblo residents, including tribal council leaders. The pueblo's new governor is considered less likely than Sanchez to question the laboratories' operations, but more and more residents are growing skeptical about Los Alamos' assurances that its wastes pose no threat.



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The pueblo still holds sacred lands on a mesa within DOE boundaries. Pueblo members continue to hunt elk, gather herbs, and conduct private religious ceremonies there, as they have done for hundreds of years. But now they can look across the canyons at some of the lab's sites perched on the edge of adjacent mesas. Mortendad Canyon, where radioactive liquids flow, cuts across pueblo lands at the base of the sacred mesa. The solid waste dump on Mesita del Buey lies just to the south.

Sanchez worries that contaminants moving from these and other sites will be ingested by the wildlife that his people hunt on the plateau, or by the cattle they graze near the river. He fears that trucks carrying radioactive materials on the two-lane highway that crosses the river and twists up Los Alamos Canyon could crash. He questions the lab's assurances that volcanic tuff protects the pueblo's water. "Unless there are no cracks, water is going to find a way through there," he contends. "It may not happen in a hundred years, but it will eventually get down here."

At Sanchez' request, lab officials last year agreed to monitor 40 sites on pueblo lands for contamination. Sanchez also has asked the Sierra Club Legal Defense Fund to assist the tribe in obtaining an independent review of risks from the lab's waste materials—and in monitoring any necessary cleanup.

Behind Gilbert Sanchez' fears—and motivating his actions—is a fundamental request: that the people of Pueblo de San Ildefonso be able to remain safely in their home for another 500 years.

TOM ARRANDALE *is a freelance writer living in Albuquerque, N.M.*

ECONOMICS

Tax Reform as Environmental Policy

When Congress lowered tax rates last year, it also eliminated key tax breaks for some of the nation's dirtiest industries.

Brent Blackwelder & David Campbell

FOR MOST AMERICANS, the good news of tax reform is now as familiar as their Social Security numbers: lower tax rates in 1987. Less well understood are the law's implications for the environment. By eliminating certain tax breaks, Congress reduced important incentives to overdevelopment. By lowering both corporate and individual tax rates, it has also ensured that the remaining tax subsidies will be less valuable—a big step toward more efficient use of both money and natural resources.

The old tax code was filled with tax breaks that encouraged environmentally unsound projects: the drainage of valuable wetlands, the plowing of highly erodible lands, the building of vacation homes on fragile sites, the construction of unnecessary nuclear and coal-fired power plants, and the rapid development of oil, mineral, and timber resources.

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ginal projects solely because the United States Treasury was willing to share so much of the risk. Tax avoidance grew into a big, wasteful, and unproductive business.

"Tax-sheltered investments make a mockery of our capitalist system," conservative columnist James J. Kilpatrick wrote during the debate last year. "The whole object is not to earn money—but to lose money."

Early in this decade, citizens complained loudly about the increasing complexity and unfairness of a tax system that often benefited no one but the lobbying organizations that won ever-new deductions, credits, and exemptions. Individuals, they claimed, were forced to provide an increasingly large portion of total tax revenues, while some corporations paid little or no tax at all.

In 1984, when the Treasury Department issued its first tax-reform proposal, conservation organizations began researching its implications. In early 1985 the Environment and Economy Project, an informal coalition of more than a dozen groups, took on tax reform as its major concern.

"Current tax provisions are the major cause of much environmentally destructive and economically inefficient investment," said a letter to Congress signed by the leaders of the Sierra Club, the Natural Resources Defense Council, the National Wildlife Federation, Environmental Action, and the Environmental Policy Institute. "Tax policy *is* environmental policy."

As soon as the Senate and House finance committees agreed to lower tax rates, removing tax subsidies grew easier. New sources of government income were needed to balance the losses expected from lowered rates. Conservationists' proposals, most of which were revenue-generating, looked more attractive than ever.

The law finally signed by the President last October doesn't give conservationists all they wanted, but it does contain significant victories. The new law discourages environmentally damaging, speculative investments in several ways:

- It lowers tax rates, decreasing the value of tax breaks.
- It repeals the investment tax credit, which allowed businesses to subtract as much as 10 percent of certain investments from their tax liability.
- It makes long-term capital gains, once a sheltered form of income, subject to normal taxation. (Under the old tax code, 60 percent of an individual's and 28 percent of a corporation's long-term capital gains were nontaxable.)
- It sets up a less generous system of tax write-offs for depreciated business assets.

The elimination of these and other tax breaks is expected to discourage investment in such capital-intensive and environmentally questionable enterprises as nuclear and coal-fired power plants. According to Ruth Caplan, executive director of Environmental Action, the new law removes about three quarters of the electric utility industry's current tax subsidies, worth $9 billion a year at current spending levels. "It's a bigger victory than we ever dreamed possible," Caplan says.

The new law also removes major incentives for sodbusting (plowing up

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rangeland) and swampbusting (draining wetlands). According to Anne E. Kinsinger, a resource specialist with the Natural Resources Defense Council, these enterprises benefited in two ways under the old code, even when they caused severe environmental problems: "First from the increased market value of the land, and second from the generous capital-gains treatment."

In addition, people who converted range or swamps to farmland were formerly allowed to deduct all their land-clearing expenses in a single year rather than over the life of the project. By providing the tax break early, Congress was in effect giving them an interest-free loan.

Such credits and deductions were the "most significant federal incentive" for the harmful conversion of wetlands to cropland, according to a 1984 report by the federal Office of Technology Assessment. In the new code, these incentives have been eliminated.

Another important provision of the new law will help reduce soil erosion and pollution from agricultural runoff. For three decades, farmers have been allowed to deduct the cost of "soil and water conservation" measures from their taxable income. In the old tax code, the deduction was so loosely defined that farmers claimed it for wetland drainage, the leveling of hills to install irrigation equipment, and other environmentally harmful practices. The new code grants the deductions only for measures approved by the U.S. Soil Conservation Service or a "comparable agency."

The new law also eliminates tax-exempt financing for certain private projects, including industrial parks, shopping centers, and sports, convention, trade show, and parking facilities.

While the victory list is long, it still leaves a lot of unfinished business for environmentalists. Congress retained two big tax breaks used by the mining and oil and gas industries: the "percentage depletion allowance" and the "expensing of intangible drilling costs." The former is a direct subsidy that allows independent oil and gas companies to deduct 15 percent and mineral companies 5 to 22 percent of their gross income each year. The latter allows

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these companies to deduct all the labor and fuel costs of drilling or mining in a single year rather than over the life of the project. Conservationists argued that both provisions merely hasten the day when the nation will be dependent upon foreign sources of these commodities.

Another disappointment to conservationists was Congress' failure to repeal the water depletion allowance, which allows farmers to take a tax deduction for lowering water tables. "The more successful you are at mining this precious resource [water], the more you are rewarded," says Robert Hamrin, former director of the Environment and Economy Project. "How perverse can a tax subsidy get?"

In the arena of renewable energy, tax reform generated mixed results. Congress extended energy tax credits for business through 1988 for solar, geothermal, and ocean thermal projects, but dropped credits for renewable residential energy and wind energy projects. Credits for small-scale hydroelectric projects were not extended, but secret horsetrading granted the old tax-code benefits to nearly 2,000 hydro developers who had filed preliminary permit applications by March 1986.

If the tax code is opened up for anything more than technical amendments this year, conservationists will be ready with a list of reforms: eliminating the tax breaks for oil, gas, and mineral extraction, removing the water depletion allowance, and halting the use of tax-exempt bonds for any environmentally harmful purpose.

Conservationists are also working to achieve their goals through other types of legislation. For instance, if the farm bill passed in 1985 comes up for amendment this year, conservationists will lobby for a provision repealing the water depletion allowance.

"Last year we won big against lobbies that had always succeeded in getting their way," says Environmental Action's Caplan. "We can win a lot more if we are willing to put the resources into it. In today's world, tax policy is an essential arena for environmentalists."

BRENT BLACKWELDER *is vice-president of the Environmental Policy Institute.* DAVID CAMPBELL *is the National Wildlife Federation's economist.*

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Just Add Water Marketing

James R. Udall

THE HEADLINED RUMORS—"Death of Big Dam Era"—are premature. It's true that the patient is failing: vital signs are weak; Bureau of Reclamation employees don black; environmentalists buy party hats. But wait—the chest still heaves.

A new development may pull the plug, however. It's called water marketing, and some say it's the most revolutionary idea to appear on the western water scene in more than a century.

Water marketing—the selling of acre-feet as though they were so many cantaloupes or avocados—is currently being touted by an unlikely coalition of libertarians, economists, and conservationists as the most cost-effective and environmentally benign way to alleviate water shortages in the West.

At the moment, water marketing is more a prospect than a reality, but the idea excites conservationists because it would allow such burgeoning metropolitan areas as Los Angeles, San Diego, Tucson, and Denver to satisfy their needs by buying water rather than building dams. "If water could be freely traded," says Tom Graff of the Environmental Defense Fund, "taxpayers wouldn't have to subsidize extravagantly expensive and destructive dams."

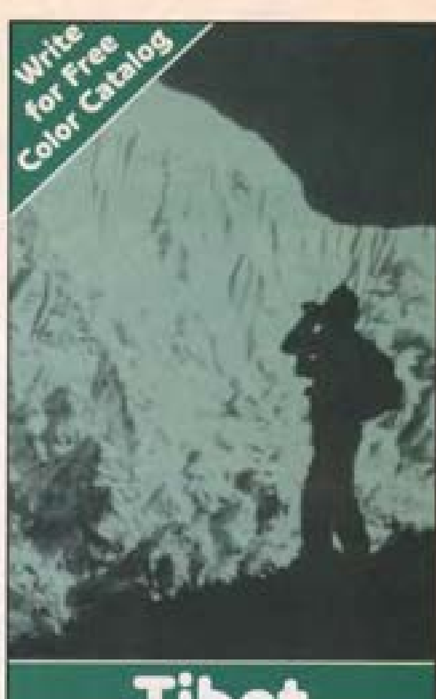
One of the many western rivers whose fate could be affected by water marketing is Colorado's South Platte, where Denver wants to build a 615-foot dam called Two Forks. The dam would inundate 25 miles of the South Platte's scenic canyon, destroy one of the state's best trout fisheries, and threaten a small butterfly—the Pawnee montane skipper—with extinction. Although Two Forks could store 1.1 million acre-feet of water, the reservoir's guaranteed annual yield would be only 98,000 acre-feet. Estimates of the dam's cost (should it in fact be built) continue to rise; the most recent was $390 million.

"Environmentally, Two Forks is a disaster," says Maggie Fox, the Sierra Club's Southwest Representative. "Economically, it's absurd. A program emphasizing water conservation, the recycling of sewage effluent, and the purchase of farmers' water rights could produce far more water at far less cost." The math is so compelling that some of Denver's suburbs have begun implementing such a program, a fact that may help torpedo this costly boondoggle.

Water marketing comes in a bewildering number of guises—sale/leaseback agreements, entitlement transfers, dry-year insurance programs, in-kind improvements, wet-year groundwater banking—but its underlying logic is simple. If water were bought and sold in the marketplace, says economist William Martin of the University of Arizona, "its price would rise to reflect its true value rather than its subsidized cost. As the price of a commodity rises, we tend to use it more sparingly, more efficiently, more intelligently. The obvious example is oil."

In Graff's view, "It's a paradox that the West's most critical resource—water—has been allocated according to socialist rather than capitalist precepts." During the past hundred years, market forces have played almost no role in determining which water projects should be built. The result: wasted water and money, plus extensive damage to the environment.

Under existing western law, water is



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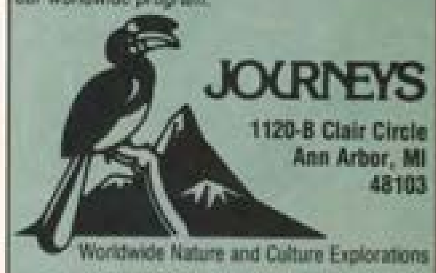

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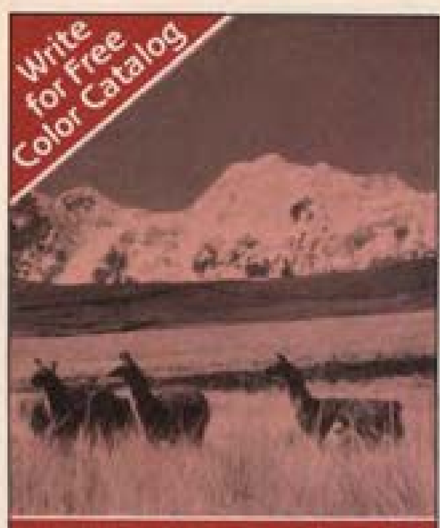

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allocated free to anyone who can put it to a state-approved "beneficial use." A seniority system determines who actually gets water: applicants "first in time" are also "first in right." A water right allows its holder to use a certain quantity of water, but in most states it does not allow the holder to sell the excess. This "use it or lose it" provision has led to inefficient water distribution.

In many cases, farmers and ranchers do not depend on nature to deliver their water; they receive it through an elaborate system of dams and canals, typically financed with state and federal funds. This water is surprisingly cheap; in some places it is essentially free.

The beauty of water marketing is that it provides an incentive for farmers and ranchers to conserve water. Agricultural users hold rights to 80 to 90 percent of the water consumed in the West. If they could save just 10 percent of that water, the amount available for all other urban and industrial uses would double. The implications are staggering: By rewarding conservation, water marketing would create an abundance of "new" water in water-short areas.

The need for new sources of water is clear. A recent report by the World Resources Institute says, "The use of water exceeds average streamflow in nearly every western subregion, and the deficits are being offset with groundwater and [imports] from adjoining basins." The study concludes that the future of western water lies in conservation, improved efficiency, and reallocation (read marketing) of existing supplies.

Water marketing is still in its infancy, and predicting its effects is a matter of conjecture. Its proponents say the scheme could have a salutary effect throughout the West. According to one rosy scenario:

- In Colorado, it could eliminate the need for the Two Forks and Cross Mountain–Juniper dams, while reducing threats of water development in the Holy Cross Wilderness Area and on the upper Gunnison River.
- In Arizona, water marketing could discourage the pell-mell pumping of ir-

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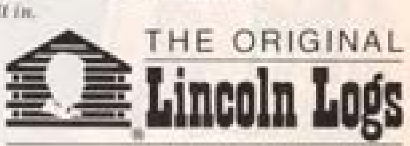

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replaceable groundwater while encouraging the retirement of land ill-suited to agriculture. It also could weaken arguments in favor of Cliff Dam, which threatens the small remaining population of Sonoran bald eagles.

■ In Nevada, water quality and quantity problems at Pyramid Lake could be mitigated.

■ In Utah, water marketing could undermine plans for some of the more expensive and destructive components of the Central Utah Project.

It may be, however, that a dose of market realities does not a panacea make. In practice, water marketing may turn out to be a good news/bad news potion—creating new problems even as it solves old ones. Opponents cite a number of shortcomings. They say, for example, that water markets would enable large agribusinesses, which receive water through a system of dams and ditches funded by federal taxpayers, to reap vast windfall profits.

DRAWN FOR SIERRA BY STEVE KELLEY

"It's a one-time taxpayer rip-off," Graff says, "but there are so many ongoing rip-offs in the existing system that I don't worry too much about it."

Water marketing also could cause social dislocation in agricultural areas—but the dislocation need not be great. Water marketing won't force farmers to sell water; it will just give them a powerful incentive to save it.

Another challenge is figuring out how to protect environmental values in these new water deals. "Who's going to put up the dollars for fish, wildlife, or instream flows?" asks David Getches, executive director of the Colorado Department of Natural Resources.

"Clearly, environmentalists will not be able to outbid large cities and land developers," says the Sierra Club's Fox. "One possible solution will be for state governments to take a more active role in protecting instream flows. Environmentalists will have to be vigilant to ensure that this occurs."

Montana, Colorado, and New Mexico have already begun claiming water to protect recreational and natural values. "But none of these states adequately safeguards the full range of values—aquatic, recreational, and aesthetic—that we are trying to protect," says Fox. "Stronger legislation is needed."

In some situations, water marketing could prove to be an enemy rather than an ally of free-flowing rivers. This double-edged nature is well illustrated by the Animas-La Plata project, which is being built primarily for the Ute Indians of southern Colorado. Although the dam would supply ten times as much water as the Utes can use, they have fought hard to get it funded because they hope to lease surplus water to San Diego. Several other western tribes, whose water rights now exist only

on paper, share similar aspirations.

Finally, one must ask whether anything that might accelerate the increasingly malignant growth of Tucson, Los Angeles, Denver, and San Diego can be considered a good thing, regardless of other possible benefits that might follow. (The West is already the nation's most urbanized region, as measured by the percentage of its residents who live in urban areas.)

Despite all these concerns, the biggest hurdle is currently a practical one: Before water marketing can become a widespread reality, it must surmount a number of barriers to free trade. In the past, the intricate web of federal and state regulations that control the distribution of western water essentially forbade water exchanges. More recently, states have begun to modify their laws to permit intrastate transfers. Nonetheless, those contemplating water exchanges today still face a daunting array of legal, logistical, and financial hurdles. In Colorado, for instance, they must demonstrate that other water holders will not be damaged by their actions. This is a cumbersome and expensive process that acts as an impediment to change.

"Such barriers can make the implementation of a water-marketing agreement a mind-bending exercise," Graff says. He should know. For years the Environmental Defense Fund has promoted a transfer of water from farmers in the Imperial Irrigation District to the nearby Metropolitan Water District (MWD) of Southern California, which expects to serve an additional 4 million people by the year 2000.

Rather than trying to siphon more water from a reluctant Northern California, the most cost-effective and environmentally benign way to address the MWD's projected water deficit would be through water from Imperial. "Although Imperial uses nearly one fifth of the Colorado's annual flow," says Graff, "much of that water is wasted because it is unbelievably cheap."

Under one proposed plan, metropolitan water users would pay $10 mil-

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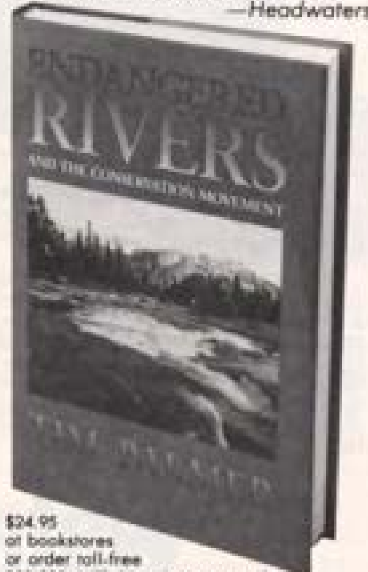

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"Everybody, including environmentalists, wins," says Carl Boronkay, general manager of the MWD. "Imperial users will still have exactly as much water as they have now, and since we'll get the water they save, we won't need to build new dams."

Although negotiations are currently suspended over details of the exchange, most observers feel that an agreement will eventually be reached. If so, it may serve as a model for similar transactions throughout the West.

In some ways, water marketing is less a revolutionary idea than the logical outcome of the development of the West. In the last 50 years the region has become as well-plumbed as any on Earth. The Colorado River is now less a watershed than a delivery system in which the Grand Canyon is just the biggest ditch. Water that begins as snowmelt in the Rockies ends up flowing to condominiums in San Diego and Phoenix.

Now that the plumbing is in place, water marketing has become the latest variation on the old adage: "Water in the West doesn't flow downhill—it flows toward money." What you think of this depends on where you sit. Farmers aren't sure whether to cheer or cry, land developers are ecstatic, and urban residents are relieved. Some environmentalists are applauding; others are cautiously ambivalent.

Those who support water marketing believe it is an idea that could encourage the West to meet future needs through conservation and reallocation rather than through building more massive storage and delivery systems. If that turns out to be the case, water marketing will be simply a tool, a free-market chisel with which to finish the epitaph: "The Big Dam Era Is Dead." ■

JAMES R. UDALL *lives in Carbondale, Colo. His work has been published in* Outside, Audubon, *and* National Wildlife.

WIN FAME AND FORTUNE

Well, maybe not a whole lot of fame, but you can win some fabulous prizes in *Sierra*'s annual photo contest. Grand prize is an all-expenses-paid trip courtesy of Questers to the Galapagos Islands and the Peruvian highlands *plus* a Nikon N2000 35mm SLR camera with a 50mm f/1.8 lens. First-prize winners in each category will receive a pair of Nikon 9 × 25 binoculars; second prize is a special-edition folding knife from Buck Knives.

And there's still an outside chance you'll become famous: The winning photos will be published in *Sierra*'s September/October issue, then mounted and hung for a year in the Sierra Club's national offices in San Francisco.

The only real requirements are creativity and originality. So read the rules and instructions carefully, and start shooting!

Second prize, color (1986) "In Praise of Plants" Jacob R. Mau, Kula, Maui, Hawaii

Categories

Wildlife: Animals, excluding humans, photographed in their natural habitats.

People in Nature: Photos of people enjoying themselves in the out-of-doors anywhere in the world.

Abstracts in Nature: The focus should be on the form, symmetry, or asymmetry of natural objects, not on their function or their place in the biosphere.

The Meeting of Land and Water: Where the surf hits the shore, the ice greets the leaf, and the rain meets Spain.

How to Enter

SUBMISSIONS: No more than two color slides (or transparencies) and/or two black-and-white prints may be submitted in any one category.

Either original or high-quality duplicate slides and transparencies are eligible as color entries, but prizewinners must provide their original(s) for publication. No color prints or color negatives from print film will be considered.

Mark each slide, transparency, or print clearly with your name and address, and state the category being entered. *On a separate piece of paper, explain where each photograph was taken, and describe the subject briefly and accurately.*

Careful packaging is important. *Improperly wrapped submissions will be returned unexamined.*

• Color slides (2 x 2) and color transparencies (4 x 5 and 2-1/4 x 2-1/4) should be placed in 8 x 10 plastic sleeves (available at any camera shop).

• Black-and-white photos should be *unmounted* prints no larger than 11 x 14, packaged between two pieces of stiff cardboard in a simple manila envelope.

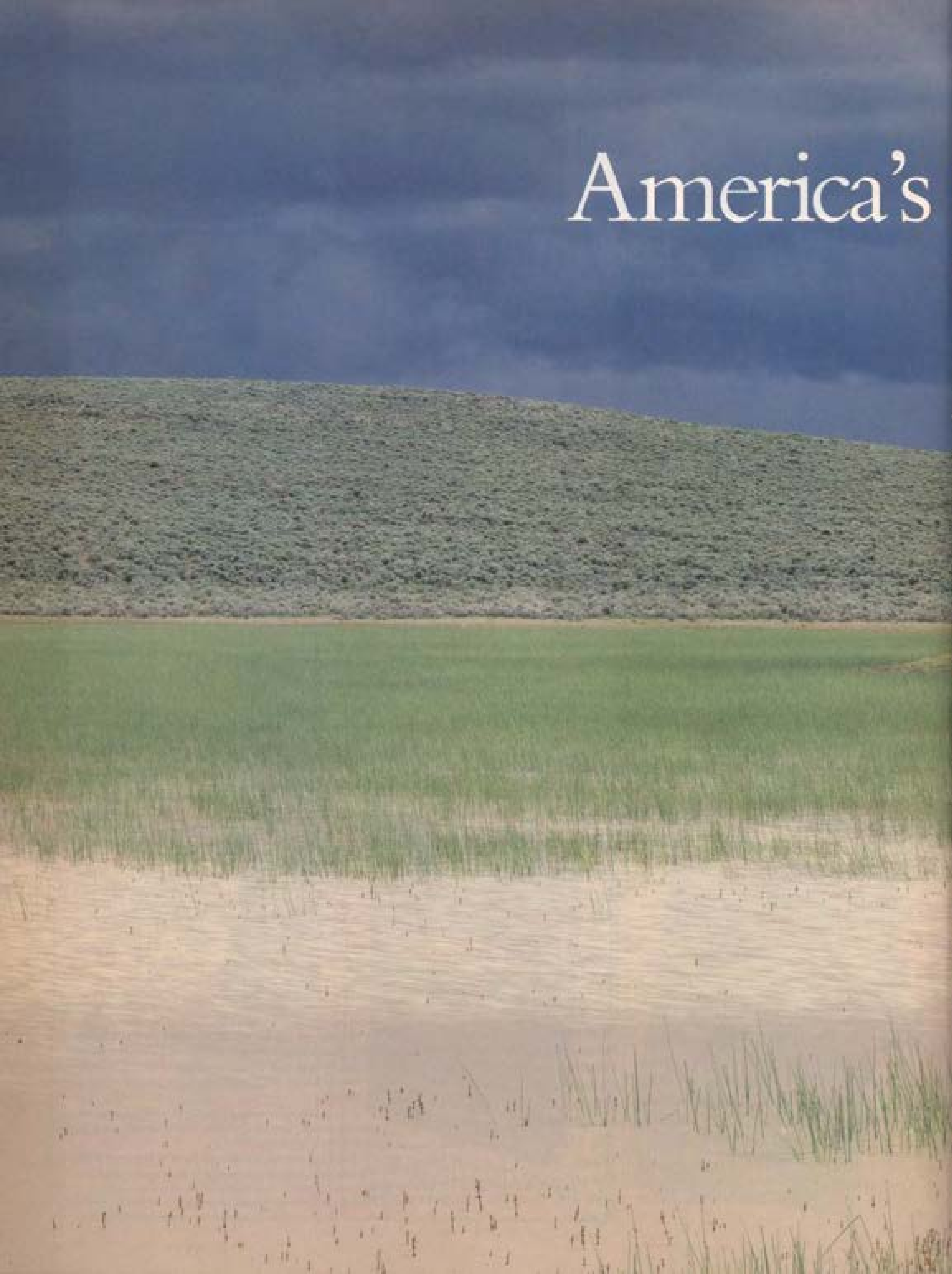
Send your submissions to *Sierra* Photo Contest, 730 Polk St., San Francisco, CA 94109. Include a self-addressed, stamped envelope for returning material and a check or money order for $2 made out to *Sierra*. (This fee covers all submissions by an individual entrant received in one package.)

ELIGIBILITY: This contest is open to all amateur and professional photographers. Sierra Club staff, their immediate families, and suppliers to *Sierra* are not eligible. Photos must be taken and owned by the entrant. Previously published work, photographs pending publications, or photos that have won other contests are not eligible. Void where prohibited.

DEADLINE: All submissions must be postmarked by midnight, June 1, 1987. Please include a stamped, self-addressed postcard if you wish receipt of your photo(s) to be acknowledged. The judges' decisions will be made by July 15, 1987, and photos will be returned within six weeks of that date.

PRIZES: In addition to a grand prize, first and second prizes will be awarded in each category. The judges reserve the right not to award a prize in one or more categories.

LIABILITY: *Sierra*'s responsibility for loss of or damage to any material shall not exceed the amount payable to the magazine under any insurance carried to cover its liability for such loss or damage. Information about the amount of coverage is available on request. We are not responsible for material lost or damaged in the mail.


America's

Unknown Wildlands

COVER

Experienced backpackers, weary of the madding crowds in our national parks and forests, are starting to explore the natural riches within the National Wildlife Refuge System.

• *Larry Rice* •

THERE ARE 424 OF THEM sprinkled throughout 49 of the United States and five trust territories. They include 90 million acres of seashores and deserts, mountains and lakes, forests and grasslands. They provide food, cover, and water for ducks, geese, and swans during their annual cycle of breeding and migration. They maintain large mammals like brown bear, bison, bighorn sheep, and elk, and preserve endangered species like the whooping crane, bald eagle, and American crocodile.

Almost incidentally, the nation's wildlife refuges also offer an outdoor haven to millions of Americans.

The National Wildlife Refuge System dates back to 1903, when President Theodore Roosevelt created this country's first refuge at Pelican Island, Fla., to protect bird species that were being killed for their feathers. If Roosevelt were alive today, he would be overjoyed at the refuge system's phenomenal expansion. Under the administration of the U.S. Fish and Wildlife Service, the United States now has the largest system of wildlife refuges in the world.

Because the primary mission of the refuges is the maintenance or increase of wildlife populations (with an emphasis on water birds), visitor services and activities must take a backseat to wildlife welfare. However, this is not to say that refuges

WILLARD CLAY

discourage visitation. Millions of people use them each year. But the refuge system's stated recreational policy is to provide "high-quality outdoor recreational opportunities . . . oriented towards wildlife and wildlands," while first protecting wildlife habitat. Recreational activities that are compatible with the refuges' mission include, but are not limited to, "hunting, fishing, wildlife observation, berry-picking, nature photography and hiking." Hiking, the policy spells out, "should be a quality experience."

James F. Gillett, Chief of the Division of Refuge Management, emphasizes that decisions regarding what types of recreational activities will be permitted at a specific refuge are based on these guidelines. "However," he says, "it is the responsibility of the refuge manager, with concurrence from the regional director, to design and implement a recreational program suitable to a specific refuge." Gillett adds that one important question is whether the recreational activities under consideration for a given refuge are compatible with the primary purpose for which the refuge was established.

Backpackers looking for little-known places to wander are fortunate in that the six refuges profiled in these pages, each with vast tracts of wilderness, have had backcountry hiking and camping designated as compatible with their management objectives. While those unfamiliar with the variety of

Sheldon–Hart Mountain offers a wealth of wildlife-watching in a variety of habitats. Clockwise from bottom left: a beaver dam and pond; a red-tailed hawk minding the nest; a pronghorn buck and doe; a porcupine glimpsed through the branches; wild mustangs roaming the pronghorns' range.

Drinking in the scenery in the Sheldon refuge's Thousand Creek Gorge.

landscapes in America's wildlife refuges might say these areas don't have the scenic grandeur of Yosemite, Yellowstone, or the Grand Canyon, you'll have a difficult time believing it when perched atop some Brooks Range peak in Alaska's Arctic Refuge or camped under a cosmic desert sky in Arizona's Cabeza Prieta. The beauty is there, and you don't have to look far to find it.

The special charm of the refuges is, of course, their wildlife. These are places to go slow, listen, watch. You might hear the ghostly calls of prairie grouse and the bugling of sandhill cranes over the Oregon high plains. You might see herds of bison stir up autumn dust in Oklahoma, or sit spellbound as desert bighorn sheep cautiously come to drink at a lonely Nevada waterhole. You might have pronghorn antelope whiz past you in the Montana badlands or be awed by a quarter-ton Alaskan grizzly tearing up a hillside for a four-ounce vole. Not every refuge will provide all things for all backpackers, but each will provide opportunities to observe nature in a way that few other places can.

For a list of all the national wildlife refuges, or for general information on the system, contact the Department of the Interior, U.S. Fish and Wildlife Service, Division of Refuge Management, 18th and C Sts., N.W., Washington, DC 20240.

Sheldon–Hart Mountain National Antelope Refuges

NEVADA & OREGON

THE GREAT BASIN DESERT stretches irregularly from the Sierra Nevada on the west almost to the Rockies on the east. Since the mid-1800s this high desert country has been abused—overgrazed by domestic livestock and overhunted by people. The California bighorn disappeared, mule deer became scarce, and pronghorn antelope, once numbering in the millions, were reduced nearly to extinction.

In an effort to stem this wildlife decline the federal government in 1936 set aside two large ranges in the western Great Basin: the 241,000-acre Hart Mountain Antelope Refuge in south-central Oregon, and the 575,000-acre Sheldon National Antelope Refuge in northwest Nevada. Only 35 miles apart, and similar in many respects, both areas are supervised by one refuge manager with headquarters in Lakeview, Ore.

Hart Mountain Refuge, to the north, is dominated by an 8,065-foot fault-block ridge that has been called an oasis in the desert. Numerous springs and creeks tumble from the cool, lightly forested highlands to the semi-arid rangelands a few thousand feet below.

Hart Mountain has two personalities. The west side is a blend of precipitous canyons, rocky bluffs, and steep cliffs, superb habitat for everything from bighorn sheep and mule deer to golden eagles and peregrine falcons. By contrast, the gently sloping east side descends in a series of hills and low ridges to the sagebrush-grass ranges typical of southeastern Oregon. Thousands of fleet-footed pronghorn use this open expanse as a summer breeding ground, along with mule deer, coyotes, bobcats, jackrabbits, and burrowing owls. Altogether, the refuge's terrain—broken yet open—is well-suited for backpacking and cross-country travel.

The Sheldon Range was established primarily as pronghorn winter range; as many as 8,000 of the animals can be found here. The mountains are small and there are few trees; there are, however, mile upon mile of high and dry tablelands and rolling sage-covered hills interrupted by narrow valleys, canyons, and steep rocky rims. Wildlife is similar to that found in Hart Mountain, and hiking is excellent.

Backpacking is allowed, with some restrictions, throughout both refuges. The Sheldon Refuge limits camping to 18 designated sites, accessible mostly by cross-country travel; springs, creeks, or artificial ponds are usually nearby. By contrast, backpackers may usually roam anywhere in the Hart Mountain Refuge. (Some areas may be closed to hikers during certain times of the year, such as when bighorn sheep are lambing, to prevent undue disturbance.) A free special-use permit must be obtained at refuge headquarters before heading out to explore either area.

Hiking and backpacking in the Sheldon–Hart Mountain refuges is gaining in popularity, but they still have fewer than 25 backpackers per year, according to Joseph Welch, assistant refuge manager. "Perhaps it's because water is generally scarce and access roads are rough and can get muddy," Welch says, "but from April to October, opportunities for wildlife observation and photography in the more remote areas of the refuges couldn't be better."

For more information: Sheldon–Hart Mountain National Antelope Refuges, P.O. Box 111, Lakeview, OR 97630; phone (503) 947-3315.

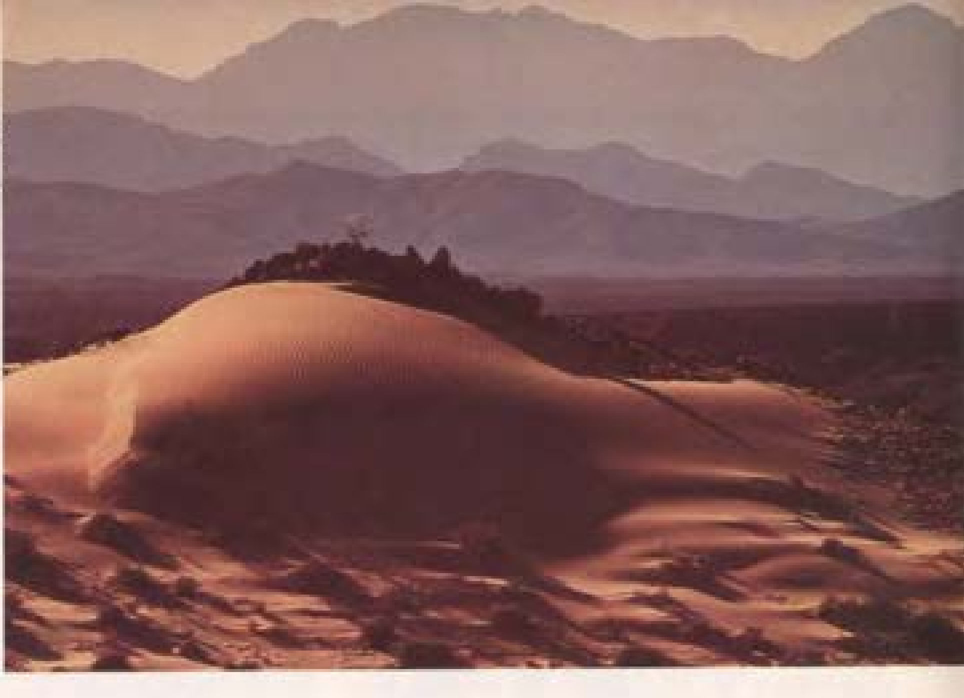
Desert National Wildlife Range

NEVADA

IT COMES AS A SURPRISE to many that fewer than 20 miles from downtown Las Vegas is the largest national wildlife refuge outside Alaska. The Desert National Wildlife Range, comprising more than 1.5 million acres, was established in 1936 to preserve the once nearly extinct desert bighorn sheep and the Mojave Desert wilderness necessary for its survival.

Six mountain ranges rise dramatically from the desert floor and run through the refuge in a general north-south direction. The highest point, Hayford Peak, juts 9,912 feet above sea level and is often covered with snow. The desert floor, by contrast, is as low as 2,500 feet in elevation and is usually bone dry and blazing hot. Five well-defined life zones are represented here, ranging from creosote-saltbush in the valleys to yucca, Joshua tree, pinyon and juniper on the mountain slopes to fir, ponderosa, and bristlecone pines on the highest ridges.

Approximately half the range is open to overnight backpacking by those with the foresight to obtain permits. A number of trails lead into the impressively scenic Sheep Mountain



Near Las Vegas, the rugged beauty of the Desert Range, a gamboler's paradise. At right, the scenic Moapa Valley.

Range, although cross-country route-finding skills are required for navigation across most of the refuge's mountains. According to refuge manager David Brown, the Desert Range can be best appreciated by those who travel on foot along its timbered mountain ridges and up its steep-walled canyons. "Most of the refuge is roadless and quite suitable to backpacking," he says. "The best times to backpack are April, May, and October. However, because of the ruggedness and roadless nature of the area, we don't get a lot of backcountry use."

This is a dry land. Annual precipitation varies from less than four inches on the valley floor to just 15 inches on the higher peaks. A few seeps, springs, and man-made catchments provide the only source of water. All water in the refuge is for wildlife; backpackers must carry adequate drinking water for the duration of their trip.

Despite the harsh conditions, life prospers in the refuge. Fifty-two mammal species—including bighorn, mule deer, coyotes, bobcats, foxes, badgers, and an occasional mountain lion—are represented here, along with 31 species of amphibians and more than 245 species of birds. The best times to wildlife-watch are in the early morning and evening hours and in the spring and fall, when temperatures are cooler.

Ending a day rolled up in a sleeping bag under a star-filled sky, listening to coyotes and great-horned owls in the distance, is one of the many rewards of a backpack trip in the Desert Range. At times like these it's hard to imagine that glitzy Las Vegas is only a half-hour drive away.

For more information: Desert National Wildlife Range, 1500 N. Decatur Blvd., Las Vegas, NV 89108; phone (702) 646-3401.

Wichita Mountains National Wildlife Refuge

OKLAHOMA

A CENTURY AND A HALF AGO the North American bison were 60 million strong, but by 1899 fewer than 700 of the great shaggy beasts remained. As part of a last-ditch stand to save the animals, the Wichita Mountains Refuge in southwest Oklahoma was established in 1905—the nation's second wildlife refuge, and the first to be set aside for a mammal.

When most people think about Oklahoma, images of flat, dusty landscapes come to mind, but as soon as one enters the 59,020-acre Wichita Mountains Refuge that stereotype is destroyed. There are granite peaks (two more than 2,000 feet high), canyons, oak woodlands, grasslands, rolling hills, streams, lakes, and two designated wilderness areas, one of which—the 5,000-acre Charons Garden unit—is shared by both buffalo and backpackers.

In the Charons Garden Wilderness, as elsewhere in this mid-continent refuge, east meets west. Species overlap produces a diverse fauna and flora; cardinals are seen alongside roadrunners, stands of eastern red cedar grow beside clumps of desert mesquite. Backpackers may encounter bison (the herd now numbers about 625 animals), elk, whitetail deer, wild turkeys, even Texas longhorn cattle. Prairie-dog towns dot the grassy areas, the busy rodents always alert for coyotes, hawks, and golden eagles. Only one trail leads through Charons Garden, but none are really needed; bushwhacking isn't too difficult in this barren, bouldery enclave.

The Charons Garden unit is unfenced, so its wildlife roam free. Hikers should always keep a safe distance from the animals: A bull bison can stand six feet at the shoulder, weigh more than a ton, and outrun a racehorse; during the midsummer breeding season, they often become especially belligerent.

Certain regulations are necessary in the Charons Garden Wilderness Area to protect the natural resource and to provide a quality experience for visitors. Backcountry permits are issued for a maximum of three days; a $2-per-person fee is charged. Permits are available by reservation up to 90 days in advance or may be assigned on a walk-in basis at the refuge headquarters or visitor center. Advance reservations are advised: A maximum of ten permit-holders are allowed in Charon Gardens at one time.

Some 20 lakes may be encountered throughout the Wichita Mountains refuge, where they combine with woods, peaks, streams, and wildlife to attract backcountry travelers.

Robert Karges, refuge manager, estimates that 400 to 500 permits are issued to backpackers each year for the Charons Garden Wilderness Area. He cautions trip-planners that there are times, particularly on spring and fall weekends, when backpackers are turned away because the demand is greater than the number of available permits, and adds that hikers shouldn't count on reliable sources of water in the backcountry.

Backpackers wishing to sample the east, midwest, and west on a single day's journey needn't charter a jet; they just have to hike into the Wichita Mountains and let the country come to them.

For more information: Wichita Mountains National Wildlife Refuge, Route 1, Box 448, Indiahoma, OK 73552; phone (405) 429-3222.

Cabeza Prieta National Wildlife Refuge

ARIZONA

TELEVISION AND MOVIES have long portrayed the Arizona desert as a land fit only for the toughest and meanest. If a bullet or the heat didn't get you, the rattlesnakes and scorpions surely would.

Whatever your desert fantasy may be—and fortunately, many folks' are of a more serene variety—a large chunk of this cactus-coated desert remains nearly as wild as it was in days of yore. The 860,000-acre Cabeza Prieta refuge, located in extreme southwestern Arizona, shares its southern border with Mexico

The Wichita Mountains, small by alpine standards, are appealing nonetheless. Bison are the refuge's wildlife stars.

for some 60 miles, and borders the 331,000-acre Organ Pipe Cactus National Monument to the east. The refuge represents one of the largest relatively unspoiled areas of Lower Sonoran Desert habitat in the United States. Its small but extremely rugged mountain ranges, separated by broad alluvial plains, provide an austere yet magnificent setting for challenging backcountry trips.

Cloaked with exotic desert plants like the organ pipe and senita cacti, elephant tree, Kearney sumac, and limberbush, Cabeza Prieta's open terrain offers excellent opportunities for cross-country hiking and wildlife viewing. The refuge is home to desert bighorn sheep, the endangered Sonoran pronghorn antelope, collared peccary (also called javelina), ringtail cat, and 30 other species of mammals. More than 165 species of birds are listed on the refuge checklist. And, as must be expected, Cabeza Prieta is a reptile stronghold: The relatively rare desert tortoise, 18 species of lizards (including the venomous Gila monster), and 18 species of snakes (six of which are rattlers) have been recorded here.

A visit to Cabeza Prieta involves more than the usual foresight and planning. And there's even an added twist: Much of the refuge is within the boundaries of the Luke Air Force Range, which occasionally uses the area for air-to-air gunnery practice. Backpackers must check with the refuge office ahead of time to ensure that entry will not conflict with military flying activities.

Once a backcountry permit is secured, visitors may camp anywhere in the refuge (except within a quarter mile of waterholes). Cabeza Prieta has excellent terrain for cross-country hiking, and there are sufficient vehicular trails for access, according to Linda Hagen, refuge manager. But she cautions would-be visitors, "We have very hot summers. Most people visit during the late fall, winter, and early spring months." No time limit will be imposed on your visit, although water is a limiting factor since there is no drinkable water within the refuge.

Hagen adds that hikers should come prepared. "At 1,300 square miles," she says, "the refuge is very large and the elements can be very harsh. Lack of water, excessive heat, and poisonous animals could cause travel problems for the inexperienced or unknowledgeable hiker. We feel, however, that Cabeza Prieta can provide one of the highest-quality experiences available in a desert environment for those prepared to appreciate what it has to offer."

For more information: Cabeza Prieta National Wildlife Refuge, 1611 N. Second Ave., Ajo, AZ 85321; phone (602) 387-6483.

Also of interest to backpackers is Arizona's Kofa National Wildlife Refuge, located a few hours' drive northwest of Cabeza Prieta. The refuge encompasses 600,000 acres of pristine desert environment that is home to the desert bighorn sheep and the California palm, the only native palm in Arizona. For more information, contact Kofa National Wildlife Refuge, P.O. Box 6290, Yuma, AZ 85364; phone (602) 783-7861.

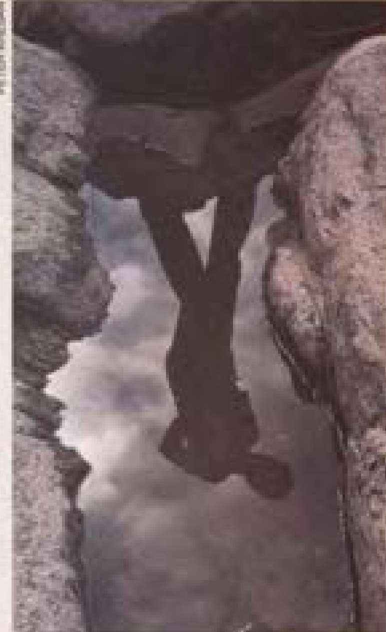
REFUGE RIGHTS AND WRONGS: A VISITOR'S CODE

Unlike national parks, which cater to the human animal, and national forests, whose primary objective is timber production, America's national wildlife refuges have wildlife as their chief management concern. Rules and regulations governing access and movement of campers and backpackers may thus be more restrictive here than in other natural areas.

To make sure you get your trip off on the right foot, be sure to call or write the refuge you're planning to visit to inform the manager of your plans. You will receive a brochure and/or map and be advised of pertinent regulations, special activities, hazards, directions for access, and other helpful information.

The refuge managers we contacted offered the following suggestions for overnight visitors:

- Make sure your vehicle is in topnotch condition. Roads to trailheads are often rough and sometimes impassible. Service stations may be scarce, and help is usually a long walk away. Be sure to carry a spare tire, jack, tow chain, and other emergency automotive gear.
- Water obtained outside of approved wells should be treated with chemicals, filtration, or by boiling for ten minutes before drinking. In some refuges it is necessary to bring water with you; at nearly eight pounds per gallon, this will influence your itinerary.
- Backpacking-type stoves are recommended and in some cases required. In certain refuges wood is scarce or nonexistent, while in other areas grass fires are a threat.
- Marked trails are infrequent, so—except when visiting refuges with restricted-access areas—your choice of hiking and backpacking routes is limited only by the amount you can carry and your imagination. Good maps and a compass are necessary items; you should know how to use both before setting out.
- Let a reliable person know your route plan and expected time of return. And don't forget to notify that person when you do return.
- Currently, 244 of the 424 national wildlife refuges allow some kind of recreational hunting in accordance with state and federal regulations. Check with the refuge manager before your visit to determine hunting dates and seasons, and what areas, if any, may be affected.
- Concentrate your wildlife viewing in the morning and early evening hours, when birds and mammals are most active. Use binoculars (and telephoto lenses for cameras), and take along the appropriate field guides.
- You can help minimize conflicts between wildlife and wildlife-watchers by obeying all signs pertaining to camping, fires, closed areas, permits, refuge hours, etc. Stay out of nesting areas, don't pick or trample plants, and avoid frightening wildlife by making loud noises or sudden movements, or by approaching too closely.



After a rain, water collects briefly in a shallow natural catchment, or tinaja. *Visitors to the Cabeza Prieta refuge are advised to bring plenty of their own water, however.*

Cabeza Prieta's open terrain makes cross-country travel seem deceptively simple. Yet the difficult conditions facing visitors to this Sonoran Desert environment—extreme temperatures and poor roads, to name two—make advance planning a must. That said, with proper precautions a memorable trip is guaranteed.

Charles M. Russell National Wildlife Refuge

MONTANA

For a taste of the Wild West as portrayed in the paintings of Charles M. Russell, the colorful early-day cowboy artist, backpackers should head to the national wildlife refuge in northeast Montana that bears his name.

Extending for 125 miles up the Missouri River from Fort Peck Dam, the spacious Charles M. Russell NWR encompasses approximately a million acres of native prairies, forested "breaks," riverbottoms, and eroded badlands. The area is a treasure house of history, wildlife, and—for the properly prepared visitor—backcountry camping opportunities as well.

The Russell refuge was established in 1936, at a time when this country's plains animals were rapidly disappearing. The refuge's goal has been to restore many of the species that Lewis and Clark recorded here in 1805. It is doubtful that grizzly bears and wolves will ever be reintroduced, but elk, deer, pronghorn antelope, and bighorn sheep, along with 40 other mammals, are doing well. There's also hope that the extremely rare black-footed ferret survives here among the 5,000 acres of prairie-dog towns.

Considering its Great Plains location, the refuge offers a surprisingly abundant and varied bird life. Well over 200 species—from golden eagles, prairie falcons, and wild turkeys to white pelicans, Canada geese, and sandhill cranes—can be observed at the refuge sometime during the year.

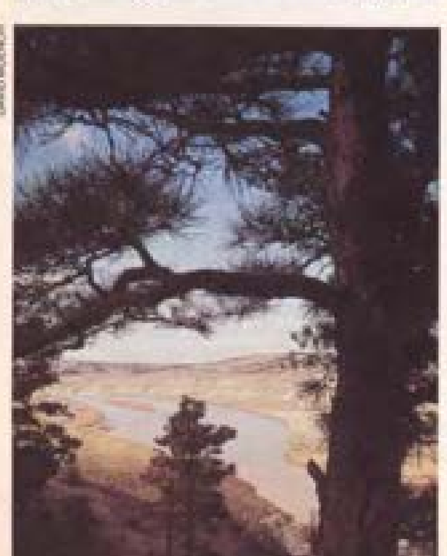
Although the entire refuge is open to backpacking and camping, perhaps the best area for hiking is the adjoining 20,819-acre UL Bend Wilderness Area. Surrounded by a U-shaped bend of the Missouri River, this rolling, semi-arid prairie provides backpackers with the ultimate in solitude. It is so rarely traversed that some of it may yet be unexplored. Access is by boat or by dry-weather road to the refuge boundary; within the refuge itself there are 700 miles of prairie trail navigable by four-wheel-drive vehicles.

According to refuge manager Ralph Fries, "Charles M. Russell NWR can provide a quality backpacking experience if you plan properly, and have the

DAVID MUENCH

Cottonwoods (above) and pelicans—emblems of the diverse scenery and species within Montana's million-acre Charles M. Russell National Wildlife Refuge. Ponderosa pine (bottom) inhabit the slopes above the confluence of the Missouri and Musselshell rivers.

GEORGE WUERTHNER



DAVID MUENCH

skills necessary to travel in a remote area that does not have marked trails." He cautions summer visitors to be prepared for high temperatures and voracious mosquitoes.

For more information: Charles M. Russell National Wildlife Refuge, P.O. Box 110, Lewistown, MT 59457, phone (406) 538-8707.

Arctic National Wildlife Refuge

ALASKA

THERE ARE FEW PLACES left on this planet that are as wild and remote as the Arctic National Wildlife Refuge in northeastern Alaska. Wilderness, wildlife, and ecological values are found here that exist nowhere else in the United States.

Originally established in 1960 and redesignated and enlarged in 1980, the northernmost unit in the National Wildlife Refuge System contains 18 million acres of (so far) undisturbed arctic environment. (Oil and gas development on 1.4 million acres of the refuge's coastal plain would, if approved, cause massive disruption of wildlife habitat there. See "Can Caribou and Oil Coexist?" *Sierra*, September/October 1986.)

Curving through the refuge east to west is the rugged, spectacular chain of peaks comprising the Brooks Range. North of the divide is the North Slope, a vast tundra criss-crossed by turbulent streams that funnel to the Arctic Ocean. South of the Brooks Range, protected from the cold blasts off the arctic ice pack, is the beginning of the boreal forest. Here, groves of stunted white spruce and balsam poplars mingle with meadows, muskeg, and gently flowing rivers.

Within this pristine ecosystem, where signs of modern man are few, wildlife populations remain much as they did long ago. Backpackers are likely to see caribou (the porcupine caribou herd, numbering around 150,000 animals, migrates through the refuge each year), grizzly bear, Dall sheep, wolverine, fox, moose, and (on the North Slope) possibly even shaggy-haired musk ox. A variety of birds—snowy owls, golden eagles, jaegers, peregrine falcons, oldsquaws, wagtails, and wheateaters, to name a few—flock to the Arctic refuge each summer to nest and raise their young.

Backpackers entering the Arctic Wildlife Refuge will find unlimited opportunities for exploration, wildlife study, and breathtaking vistas. But this isn't the type of place to enter casually. There are no conveniently signposted auto tours, no network of trails to famed scenic spots or wildlife viewing areas. The only way into and out of the refuge is by chartered air taxi from Fairbanks or one of three villages farther north. Visitors have to be totally self-reliant for the duration of their trip.

Glenn W. Elison, refuge manager, recommends that potential visitors first study the refuge pamphlets available by mail. "Then, after topographic maps are studied and a tentative itinerary is made, call or write the refuge office to discuss your plans with the staff," he advises. "We have a broad general knowledge of the refuge and provide some specific information about the more frequently traveled routes." However, because of

the extremely vast and remote nature of the area, there may be very little information on a particular route someone wishes to travel. Therein lies the challenge and uniqueness of a wilderness trip in the Arctic NWR.

"Although this is not a place for the inexperienced," Elison adds, "a backpacker well prepared both physically and mentally should have a most enjoyable experience."

For more information: Arctic National Wildlife Refuge, Federal Building & Courthouse, 101 12th Ave., Box 20, Fairbanks, AK 99701; phone (907) 456-0250.

The Arctic refuge is only one of many in Alaska that provide fantastic backpacking opportunities. In all, wildlife, wilderness, and solitude abound. To find out more about these refuges, contact the U.S. Fish and Wildlife Service, 1011 E. Tudor Rd., Anchorage, AK 99503; phone (907) 276-3800. ■

LARRY RICE, *a wildlife biologist with the Illinois Department of Conservation, is a freelance writer and photographer.*

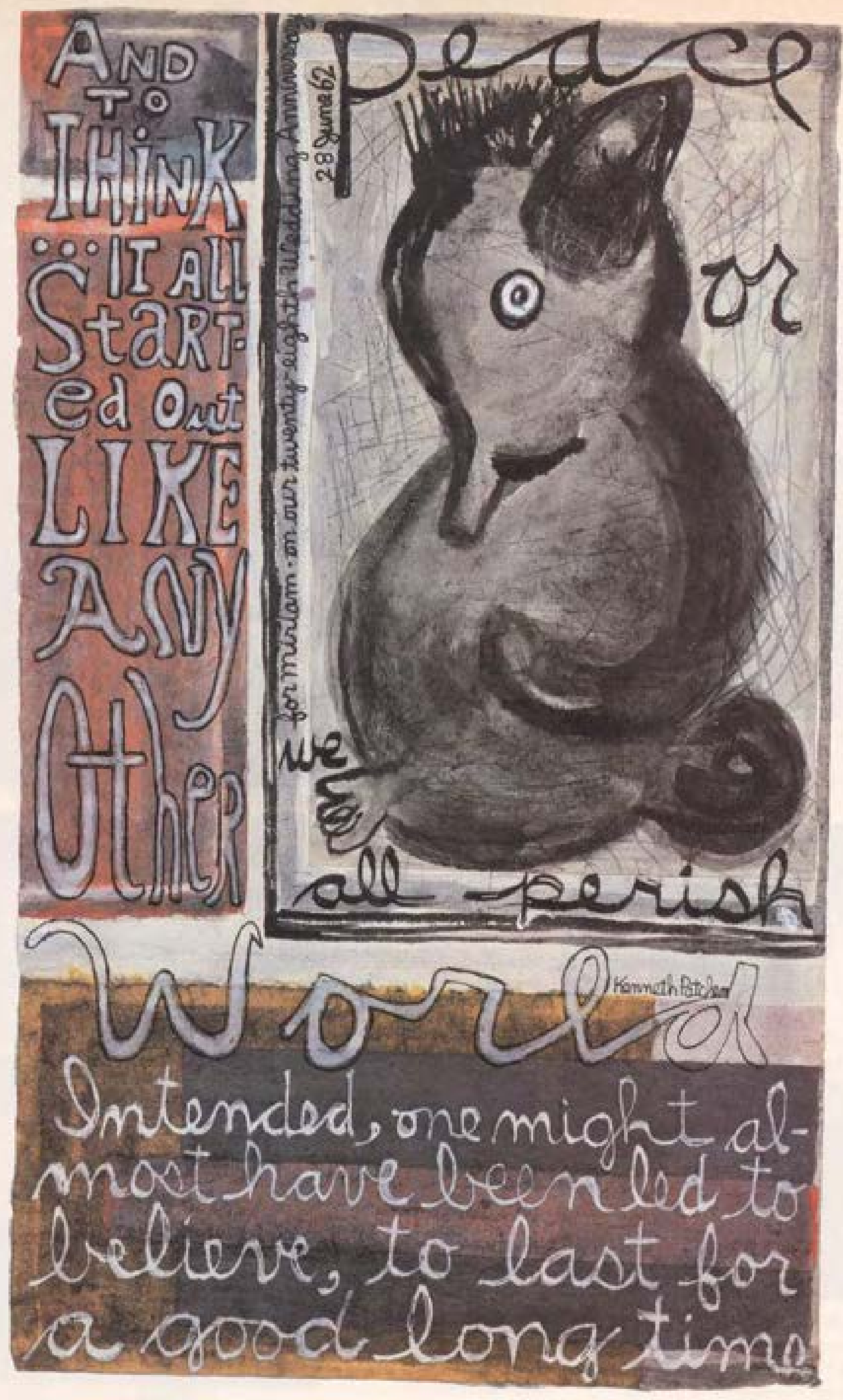
Perils of an outdoors career: A wildlife biologist is dive-bombed at the Arctic refuge.

Strange sights under Arctic lights—the midnight sun at summer solstice (exposed at 10-minute intervals).

Oh, you beautiful Dall! These white Alaskan sheep, related to the bighorn (though the Dall's horns are more impressive), occupy the high ground in the Brooks Range.

The Arctic NWR is host to numerous bird species, among them snowy owl (right) and willow ptarmigan (below).

The Arctic refuge is almost unimaginably vast; backpackers here are literally explorers too.



AND TO THINK
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LIKE
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for miriam · on our twenty-eighth Wedding Anniversary
28 June 62
World
Kenneth Patchen
Intended, one might al-
most have been led to
believe, to last for
a good long time

Back From the Abyss

In spite of Earth's deteriorating condition, there is one very powerful reason to be optimistic about the future of our spaceship and its precious living cargo: We are not threatened by anything like a runaway planet bearing relentlessly down on us. Rather, Earth's peril is entirely traceable to the behavior of a single species: *Homo sapiens*.

Ironically, the end of Earth as we know it is likely to be caused by the only product of the planet's evolutionary processes that has the capacity to foresee its own denouement. It is an end that none of the 5 billion people now on the planet desires, but one that they must work together to avoid. That end is the collapse of civilization, accompanied by enormous damage to Earth's ecosystems. It could come about gradually over the next half century as a consequence of continuing human population growth and behavior patterns that degrade the planet's ecosphere. Or it could occur with lightning swiftness any day, by design or accident, if an appreciable portion of humanity's stock of nuclear weapons were detonated. One might crudely characterize these different endings to our world as the whimper and the bang.

The whimper could be avoided by steps that are rather simple in outline, though quite complex in practice. They are nevertheless steps that humanity in large part *already knows how to take*.

First, the growth of the human population must

ANNE H. EHRLICH & PAUL R. EHRLICH
Picture Poems by KENNETH PATCHEN

be halted, and a slow decline initiated toward a size that can be sustained over the long run. That no one knows at the moment what the appropriate size might be does not matter. Everyone knows the direction in which it lies, and decades will be required even to halt growth in most nations.

The challenge is to get moving as fast as possible. Even a small delay in reducing births in a growing population means a much larger population size at its peak; likewise, even a small early reduction in the growth rate brings huge dividends later.

Unfortunately, the world's leaders have been slow to recognize the true dimensions of the threat posed by overpopulation. Often, when recognition has come, one of the first things to be sacrificed has been individual freedom. Freedom certainly suffers from the disease of overpopulation as votes are diluted and sheer numbers of people restrict the freedom that individuals might otherwise enjoy. But freedom also suffers when cures are attempted.

What, then, is the ethical course for solving the population problem before time runs out? Is government control of fertility justified? Our answer is that in some form it is not only justified but morally required worldwide. The size of a nation's population is surely as legitimate a concern of its government as national security. Indeed, the two are closely interrelated, and beyond a certain minimum, especially in the modern era, numbers do not confer military security.

Governments normally have the power to regulate the number of spouses an individual can have; and as India, China, and a few other nations have demonstrated, governments can both justify and exert power to regulate family size. So the most difficult ethical question becomes not *whether* governments should attempt to control population size, but *how*. Because of their high per capita use of resources and the environmental impact of the rich nations, their overpopulation is more serious for the Earth as a whole than overpopulation in poor nations. Clearly, in the United States, Canada, Britain, Japan, and most other overdeveloped countries, the first measures to be tried should be noncoercive ones designed to remove incentives for having large families, to ensure full access to all safe and effective means of birth control, and to put the moral (and educational) power of the government firmly behind the notion of "stopping at two." Given the present demographic situations in these postindustrial nations, we suspect that such action would be enough to end growth relatively soon and to begin the required slow decline.

Unfortunately, such simple methods are not likely to be sufficient for most developing countries. Each nation will require programs designed by and for the local people. The greatest successes in reducing birth rates have occurred in countries that have made progress in providing education, especially for women, and improved health programs that reduce infant mortality and increase life expectancy, as well as strong family-planning programs. Other policies that have sometimes helped include provision of food supplements and social security programs. In some countries, government-sponsored peer pressure and economic incentives and disincentives (such as eligibilities for housing and education) have been successfully applied.

No one would pretend that stopping population growth in a poor country is easy; there are many seemingly more urgent claims on limited resources, and too few political leaders as yet committed to a serious effort. But how to do it is no longer a mystery. Modern contraceptive methods may not be perfect, but some method is adequate for most people most of the time. Abortion, undesirable though it may be in many ways, is available as a backup (where legal), and sterilization can prevent extra births after families are complete. For people who have moral objections to abortion, the only practical answer is to maximize knowledge and availability of effective contraception, and thus diminish the need for abortion.

Furthermore, the social changes that set the stage for family limitation are now reasonably clear, and all are appropriate social goals in their own right: reduction of infant mortality, improved nutrition, improved health and education, and enhanced status of women. Not only does controlling population growth by itself benefit people in developing countries, but the types of development that are most immediately beneficial—and that contribute to further development—also foster population control.

Another example of a step in the direction of a sustainable world is the trend toward conservation of energy in the West. Conservation, of course, reduces the pressures on nonrenewable fossil fuel and uranium resources, and thus at least slows the rate of capital-burning by humanity—especially by the industrialized nations. Beyond that, however, the use of energy is directly or indirectly involved in almost all environmental deterioration, whether the energy in question is obtained by the burning of fuel wood in a simple stove in a village hut or the burning of coal or oil in a modern power plant.

But energy conservation is not, by itself, sufficient to lighten the environmental burden. This is clearly seen in the urgent need to abate acid rain, which threatens to destroy ecosystems over

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THE BEST HOPE
Is that one
of these days
the ground
will get disgusted
enough just to walk
away ~ leaving
people with nothing
more to stand on
than what they
have so bloody well
stood for up to now
Patchen

large sections of the Northern Hemisphere.

To reduce this threat requires, among other things, installing pollution-control devices on the exhaust stacks of hundreds of power-generating and industrial plants. But such devices can be costly, and many of the worst offenders are in areas and represent industries that are already threatened economically. Thus the long-term benefits to society as a whole of controlling the pollution must be balanced against the short-term costs to stockholders who may lose profits and to workers who may lose jobs.

This choice is not a new one, though, and in most Western societies it has been made, at least in principle: Polluters have been forced to internalize the costs formerly imposed on the public at large. To the degree feasible, industries must prevent the emission of pollutants. Where this is too costly, or where it is too late (as in the case of toxic wastes dumped decades earlier), the offending companies must pay for cleaning up.

Acid precipitation has the advantage —if it can be called that—of being a problem primarily for the overdeveloped nations that mostly cause it. In contrast, the buildup of carbon dioxide in the atmosphere is in several respects an even knottier problem for the global community. First, while the contributions from combustion of fossil fuels come predominantly from the rich nations, the developing nations contribute significantly, principally by their destruction of tropical forests. And everyone will pay a share of the costs.

Moreover, unlike acid rain, the carbon dioxide problem is not caused by a trace pollutant. Consequently, there is only one way to stop producing excess carbon dioxide: Stop burning fossil fuels and wood. It is completely impractical to stop entirely, of course, given humanity's dependence on fossil fuels. But the rate of production of carbon dioxide could be lowered significantly, which would greatly alleviate the problem. Simply slowing the rate at which carbon dioxide accumulates in the atmosphere would allow more time for part of it to be absorbed in the oceans, and for both society and biotic communities to adjust to changes in climate.

This slowing of the build-up process could be accomplished through several measures: energy conservation, especially of fossil fuels; switching to other forms of energy (hydro, solar, or wind) wherever feasible; and using those fossil fuels that produce less carbon dioxide per ton burned (oil is better than coal, while natural gas is better than either).

The carbon dioxide dilemma shares with acid rain the characteristic of being a subtle, long-term threat, for which much uncertainty surrounds both the processes and the exact consequences for the ecosphere and for humanity. The carbon dioxide buildup in particular is a global problem that can be successfully addressed only through concerted international action. In this case, the developing nations will have to be partners in the effort with the disparate, often mutually unfriendly industrial nations.

The environment is not an infinite sink that can be abused without penalty, as many societies have learned to their sorrow. Fortunately, natural systems *do* have considerable ability to resist degradation and rebound from gross insults, if given half a chance.

There are many ways that societies can reduce the pressure and give ecosystems some chance of recovering. The prime step might be the hardest one to take, but it is essential: permit no development of any more virgin lands. Since *Homo sapiens* already occupies and uses the vast majority of usable, productive land, precious little is left that has not felt the tread of a human foot. But whatever relatively undisturbed land remains that supports a biotic community of any significance (excluding windswept mountaintops, barren deserts, or frozen ice fields) should be set aside and fiercely defended against encroachment.

Plenty of land is available for development that has been used in other ways: as farmland, pasture, logged forest, or human settlement. All new development should be restricted to such land. Moreover, the most intensive kinds of development (housing, factories, roads, airports, etc.) should be sited as much as possible in older, intensively developed areas.

Under such a regime, natural forests could not be converted to pastures or farms, fragile or marginal grasslands would not be converted to cropland, and good farmland would not be covered with roads, factories, or housing. Increases in food production would have to come from enhanced yields on already cultivated land—as nearly all of it now does.

A corollary to not degrading any land further might be to restore as much land as possible. Turning marginal farms into parks, preserves, and greenbelts could be considered a "higher use" for land, to be encouraged especially near cities, where recreational open space is often scarce. City parks and greenbelts could be enriched by planting native flora, and homeowners could be encouraged to do the same with their gardens. Such improvements would help preserve the planet's diversity of life by maintaining a habitable place, if only a tiny bit in each individual instance. Thousands of tiny instances could add up to a lot of habitability.

One obvious place to obtain the resources to start restoring our environment is the swollen military budgets that afflict most of the world's nations. Leaders of both superpowers and of other nuclear-armed nations have acknowledged that a nuclear war cannot be won. That being the case, the tens of billions of dollars being poured into nuclear weapons and their delivery systems every year (beyond perhaps a small

Peace now
for
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Patchen

deterrent arsenal until mutual distrust can be reduced to manageable levels) are simply being wasted on an unusable product.

Yet, even if nuclear weapons were somehow totally banned, the determined militarists would doubtless turn to chemical and biological weapons in an attempt to achieve a similar capability of mass death and injury. They would use conventional weapons, the kinds used in good old World War II. But the world today is much more crowded and resource-poor than it was during World War II. In 1940, Europe was the only net food-importing region; today North America is the only net food exporter. Twice as many people are alive now as were during World War II. Fighting a conventional war on a much more crowded, much more resource-depleted planet, with much more powerful versions of the weapons of the 1940s would be the greatest catastrophe yet experienced by humanity, and might well be a major blow to the integrity of many of Earth's ecosystems. And it must be remembered that, while nuclear weapons might be banned, the knowledge of how to build them cannot. One might surmise that another World War II–type conflict would quickly lead to a new nuclear arms race and escalate to a nuclear war.

So the weapons are not the real problem. The real problem is that NATO and the Warsaw Pact nations find themselves trapped in an increasingly unstable arms race. Far from contributing to security, the accumulating weaponry diminishes it in more than one way: by increasing the likelihood of an accidental war that threatens everyone's well-being, and by diverting attention and resources from the deepening human predicament, which threatens world security far more than political differences can.

The bottom line is that humanity can no longer afford to permit the close connection between nation-states and warfare that has existed for the nearly 10 millennia since the appearance of nation-states. Either the connection will be broken, or civilization itself will be. "Realists" may consider world peace an impossible goal, and for all we know they may be correct. But the only realistic course of action today is to strive for that goal.

It seems obvious to us that a bilateral, verifiable reduction in nuclear arms is a first step that must be taken *now* if humanity is to have a chance for the bright future that is otherwise possible. Certainly, each side will have to take the risk that the other could violate an arms control agreement, but with the safeguards now available, that risk is tiny compared to the risk of all-out thermonuclear war.

The primary responsibility for moving toward a reduction in nuclear arms clearly rests with the United States and the Soviet Union. And since the United States is an open society and the Soviet Union is not, we believe the United States should take the initiative, remembering that disarmament is not a "zero-sum" game. A gain for one side does not necessarily imply a loss for the other: Both players can come out winners.

The gap between Earth's rich and poor nations, basically a North-South gap, is much wider than that between East and West. And the nations of NATO and the Warsaw Pact are all on the same side of that gap. Both blocs could benefit immensely by converting their military competition into a competition to aid the poor. If this is not done, the poor, armed with nuclear weapons (as they soon will be), could become an enormous threat to both. It seems unlikely that three fourths of the human population will quietly sink into the abyss while allowing the rich to continue their gluttonous behavior.

It is entirely within the power of humanity to close the gap between rich and poor and to reduce the human population to a level at which all people could lead a decent life without degrading the ecosphere. A transition can be made to living primarily on income; agricultural systems can be designed that would be highly productive while helping to support the ecosystems on which they depend. Societies can turn their backs on racism, sexism, gross economic inequality, and above all war as a mode of problem-solving. People can learn to value political, social, and cultural diversity, and to make the maintenance of organic diversity a quasi-religious duty.

In short, there are no insuperable barriers to creating a peaceful planet on which *Homo sapiens* can lead a rich existence without overstressing the natural systems that support human life—an Earth on which biological and cultural evolution can proceed into the future indefinitely. That is unless, of course, the behavior of our species turns out to be the barrier. We might be cheered by the thought that many present behavior patterns are quite new in evolutionary terms, the product not of millions of years of biological evolution, but of a few millennia of cultural evolution. Humanity has the tools in hand to accelerate cultural evolution to the point where patterns that took thousands of years to develop can be altered in decades.

The great hope for civilization lies in this: that people can recognize how the human predicament evolved and what changes need to be made to resolve it. No miracles, no outside intervention, no new inventions are required. Human beings already have the power to preserve the Earth that everyone wants: They simply have to be willing to exercise it. ■

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DAVID CROSS PHOTOS

Seth Zuckerman

LIVING THERE

Call it a bioregion, a watershed, or a life-place, your backyard by any other name is just as sweet.

The bioregional spirit: Residents of California's Mattole River Valley work to restore salmon to their river. Valley-dwellers are learning to care for the watershed themselves; as one of them puts it, "Everybody needs a place to put their feet."

Time was, they say, when the Mattole River was so thick with king salmon that people backed their trucks up to the riverbank during the annual spawning runs and heaved the fish in with pitchforks. But as roads and clearcuts stripped the steep hills, soil washed into the river and the gravel where the salmon laid their eggs was buried. By the late 1970s, most of the 2,000 residents of the remote Northern California Mattole Valley were resigned to the salmon's eventual extinction.

But a small and determined band of locals has spent the last six years helping the salmon survive. They trap the fish returning to spawn, incubate the eggs, and release the fry into the river. They are also improving the fish's habitat—breaking up logjams that block the salmon's migration, armoring the banks

ALONG THE MATTOLE, HELPING HANDS HEAL THE WATERSHED

A few miles down the dirt switchbacks from the Panther Gap Road, past the trailer, buckwheat patch, and goose pen, about a dozen people are clustered on the edge of a gully. The ravine is dry on this October afternoon, but during the coming rainy season it will swell to a small torrent, eroding the gully and caving in its banks. Today the local high school is trying to figure out how to keep the soil where it belongs.

"Now, how can we stop the water here?" one of the adults asks.

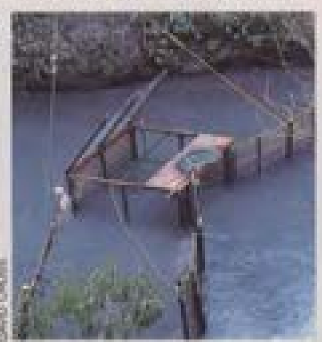
You can't stop water! a chorus of voices reminds her.

"OK—slow it down," she amends.

Various suggestions follow. Finally the students, teachers, and landowner settle on a plan to armor the places where the stream is eating away at the earth fastest. They will spend a couple of days digging rocks, hauling them to the site by truck and wheelbarrow, and placing them strategically in the gully.

The students are part of a far-reaching effort to restore the 300-square-mile Mattole River Valley to ecological health. Tens of thousands of salmon used to head for the mouth of the river, on California's north coast 35 miles south of Eureka, every year. But in the wake of erosion caused by logging, overgrazing, and poorly built roads, the fish dwindled to a small percentage of their former strength, and threatened to disappear entirely.

A salmon weir and trap capture the fish on their way upstream.


DAVID CROSS

RANDY STEMLER

A series of small dams changes the gradient and speed of the river and keeps gravel, essential for spawning salmon, in place.

GARY PETERSON

As part of the local curriculum, elementary school students release salmon into the river.

When David Simpson moved to the Mattole Valley in 1970, he arrived just in time for the last of the rich salmon runs. In 1979, Simpson's friend Freeman House moved to the valley after years as a salmon fisherman in Alaska and Puget Sound. Together they laid the groundwork for an attempt to save the Mattole's king salmon run.

Simpson and House started with a straightforward concept—capturing salmon as they return to spawn and incubating their eggs until the fry emerge, thereby keeping the eggs from being buried under river silt. Simpson, House, and their colleagues in the Mattole Watershed Salmon Support Group now spend a couple of months a year in chest waders, in and out of the 50-degree water, often taking time out from setting up their homesteads to work the traps. Within a year of 1980's startup it became ap-

DAVID CROSS

By planting redwoods, valley residents restore the land—and help save the river.

where silt is eroding into the river, and planting trees to anchor the soil.

The restoration of the Mattole Valley is just one example of a growing ecological movement called bioregionalism. Using picks and hoes as well as word processors, bioregionalists work to preserve and restore the regions in which they live. They contend that the only way to save the whole planet is to save its parts—and the part they are best able to save is the one nearest home. Bioregionalists try to understand the nature of the terrain, climate, life forms, and culture of their regions—and they try to live in ways that complement those special qualities. Theirs is an outlook most common among people who plan to stay in their bioregion, their "life-place," for decades and even generations.

Bioregionalists look at entire eco-

parent that to save the salmon run the hatchboxes would have to be supplemented by a major effort at habitat restoration.

The salmon group has scored several significant successes. Operating on a shoestring budget of $25,000 a year raised from the California Department of Fish and Game, private foundations, and local residents, it has released 102,000 salmon fry into the river to date. Biologist Gary Peterson estimates that about a quarter of last year's spawners were hatched through the help of the salmon group, and that the run might have dropped below its minimum viable size without that boost. By obtaining eggs from Mattole fish instead of from commercial hatcheries, the group has helped preserve the native strain of king salmon, adapted to the unique conditions of the river over thousands of generations and never mixed with other gene pools.

House and Simpson see the hatchbox project continuing for several more years, and the restoration work will require much longer than that. Ensuring that the work progresses for the decades it will take until the watershed can manage itself was one reason they decided to involve high school students.

The gully where the students work belongs to Peter Marshall, who bought 100 acres in the Mattole Valley and set up residence there in 1980. Two years later, the region was hit by its wettest winter in decades. "I don't know if you've ever seen the earth oozing downhill at half a mile per hour," Marshall recalls, "but I have never been so shaken." He proceeded to start a nursery, in which he raises native plants for erosion control—from the lofty Douglas fir to coyote brush and perennial bunchgrasses. His investment has brought him little income; so far, he has used most of the seedlings himself, but he hopes to make some larger sales to the salmon group and other outfits working on watershed rehabilitation.

The restoration workers' next task is to develop a comprehensive plan to control erosion, including a list of sites that need work most urgently. The survey is being conducted under the auspices of the Mattole Restoration Council (Box 188, Petrolia, CA 95558), an umbrella association of groups and individuals working on ecosystem rehabilitation. The council and its constituent groups have 50 to 100 active members—a significant fraction of the 2,000 or so people who live in the river basin. It is also encouraging the formation of tributary groups to handle problems on creeks; at least four such groups exist already. "I imagine the council's status as a nongovernmental organization growing," House says, "until it's the governing body of a self-regulating watershed.

"People call us for advice on erosion problems," House adds. "The California Fish and Game Department is easy about giving us permits; they say, 'You guys know what you're doing.'"

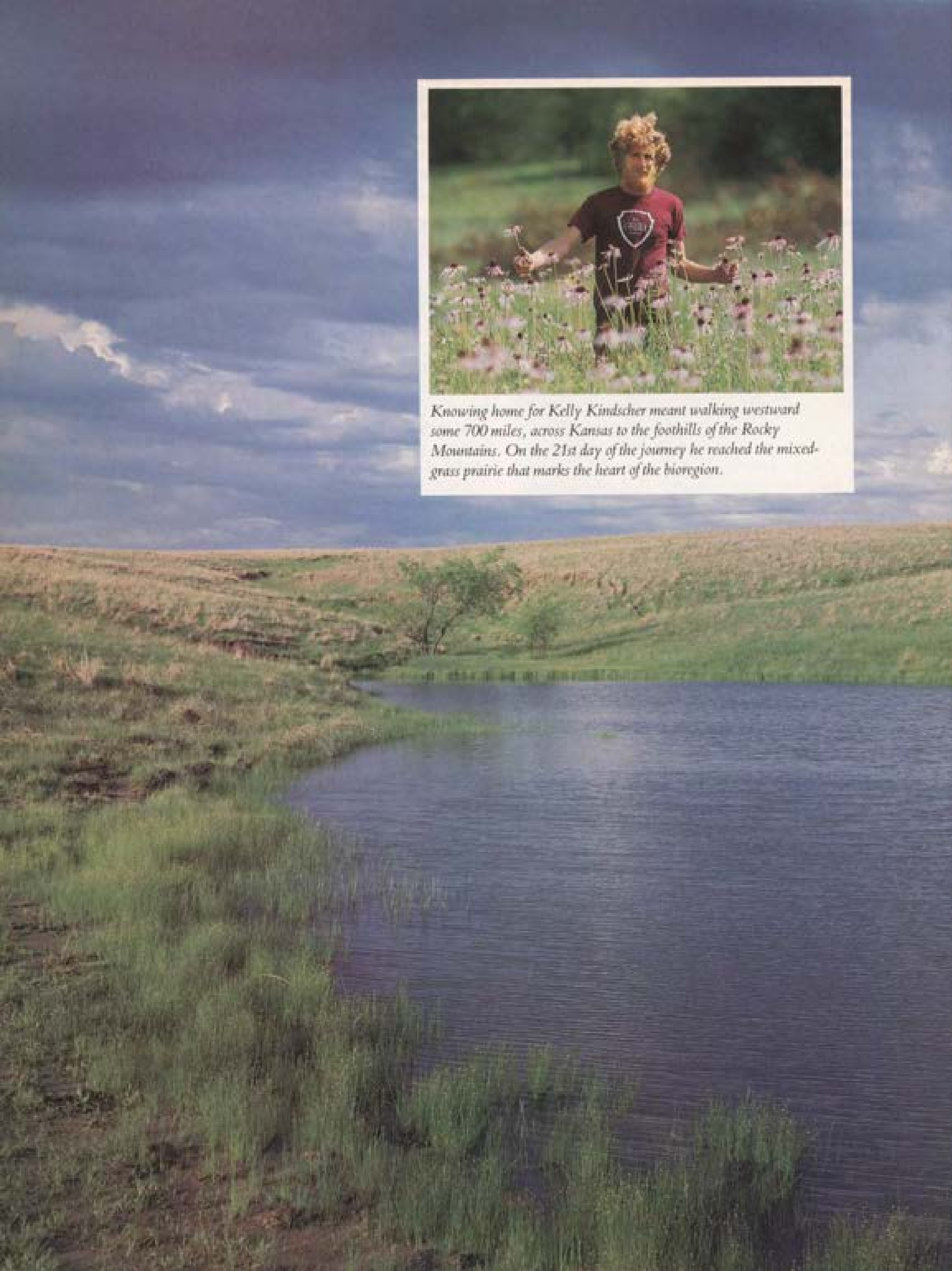
Council Chair Jan Morrison envisions the group operating its own road-building service, in order to do the job without the serious erosion often caused by poorly built roads. Other members have similar plans: "In ten years, we'll be doing the logging here," says House. "The talents we develop for restoration work are the same ones needed for logging and fish work."

Echoes Simpson: "By undoing the damage that's been done, we're learning the right way to do things, and ultimately we'll be able to do them ourselves."

Some of the workers' greatest achievements have been in changing local attitudes. People now believe that there is a chance to save the salmon—and are starting to understand what it will take to do so. One night, Simpson caught four teenage poachers whose justification for fishing was that "there are plenty of salmon in the river." He hired them to staff the trap for a night. When the teenagers went to the upper reaches of the river where the salmon spawn and die, they realized they were wrong—they were lucky to see a pair of fish every hundred yards. "Even the few hard-core poachers are coming around," Simpson says.

The salmon spawning cycle has become an increasingly prominent part of the valley's culture: Students at the elementary school take part in the annual fish releases, and they painted a mural at their school showing the fish swimming upstream to spawn. The salmon have even inspired Simpson and local doctor Richard Schienman to write a series of cabaret songs about the fish, including the classic "Queen Salmon":

When you are a salmon, you only get one shot
Most all the other creatures get to do it quite a lot
So when the winds start blowing cold, my blood it's running hot
I better get my ass upstream before it starts to rot.
My sense of smell will guide me, my love cannot fail
Upstream lies my only piece of tail.



Knowing home for Kelly Kindscher meant walking westward some 700 miles, across Kansas to the foothills of the Rocky Mountains. On the 21st day of the journey he reached the mixed-grass prairie that marks the heart of the bioregion.

systems, not just isolated issues within them. They focus on their own lifeplaces more than on global issues, and they try to adapt their cultures, including community celebrations, dance, and music, to the particulars of their bioregions. As an example, poet Gary Snyder often challenges bioregionalists to give directions to their home without reference to human artifact—no city or street names, just natural features.

The conceptual roots of bioregionalism go back to indigenous peoples who lived as members rather than rulers of their ecosystems. These cultures had (and some still have) a sacred involvement with the natural cycles and conditions of their place, according to Peter Berg, founder and director of Planet Drum Foundation, a nonprofit ecological-education group.

The bioregional philosophy was first articulated in its current form about a dozen years ago by Berg and his colleagues at Planet Drum. Their first products were "bundles," collections of maps, booklets, poems, and broadsides that typically celebrated a specific region. For the past few years, Planet Drum has published a newspaper, *Raise the Stakes*, that includes articles ranging from critiques of bioregional theory to reports of local work and organizing.

"When I explain bioregionalism to people, one of two things happens," Berg says. "Either they say, 'That's what I am,' or the next day they say, 'You know, I just had this idea. . . .'" Thanks to its simplicity, perhaps, and the fact that the theory can be adapted to the particulars of any bioregion, the movement now counts in its ranks 60 to 70 local groups across North America. The many projects that have sprung from bioregionalist thinking are as diverse as the ecosystems within which they have evolved.

When Kelly Kindscher decided to become better acquainted with his bioregion, he wasn't content merely to study maps and books. He and a friend shouldered knapsacks in Kansas City, where the Kansas River joins the Missouri, and started walking west. "I wanted to study the prairie plants, to meet the people of the region and talk about the way they use the land," Kindscher explains. He hiked along county roads and across fields, paying close attention to the transition from tallgrass to shortgrass prairie as he drew closer to the Rocky Mountains. After 79 days he reached the foothills of the Rockies, south of Denver. "When I saw the first blue spruce, which can't tolerate the drier conditions and lower elevation of the prairie, I knew that I had crossed the region," he says.

Kindscher is the author of a forthcoming book on edible native plants of the prairie, and is writing another volume on indigenous medicinal plants. His knowledge of the prairie is especially handy when it comes to burning it. "Fires every one to five years were part of the natural condition," he says. Fire keeps trees from creeping in, and frees the grasses from the dead thatch that accumulates from each season's growth. Kindscher and other members of the bioregional Kansas Area Watershed Council have set controlled fires at the request of several people who have "prairie yards." They have even started prairie fires inside the Lawrence city limits—on a nine-acre prairie the city recently bought as parkland—for what Kindscher guesses is the first time in 130 years.

The Kansas bioregionalists emphasize the cultural side of their place. Their series of poetry readings on the region's natural cycles has taken them across the watershed from Topeka to Manhattan and beyond. "We don't claim to be good poets," Kindscher says, "but we can represent the region and various aspects of it."

The council also sponsors quarterly camp-outs that, according to one participant, generate a "tribal feeling" in the group. The camp-outs usually draw between 60 and 80 people, although the turnout fell to eight once when the temperature dropped below zero.

Another council project includes the publication of a calendar featuring the watershed's plant and animal life. "It's a unique calendar in that it never goes out of date," says designer Ken Lasman, a Kansas native. "Year in and year out, the morel mushrooms appear in the second week of April—give or take a week or so. The calendar is a useful tool for understanding what it means to be where you are in the Kansas River Basin."

Halfway across the continent in northern British Columbia, Doug Aberley has mapped the entire province into its component bioregions. Aberley, village administrator and planner for the hamlet of Hazelton, started by mapping

Old Aiyansh, B.C., is one of many villages that have been abandoned as the provincial governments have increasingly centralized Canadian commerce. Bioregionalists propose revitalizing the settlements and bringing trade in natural resources back under local control.

the province's watersheds—not just their topography but their climate, minerals, soils, vegetation, population, and transportation patterns. From there he went on to propose in his master's thesis a new political structure more attuned to the local ecology.

In Aberley's proposal, municipalities and regional districts would be abolished, to be replaced by community councils that would have control over resources in their area—a responsibility now vested in various provincial ministries. Aberley thinks rural regions can supply more of their own food and energy, instead of being simply resource colonies for the national economy. He also feels his proposal addresses some of the frustrations of people in rural regions. "The Forest Ministry controls 80 percent of the land in northwest British Columbia," Aberley offers as an example, "but we live 800 or 900 road miles from the center of the government."

A "devolutionary contract" would require these community councils to manage their resources for sustainable yields. "The province would continue to monitor performance," Aberley says, "so the central government doesn't disappear in a utopian flash." He adds that his plan has met with positive response from mainstream planners because it holds out the promise of cutting the cost of government.

WHERE YOU AT? A BIOREGIONAL QUIZ

What follows is a self-scoring test on basic environmental perception of place. Scoring is done on the honor system, so if you fudge, cheat, or elude, you also get an idea of where you're at. The quiz is culture-bound, favoring those people who live in the country over city dwellers, and scores can be adjusted accordingly. Most of the questions, however, are of such a basic nature that undue allowances are not necessary.

1. Trace the water you drink from precipitation to tap.
2. How many days till the moon is full? (Slack of two days allowed.)
3. What soil series are you standing on?
4. What was the total rainfall in your area last year (July-June)? (Slack: 1" for every 20".)
5. When was the last time a fire burned your area?
6. What were the primary subsistence techniques of the culture that lived in your area before you?
7. Name five native edible plants in your region and their season(s) of availability.
8. From what direction do winter storms generally come in your region?
9. Where does your garbage go?
10. How long is the growing season where you live?
11. On what day of the year are the shadows the shortest where you live?
12. When do the deer rut in your region, and when are the young born?
13. Name five grasses in your area. Are any of them native?
14. Name five resident and five migratory birds in your area.
15. What is the land-use history of where you live?
16. What primary geological event/process influenced the land form where you live? (Bonus special: what's the evidence?)
17. What species have become extinct in your area?
18. What are the major plant associations in your region?
19. From where you're reading this, point north.
20. What spring wildflower is consistently among the first to bloom where you live?

SCORING

0-3	You have your head in a hole.
4-7	It's hard to be in two places at once when you're not anywhere at all.
8-12	A fairly firm grasp of the obvious.
13-16	You're paying attention.
17-19	You know where you're at.
20	You not only know where you're at, you know where it's at.

Used with permission of the authors, Leonard Charles, Jim Dodge, Lynn Milliman, and Victoria Stockley. The quiz was first published in the Winter 1981 issue of Co-Evolution Quarterly, *now known as the* Whole Earth Review.

A CITY MIGHT SEEM an unlikely place for these ideas to emerge, yet bioregional groups have sprung up in several urban areas, not unlike dandelions poking through the concrete. "We are aware that the job is toughest where the city is biggest," admits Manhattanite Kirkpatrick Sale of the Hudson Bioregional Council. "We're more distant from the more benevolent part of Nature, but that just means we have to look harder to find the natural cycles of the place."

Living in the city can make it tricky to bring bioregional principles into one's daily life. Nonetheless, some people are trying. In Vancouver, B.C., activists are working to bring Brewery Creek, which has been buried in storm sewers for years, back to the surface. They're proposing a relatively narrow park that would loosely follow the old creekbed, with wider segments to be set aside at the mouth of the creek and where old brewery buildings still stand. Eventually they hope to see a significant portion of the creek come alive, flowing beside a pedestrian corridor instead of being piped through culverts.

Down the coast in San Francisco, Berg and Planet Drum have launched Green City, a project designed to create a blueprint for the greening of San Francisco. They brought together recyclers, poets, park planners, and neighborhood organizers in nine thematic meetings. "These are people who get their hands dirty," says Berg, and they aren't just

environmentalists. The recycling roundtable, for instance, drew the city's largest garbage company and firms that collect commercial and industrial scrap, as well as local recycling centers. Using ideas from the meeting, Planet Drum drafted proposals for municipal action that take the area's natural systems into account.

Berg makes much of the economic balance between cities and the rural hinterland. "Cities are net consumers," he says. "They must become more reciprocal and responsive to the rest of their bioregions." He explains that wealth typically flows from upriver resource provinces that produce timber, raw materials, and agricultural products to cities located downriver. Little flows back. For the bioregion to attain stability and long-term economic health, cities must not drain the hinterland as they do now.

The Hudson Bioregional Council came up with a proposal that would illustrate this reciprocal relationship. Their plan entailed sailing upriver to bring country products such as crafts and organic produce back down to New York City, where the boat would load up with organic waste material to ship back to the farmers. Although the scheme sank in an intractable morass of regulations, it stands as an example of what urban bioregionalists envision for the links between city and rural areas.

Despite the broad array of bioregional activities under way, few of these groups actually pitch themselves as bioregionalists. "We're trying to transcend the polarization between the old [ranching and logging] culture and the new settlers," says Freeman House of the Mattole Restoration Council. "'Isms' just aren't useful. People can understand restoration work pretty readily—but if you have to stop and explain bioregionalism, it can get in the way."

"I don't know what bioregionalism is," says Peter Marshall, a Mattole Valley resident whom House describes as a model landowner. "I just live here."

Since the second biennial North American Bioregional Congress, held last August, the movement has taken a slightly higher profile. The 165 people in attendance agreed to give the movement an ongoing presence between congresses. Planet Drum (Box 31251, San Francisco, CA 94131) is publishing a directory of bioregional groups, the Hudson Bioregional Council (113 West 11th St., New York, NY 10011) is putting out a bibliography, and New Life Farm (Box 3, Brixey, MO 65618) in the Ozark Mountains serves as an information clearinghouse. Meanwhile, bioregionalists are planning the next congress for Cascadia, north of the 49th parallel (in British Columbia, that is), in the summer of 1988.

Bioregionalism takes the growing body of knowledge about ecology and applies it to real-life situations in ways that can be used by individuals in their neighborhoods and townships. Its direct approach to restoring and maintaining the places where we live is a step beyond the protests and demonstrations that often characterize the politics of environmental crisis. It may be the only hope of ensuring that salmon will continue to spawn in the Mattole River. ■

SETH ZUCKERMAN *is a California freelance writer who lives near the estuary of the San Joaquin and Sacramento rivers.*

The eagle has landed.

In Oklahoma and Mississippi. Georgia and Alabama. Where few bald eagle nests have produced young in the last 50 years. Using precious eggs and dedicated effort, the Sutton Avian Research Center is successfully raising eaglets from fuzzy to fierce. And releasing them into the habitats bald eagles used to call home. Phillips Petroleum supports this unique program to re-establish our endangered national symbol.

After all, if Man can land an Eagle on the moon, he can surely keep them landing on the earth.

PHILLIPS 66

For more information, contact the George Miksch Sutton Avian Research Center Inc., P.O. Box 2007, Bartlesville, OK 74005, (918) 336-7778.

SIERRA CLUB FINANCIAL REPORT

Fiscal Year 1986

Pursuant to the provisions of sections 6321 and 6322 of the California Corporations Code, the following information is furnished as an annual report:

The Club's complete financial statements for the fiscal years ended September 30, 1986 and September 30, 1985, together with the report of KMG Main Hurdman, independent accountants, are available on request from Sierra Club headquarters at 730 Polk Street, San Francisco, California 94109;

The membership list of the Sierra Club is on file at the Club's headquarters at 730 Polk Street, San Francisco, California 94109;

There are no transactions to disclose that constitute a conflict of interest involving directors or officers; no member has voting power of 10% or more;

The books of account and minutes of meetings of the Board of Directors are available for inspection by members on written request at the Club's headquarters at 730 Polk Street, San Francisco, California 94109.

Board of Directors
Sierra Club
San Francisco, California

We have examined the combined balance sheet of the Sierra Club and subsidiary as of September 30, 1986, and the related combined statements of revenue, expenses and changes in fund balances, and changes in financial position for the year then ended. Our examination was made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and such other auditing procedures as we considered necessary in the circumstances. The combined financial statements of the Sierra Club and subsidiary for the year ended September 30, 1985 were examined by other auditors whose report dated December 11, 1985 expressed an unqualified opinion on those statements.

In our opinion, the 1986 combined financial statements referred to above present fairly the financial position of the Sierra Club and subsidiary as of September 30, 1986, and the results of their operations, changes in their fund balances, and the changes in their financial position for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

KMG Main Hurdman
Certified Public Accountants
December 12, 1986

To the Members of the Sierra Club:

Fiscal Year 1986 ended with an operating surplus of $226,600 compared to a surplus of $1,459,800 in fiscal 1985. Fund balances (net worth) reached an historic high of $5,267,400.

Revenue rose $2,389,000 to $25,282,900 in fiscal 1986. Member dues, up $1,337,600 to $8,938,000, was the largest increase, but income for book and catalog sales was also up $1,022,200, royalties on publications $251,200, and advertising, investment, and other income $345,400. Contributions and grants were down $468,100, and outings and lodge fees were down $99,300.

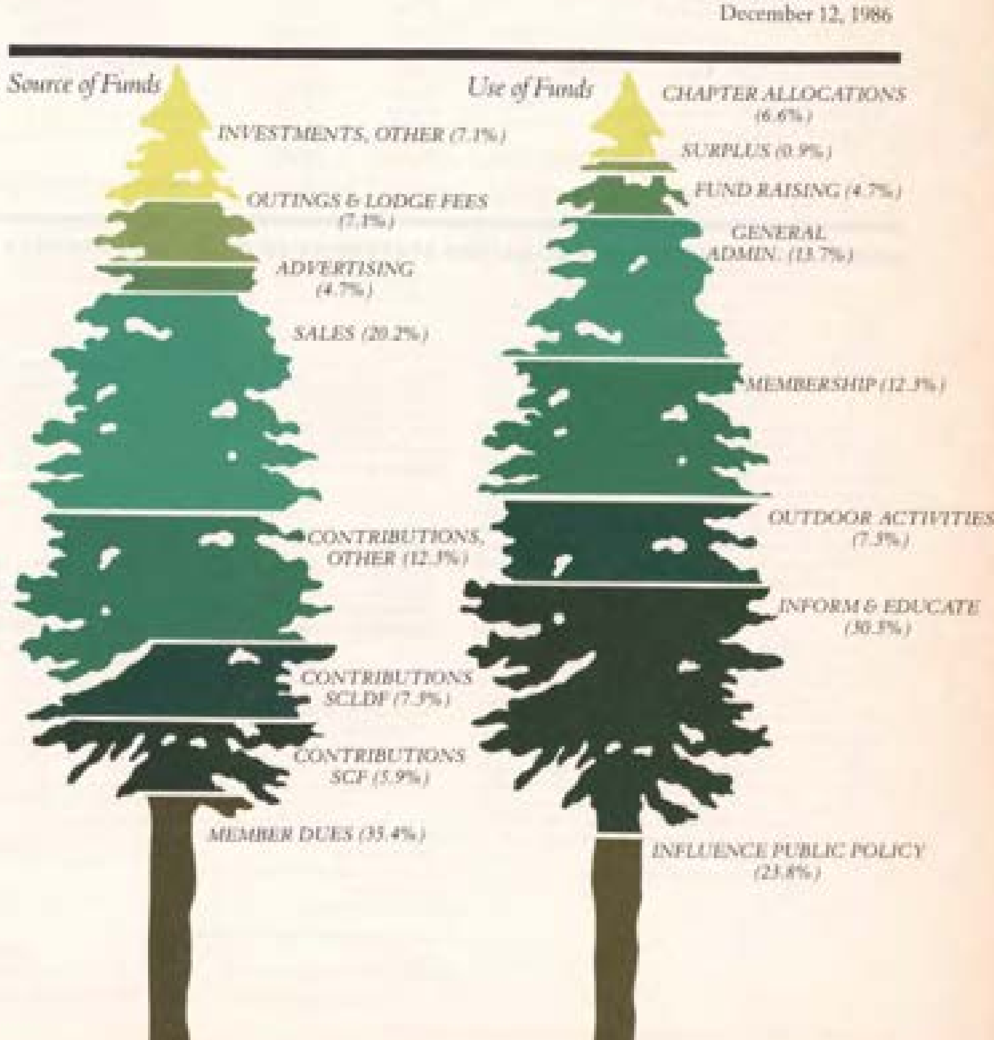
Expenses increased $3,622,200 to $25,056,300 for fiscal 1986. Expenses for studying and influencing public policy were up $439,200, and for information and education up $1,120,500. Chapter dues allocations were $1,655,400, an increase of 21% over fiscal 1985. Expenses for support services of $7,768,000 were up $1,754,300 over fiscal 1985.

The Sierra Club again ended the fiscal year with no bank debt.

The endowment fund, primarily revenue from Life Memberships, is up $362,100 to $2,701,100.

Sierra Club membership, as indicated by the very significant increase in revenue from membership dues, continues to show an extremely healthy growth—up 8%, to 394,393 members, at year end.

Denny Shaffer
Treasurer



SIERRA CLUB & SUBSIDIARY COMBINED BALANCE SHEET

Assets

	September 30 1986	September 30 1985
CURRENT ASSETS:		
Cash (primarily interest-bearing accounts)	$ 196,400	$ 870,200
Trade accounts receivable, less allowances for returns of $80,000 and $75,000	1,087,200	913,400
Other receivables, less allowances for doubtful accounts of $44,000 and $36,000	696,700	496,300
Grants receivable	308,700	333,700
Inventories	1,319,200	1,284,900
Advances, less allowances of $40,000	456,300	613,100
Prepaid expenses	1,327,200	996,800
TOTAL CURRENT ASSETS	5,391,700	5,508,400
INVESTMENTS	2,729,100	2,351,700
PROPERTY AND EQUIPMENT	985,500	878,300
TOTAL ASSETS	$9,106,300	$8,738,400

The accompanying notes are an integral part of these combined financial statements.

Liabilities and Fund Balances

	September 30 1986	September 30 1985
CURRENT LIABILITIES:		
Accounts payable	$2,271,100	$2,782,900
Current portion of capital lease obligations	127,100	83,800
Accrued expenses	704,600	556,300
Deferred revenue	354,400	436,700
Deferred revenue—restricted	70,000	61,100
TOTAL CURRENT LIABILITIES	3,527,200	3,920,800
LONG-TERM CAPITAL LEASE OBLIGATIONS	311,700	148,900
FUND BALANCES:		
Unrestricted	2,534,800	2,308,200
Endowment	2,732,600	2,360,500
	5,267,400	4,668,700
TOTAL LIABILITIES AND FUND BALANCES	$9,106,300	$8,738,400

SIERRA CLUB & SUBSIDIARY COMBINED STATEMENT OF CHANGES IN FINANCIAL POSITION

	Year Ended September 30 1986	1985
FINANCIAL RESOURCES WERE PROVIDED BY:		
Excess of revenues over expenses before capital additions	$ 226,600	$1,459,800
Add items not requiring working capital:		
Depreciation and amortization	331,900	322,500
Amortization of discount on investments	(112,100)	(92,600)
Loss on disposal of property and equipment	21,500	—0—
TOTAL RESOURCES PROVIDED FROM OPERATIONS	467,900	1,689,700
New life memberships	362,100	333,200
Other capital additions	10,000	—0—
Proceeds from sale of investments	494,000	—0—
Increase in capital lease obligations	328,400	258,600
TOTAL RESOURCES PROVIDED	1,662,400	2,281,500
FINANCIAL RESOURCES WERE USED FOR:		
Purchase of noncurrent investments	759,300	255,400
Acquisition of property and equipment, net	460,600	407,800
Reduction of capital lease obligations	165,600	123,200
TOTAL RESOURCES USED	1,385,500	786,400
INCREASE IN WORKING CAPITAL	$ 276,900	$1,495,100

	Year Ended September 30 1986	1985
CHANGES IN COMPONENTS OF WORKING CAPITAL:		
Increase (decrease) in current assets:		
Cash	$ (673,800)	$ 741,400
Trade accounts receivable, net	173,800	465,900
Other receivables, net	200,400	120,800
Grants receivable	(25,000)	163,700
Inventories	34,300	294,200
Advances, net	(156,800)	150,100
Prepaid expenses	330,400	540,900
	(116,700)	2,479,000
Decrease (increase) in current liabilities:		
Accounts payable	511,800	(792,500)
Current portion of capital lease obligations	(43,300)	(33,900)
Accrued expenses	(148,300)	(74,800)
Deferred revenue	82,300	(82,700)
Deferred revenue—restricted	(8,900)	—0—
	393,600	(983,900)
INCREASE IN WORKING CAPITAL	$ 276,900	$1,495,100

The accompanying notes are an integral part of these combined financial statements.

SIERRA CLUB & SUBSIDIARY COMBINED STATEMENT OF REVENUE, EXPENSES & CHANGES IN FUND BALANCES

Year Ended September 30, 1986 (With Comparative Totals for September 30, 1985)

	1986 Unrestricted	1986 Endowment	1986 Restricted	1986 Total	1985 Total
REVENUE:					
Member dues	$ 8,938,000	$ —0—	$ —0—	$ 8,938,000	$ 7,600,400
Contributions and grants	4,426,600	—0—	2,018,500	6,445,100	6,913,200
Outings and lodge reservations and fees	1,803,200	—0—	—0—	1,803,200	1,902,500
Book and catalog sales	5,116,000	—0—	—0—	5,116,000	4,093,800
Royalties on publications	918,500	—0—	—0—	918,500	667,300
Advertising, investment and other income	2,055,000	—0—	7,100	2,062,100	1,716,700
TOTAL REVENUES	23,257,300	—0—	2,025,600	25,282,900	22,893,900
EXPENSES:					
Program services:					
Studying and influencing public policy	4,571,900	—0—	1,452,600	6,024,500	5,585,300
Information and education	7,280,400	—0—	432,100	7,712,500	6,592,000
Outdoor activities	1,782,600	—0—	113,300	1,895,900	1,873,700
Chapter allocations	1,655,400	—0—	—0—	1,655,400	1,369,400
	15,290,300	—0—	1,998,000	17,288,300	15,420,400
Support services:					
General and administrative	3,436,200	—0—	27,600	3,463,800	2,783,500
Membership	3,114,400	—0—	—0—	3,114,400	2,380,600
Fund raising	1,189,800	—0—	—0—	1,189,800	849,600
	7,740,400	—0—	27,600	7,768,000	6,013,700
TOTAL EXPENSES	23,030,700	—0—	2,025,600	25,056,300	21,434,100
Excess of revenue over expenses before capital additions	226,600	—0—	—0—	226,600	1,459,800
Additions to Endowment Funds—new life memberships	—0—	362,100	—0—	362,100	333,200
Other capital additions	—0—	10,000	—0—	10,000	—0—
Excess of revenues and capital additions over expenses	226,600	372,100	—0—	598,700	1,793,000
Fund balances at beginning of year	2,308,200	2,360,500	—0—	4,668,700	2,875,700
FUND BALANCES AT END OF YEAR	$2,534,800	$2,732,600	$ —0—	$5,267,400	$4,668,700

The accompanying notes are an integral part of these combined financial statements.

1—Summary of Significant Accounting Policies

Basis of Presentation

The combined financial statements include the accounts of the Club and its wholly-owned subsidiary, Sierra Club Property Management, Inc. The combined financial statements do not include the financial activities of the Club's various self-directed chapter and group organizations.

Donated Services

Some members of the Club have donated significant amounts of time to both the Club and its chapters, groups and committees in furthering the Club's programs and objectives. No amounts have been included in the financial statements for donated member or volunteer services inasmuch as no objective basis is available to measure the value of such services.

Trade Accounts Receivable

Allowances for publication and catalog returns are determined using historical return rates.

Inventories

Inventories consist of publications and catalog merchandise and are stated at the lower of cost or market. Unit costs for new books are based on paper, printing, and binding charges only (manufacturing costs). Plant costs are amortized over unit sales for the first printing, but for no longer than the first twelve months of sales.

Advances

An allowance is provided against advances to authors for estimated losses resulting from unearned royalties.

Property and Equipment

Property and equipment are stated at cost at the date of acquisition or fair value at the date of gift or bequest. Depreciation expense is provided on a straight-line basis over the estimated useful lives (2 to 30 years) of the related assets. When assets are retired or otherwise disposed of, the cost and related accumulated depreciation are removed from the accounts, and any resulting gain or loss is recognized in income for the period. The cost of maintenance and repairs is charged to expense as incurred; significant renewals and betterments are capitalized.

Deferred Revenue

The Club defers revenue from outings and grants until the period the trip is completed or the grant requirement is met.

Contributions

All contributions are considered available for unrestricted use unless specifically restricted by the donor. Restricted contributions are recognized as revenue as the restrictions are met.

Legal services performed on behalf of the Club by the Sierra Club Legal Defense Fund are recorded as contributions with equivalent amounts charged to expense (see Note 10).

Reclassifications

Certain items, not affecting total revenues or total expenses, related to the year ended September 30, 1985 have been reclassified to conform to the current year's presentation.

2—Organization

The Sierra Club is a nonprofit voluntary membership organization established to explore, enjoy and protect the wild places of the earth. The Club operates many public interest programs covering a broad range of environmental issues. The studying and influencing public policy program consists of staff and volunteers engaged in legislative and nonlegislative activities, including lobbying, research, legal and policy development. Information and education includes the literary programs of Sierra Club Books, catalog operations and *Sierra*, the Club's magazine. Outdoor activities include national and international outing programs, consisting of approximately 250 trips annually. The membership program serves approximately 394,000 members and includes support and funding of 57 volunteer chapters and over 330 groups, and the development of a broad-based volunteer membership.

3—Investments

Investments of the Sierra Club Endowment Fund are stated at amortized cost. It is the Club's intention to hold investments to maturity. No allowance for the decline in market value below cost is established unless there is a permanent impairment of value. The composition of investments by fund group is as follows:

	September 30	
	1986	1985
Investments	$2,729,100	$2,351,700
Amounts due from unrestricted funds	3,500	8,800
Endowment Fund balance	$2,732,600	$2,360,500

Cost and market values at September 30, 1986 and 1985 were:

	1986	
	Amortized Cost	Market Value
U.S. government and Federal agency bonds	$2,598,100	$2,881,200
Money market funds and savings account	131,000	131,000
	$2,729,100	$3,012,200

	1985	
	Amortized Cost	Market Value
U.S. government and federal agency bonds	$2,306,400	$2,387,300
Money market funds and savings account	45,300	45,300
	$2,351,700	$2,432,600

Investment income amounted to $246,900 in 1986 and $256,600 in 1985. The rate of return on endowment investments was 9% in 1986 and 11% in 1985.

4—Property and Equipment

	September 30	
	1986	1985
Land	$ 3,300	$ 3,300
Buildings and leasehold improvements	274,500	501,400
Furniture and equipment	1,271,600	1,331,400
Leased equipment (Note 6)	585,900	520,500
	2,135,300	2,356,600
Less accumulated depreciation and amortization	(1,149,800)	(1,478,300)
	$ 985,500	$ 878,300

Depreciation and amortization expense was $331,900 and $322,500 for the years ended September 30, 1986 and 1985, respectively.

5—Line of Credit

The Club has available to April 30, 1987 a revolving line of bank credit which permits borrowings of up to $2,000,000 at the bank's prime interest rate. The line is secured by the Club's endowment investments. No amounts were outstanding at September 30, 1986 and 1985.

6—Leases

Substantially all leases are for office facilities (see Note 10), computer equipment, system software and other equipment. Certain leases provide for extensions and additional rental payments based on expenses. Future minimum payments under all noncancellable leases with terms greater than one year at September 30, 1986 are as follows:

Year Ended September 30	Capital Leases	Operating Leases
1987	$174,800	$1,273,500
1988	161,100	1,243,300
1989	83,300	1,216,700
1990	83,300	1,206,400
1991	26,500	1,203,100
Later years	-0-	3,712,500
Total lease payments	529,000	$9,855,500
Less amount representing interest	(90,200)	
Present value of lease payments	438,800	
Less current portion of capital lease obligations	(127,100)	
Long-term capital lease obligations	$311,700	

Minimum future rentals receivable under noncancellable operating subleases at September 30, 1986 amounted to $413,200.

Rent expense for operating leases was $945,300 in 1986 and $480,100 in 1985. Substantially all leased equipment is pledged as security under the related leases.

7—Fund Balances

The following is a summary of fund balances:

	September 30	
	1986	1985
Unrestricted Funds:		
Invested in property and equipment	$ 546,700	$ 645,600
Other unrestricted funds	1,988,100	1,662,600
	$2,534,800	$2,308,200
Sierra Club Endowment Funds:		
Life memberships	$2,211,700	$1,849,600
Designated by Board for permanent investment	489,400	489,400
Endowment—income restricted	21,500	21,500
Term endowment	10,000	-0-
	$2,732,600	$2,360,500

The Club's bylaws provide that all life memberships and such other funds as designated by the Board for permanent investment shall be held as endowment funds. The income from these endowments is unrestricted. In addition, the club has received certain funds for which the donors have specified that the principal be maintained in perpetuity, with the income to be used for certain specified activities (primarily outings-related). In addition, during the year ended September 30, 1986 the Club received a term endowment in which the donor specified that the income be unrestricted but the principal be held for a term of 20 years, after which time it can also be used for unrestricted purposes.

8—Income Tax Status

The Club has received rulings from the Internal Revenue Service and State of California Franchise Tax Board granting exemption from income taxation. Contributions to the Club are not deductible for tax purposes by the donor.

9—Pension Plan

The Club has a defined-benefit pension plan, covering substantially all full-time employees who meet minimum age and service criteria. Voluntary employee contributions to the plan are permitted. Pension expense, which is funded currently, was $199,600 in 1986 and $154,600 in 1985.

A comparison of accumulated plan benefits and plan net assets as of the most recent valuation dates is presented below:

	September 30	
	1985	1984
Actuarial present value of accumulated plan benefits:		
Vested	$ 372,000	$426,000
Nonvested	15,000	69,000
	$ 387,000	$495,000
Net assets available for benefits	$1,155,000	$907,000

The weighted average assumed rate of return used in determining the actuarial present value of accumulated plan benefits was 7.5% for both years.

10—Transactions with Affiliates

The Sierra Club receives contributions from the Sierra Club Foundation and the Sierra Club Legal Defense Fund. Contributions from the Sierra Club Foundation represent direct grants to the Club in support of various programs and totaled $1,594,800 in 1986 and $2,488,800 in 1985. Contributions from the Sierra Club Legal Defense Fund for legal services performed on behalf of the Club totaled $1,853,900 in 1986, and $1,760,700 in 1985.

Sierra Club Property Management, Inc. (SCPM, Inc.) is the general partner of National Headquarters Associates (a limited partnership). The limited partnership was formed to raise capital for purposes of acquiring and rehabilitating an office building for lease by the Sierra Club. The building was completed and occupied by the Sierra Club in November 1985. This operating lease has a ten-year term and requires monthly payments of $99,000, subject to adjustment in certain circumstances for changes in the limited partnership's debt service requirements. In addition, the Club is responsible for taxes on the property, repair and maintenance, and shares insurance, utility and security costs with the limited partnership.

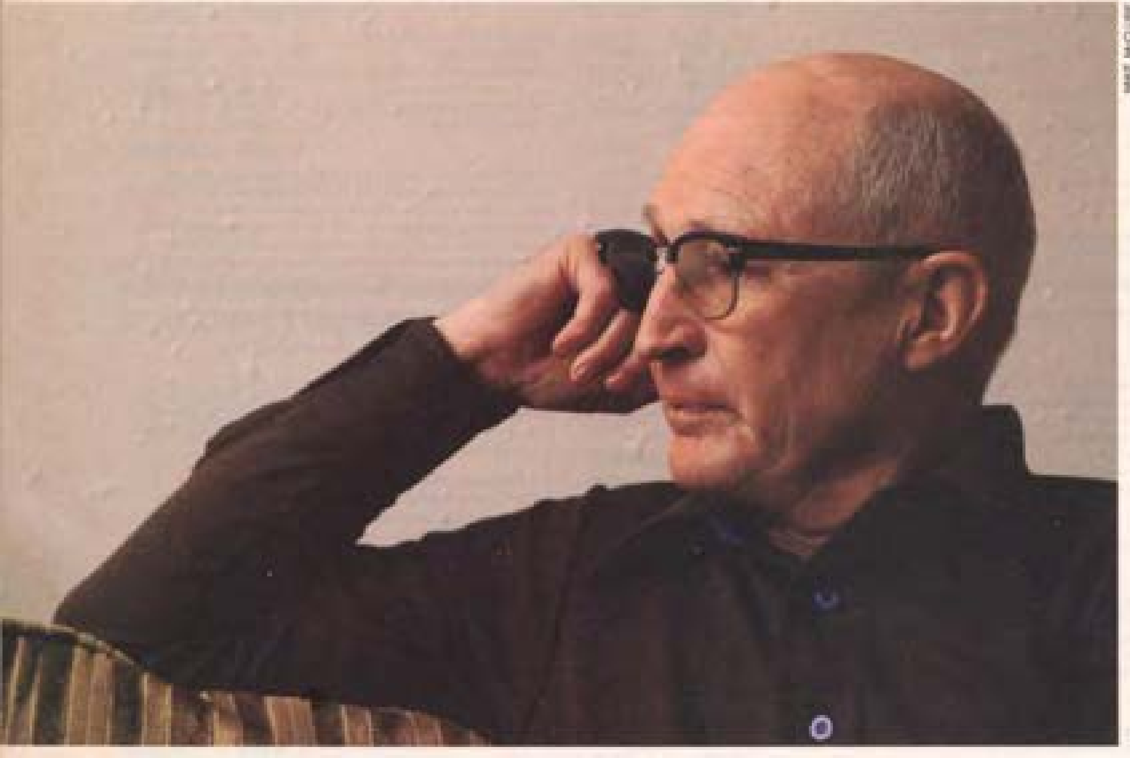
11—Contingencies

In connection with its conservation efforts, the Club has a suit pending against the Federal government over land use issues. As a result of this action, the Club has been sued by an Alaskan corporation for interference in the corporation's attempt to commercially develop forest lands on Admiralty Island conveyed to it pursuant to Federal legislation. No amount of damages has as yet been specified by the claimant. The Club believes its actions are constitutionally protected by the First Amendment right to petition the government and has filed motions for dismissal.

In addition, a former employee of the Club has filed a claim for $315,000 against the Club for wrongful termination.

In the opinion of the management of the Club, both of these claims are without merit and ultimate disposition of the matters will not have a material effect upon the financial statements.

Saga of a High Country Newsman



"Crickets chirp outside my door. A harvest moon beams brightly through the gathering dusk. From my wife's gardens, fragrance wafts softly on the evening breeze. This is life at its fullest."

Geoff O'Gara

THAT WAS LIFE in the foothills of the Wind River Mountains as Tom Bell saw it in 1969. A sometime teacher, wildlife biologist, and rancher, Bell wrote columns for various Wyoming publications on the side.

You find columns like Bell's in many small-town Rocky Mountain newspapers, though not usually so well written. Rural writers are always struggling to articulate what it is that satisfies them so about a marsh hawk circling the snowy plain or the bugling of elk in the high meadows. They want to express what brought them to this country, or what keeps them here, tolerating its harsh winters and hard work.

If that was all Bell had ever written, he might never have been known beyond the snug confines of the Wind River Valley, and that might have suited him fine. Or he might have continued teaching biology at the junior high school and worked quietly in his spare time on a novel about life in the Wind River Mountains, drawing on his family's history in the coal mines, on ranches, and in the saloon business.

Yet alongside the serene visions of rural life, Bell saw mountainsides scarred by jade hunters and illegal fences strung by cattle ranchers across public lands. His peaceful reveries were disturbed by nightmares of what the nation's hunger for raw materials and recreation might do to Wyoming's remaining wilderness.

And so another type of column would sometimes appear, written by a somewhat different Tom Bell. This other Bell would lash out at the "partisan politics and horse and buggy policies" of the Wyoming Game and Fish Department (GFD), a former employer. He would attack greedy politicians and industries that "assumed that the freedoms which guarantee profits are a license to pollute the air and the water which belong to all of us."

This angry Bell was a little out of step with the Wyoming of that time—or at least with the politicians who ran the state. Stan Hathaway, a pro-development Republican, was the newly elected governor. Developers interested in minerals, oil, and coal were poised to devour the plentiful riches below the state's public and private lands. While the rest of the nation was increasingly interested in conserving wildlands, Wyoming's leaders seemed eager to exploit them.

It's no surprise, then, that Wyoming's nascent environmental movement had lagged a little behind other parts of the country during the 1960s. This was the movement for which Tom Bell would provide a voice—a distinctly regional, often visionary voice. Writing in the newsletter of a statewide environmental group called the Wyoming Outdoor Council—and later in *High Country News*, a distinguished regional environmental paper—Bell began informing people in Wyoming about the conservation consciousness developing around the country. At the same time he was informing people throughout the nation that a parallel consciousness was indeed coming of age in Wyoming.

THE FIRST THING one notices, meeting Tom Bell, is how compact a man he is—small and athletically trim in his 60s, with a beaky face beneath a Stetson. The second thing one notices is his missing right eye.

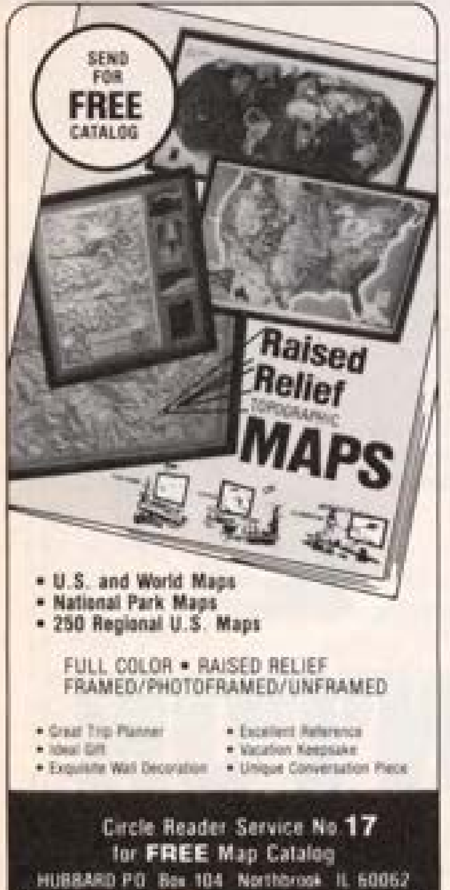
Bell was a gung-ho bombardier flying missions in southern Europe when he caught a piece of flak. He touched his face; it "felt like a piece of pulverized liver." At first his fellow crewmembers assumed he was dead. But Bell survived—a fact he would later invest with religious significance.

After a brief period of hunting and wandering in the Wyoming mountains, Bell studied biology at the University of Wyoming. Summers were spent working as a fisheries biologist.

His resumé after graduation is a restless one. He helped manage a sawmill in Jackson. He worked at the Dubois Fish Hatchery for the Wyoming Game and Fish Department. He tried the oil and gas business, working for his wife's family. (He'd met Tommie while both were students at the university.) Then he went back to school to study for a degree in range and big game management. There was more work for Wyoming GFD, a stint teaching in public schools, and then his first job in journalism, with the *Wyoming State Journal* in Lander. And Bell was increasingly active in the Wyoming Wildlife Federation and other conservation groups.

Roger Budrow, the *Journal*'s publisher, had teenage daughters who came home enthralled from Bell's junior-high science class. Budrow met Bell, heard him talk about environmental issues, and suggested that he write a column. Budrow was impressed, too, with Bell's willingness to take his causes into hostile quarters. "Imagine a young junior-high teacher up in front of the Rotary Club just tearing into a person who typified the establishment," he later reminisced. (The person in this case was Frank Mockler, a Dubois rancher and onetime gubernatorial candidate whose range practices Bell attacked.) "His voice would start rising, then reach a crescendo. But all of it was based on scientific knowledge. Like Socrates was a gadfly to the intellectuals of Athens, Tom was a gadfly to Wyoming."

In 1966, Bell took time off to write a



THE FISHERMAN'S PROBLEM

Ecology and Law in the California Fisheries 1850-1980

Arthur F. McEvoy

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work of fiction about Wyoming. But there was too much going on for him to remove himself from the fray, or to write strictly pastoral pieces. He knew the public lands of Wyoming well enough to know that those barbed wire fences he kept running into—the ones with "No Trespassing" signs, the ones that were blocking the passage of antelope herds—were strung out across public lands, most of which were administered by the U.S. Bureau of Land Management (BLM).

Herman Werner was one of the old Wyoming stockmen who had been grazing public lands for ages. His "Diamond Ring" signs were on fences throughout the BLM lands outside of Casper. Bell went out and took pictures. He wrote about the fences. He alerted the Wyoming Wildlife Federation. And he went to Washington to ask that the BLM be investigated. The public clamor grew, and an investigation revealed that 16,000 miles of illegal fence had been strung on BLM lands in the West.

One evening, after the controversy began making headlines, Bell arrived late for a public meeting on fencing that was being held by the Izaak Walton League. After slipping into the jammed building, he was leaning against the back wall when he felt a hand grip his arm. It was old Herman Werner, and his hand was shaking so much that Bell, too, began shaking.

"Young man," said Werner, "I don't like what you've been writing about me."

Bell, whose friends describe him as "shy" and "gentle," replied: "Well, I'm not building those damn fences." Werner's trembling grip told Bell that even the "kings of the range," the stockgrowers, were frightened when the public turned against them.

Bell was impatient to change the way resources were being managed in Wyoming, but there were hindrances. Conservation groups like the Wyoming Audubon Society and the Wyoming Wildlife Federation were not working in concert, not presenting a united front in the political forums where conservation issues were decided. And the state's media turned a blind eye to the abuses being inflicted on land and wildlife.

So in 1968, after the gubernatorial

election that brought Stan Hathaway to power, Bell formed the Wyoming Outdoor Coordinating Council as an umbrella organization for several conservation groups. The following year, when the opportunity to take over a struggling tabloid called *Camping News Weekly* presented itself, Bell saw a chance to present the kinds of stories the mainstream media were ignoring. He turned the Outdoor Council over to young Keith Becker—a Wyoming native and one of several energetic recruits to the state's environmental movement—and stepped up to his bully pulpit. The Outdoor Council and *High Country News* (which *Camping News Weekly* became in 1970) shared an office, so Bell was able to be both journalist and activist.

Thus began three of the most tumultuous years of Tom Bell's life. The effort to get the word out—about wilderness, about archaic mining laws, about illegal shooting of golden eagles, and so many more issues besides—would cost Bell his ranch, many of his friends, and, very nearly, his sanity.

High Country News began as a hybrid. It retained something of the recreation emphasis of *Camping News Weekly*, calling itself "the outdoor and environmental weekly." The environmental half included coverage of the Wyoming Outdoor Coordinating Council, Bell's "High Country" column, and devastating attacks on subjects such as uranium mining in the Red Desert or clearcutting on the Shoshone National Forest. The recreation half might feature snowmobiling, or news of the Pink Garter Theater's opening in Jackson, or an item about some fellow who downed two coyotes with one bullet.

It was the emphasis on environmental issues that gradually came to occupy more and more of the paper, particularly after Earth Day in April 1970. The rest of the region began to take notice. Dick Prouty, then an environmental reporter for the *Denver Post*, recognized *HCN*'s importance early by the fact that press flaks for the big energy companies had begun quoting it. "They respected the reporting there," says Prouty, "and we all started using it for ideas."

Bell was inspiring a younger generation of environmentalists with his passion. "He had a native sensibility," recalls one of them, Colleen Cabot, "as if he knew what Wyomingites would take, what they would listen to. He became more outspokenly radical as the movement evolved." Thus you could find a dramatic front-page picture of a dead eagle with the headline "The Shame of It!" and an out-and-out attack on a powerful rancher who was baiting and killing golden eagles. Unrelentingly, Bell attacked Gov. Hathaway and other powerful politicians. The national media perked up its ears. *High Country News* extended its coverage to neighboring Rocky Mountain states and beyond, including stories from as far away as Arizona and Nebraska.

Part of what made *HCN* such an exciting read was its urgency. Bell was frantically warning that clearcuts on Shoshone National Forest were stripping away big game habitat and baring hillsides that might never regenerate timber. (In his words, the "timber beasts" in the Forest Service "were leading the big companies in.") And it seemed that whenever Bell pointed to a problem, he would hear from correspondents telling him that the same

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thing was occurring elsewhere as well.

Bell was certainly not winning every battle. But the clearcuts began to shrink in size as the protests increased, and by the time Shoshone officials began scouting the timber in the beautiful DuNoir area of northwest Wyoming, Bell had two members of the congressional delegation out on a mountain peak, looking at swans on a lake and vowing to stop the rampage. The DuNoir is now protected, though its future is not certain.

But there were problems. Bell's 16-page tabloid was surviving on unpaid contributors, a lenient printer, donations, and infusions of Bell's own money. In 1971 the Bells sold their ranch outside Lander to support the paper, a move that Tommie Bell called "a heartbreaker for both of us." After raising three children they had adopted three more, and yet Bell had paid himself only $910 over a two-year period.

"It ran on passion," says Bell. "Eventually the advertising ran out. We had a circulation of between 1,200 and 1,500—not nearly enough to pay the way. I decided to keep going until the money ran out."

That happened in March 1973. Bell announced that "barring a miracle" *HCN* would fold. He was exhausted and unhappy, and the gloom did not lift even when he left the office and headed into the backcountry.

Then the miracle happened. Contributions poured in from all over the country. *High Country News* was able to pay off its debt. Bell was able to invite two young writers to come and work for him at subsistence wages. Their arrival was an infusion of fresh blood, some of that young spirit that Bell had once called "our last best hope."

"You can put a problem in the hands of the Lord, but you can still do something about it."

But Bell himself, still unhappy, was undergoing a spiritual upheaval. He was mercurial in the office—one minute thoughtful and attentive, the next minute lost in gloom and upset over a misplaced comma. He later realized that he was "right on the edge of going off my rocker." He found relief only when he "turned my life over to the Lord."

This is an episode that many of Bell's allies in the environmental movement still find troubling. Rather suddenly, in the summer of 1973, Bell announced that the Lord had told him to move to Oregon, leaving his new editorial staff to run the paper on their own. They sensed a new passivity in him—a tendency to defuse his own passion by saying that even environmental problems were in the hands of God. At one point, reading a religion-oriented column Bell had sent to *HCN* after his move to Oregon, the young staff went to a local bar to hold a wake for the paper, which they feared was losing its focus. But Bell stopped sending evangelistic columns when he heard his staff's concerns.

Bell, who has since moved back to Lander, understands the consternation of people who don't share his beliefs. "The world doesn't believe that the

Box 966-KB, Binghamton NY 13902

Lord talks to you," he says. He has had several deep religious experiences, though he finds it difficult to discuss such events in objective terms. Still, religion has not put out his fire. "You can put a problem in the hands of the Lord, but you can still do something about it," he says.

Plenty has been done about the issues Bell first articulated in the late '60s. Many of the laws that form the foundation of environmental policy in Wyoming were passed before he moved to Oregon, and others followed shortly thereafter. The state's Environmental Quality Act even has former Gov. Hathaway's signature on it.

In addition, the two institutions he created, *High Country News* and the Wyoming Outdoor Council, have thrived. *HCN*'s readers have repeatedly provided miracles: when the uninsured staff was decimated in an automobile accident, and whenever the money runs low. Today it has an annual budget of more than $200,000 and a circulation of 5,400. The Wyoming Outdoor Council has had its ups and downs, but a recent drive brought membership to an alltime high, and it continues to provide education and leadership on issues such as acid rain and forest planning.

If the Rocky Mountain environmental movement of the 1960s had been given the power to construct from scratch a leader to represent its cause before the world, certain attributes would surely have been included. That leader would be a native, not a newcomer to the region but someone familiar from childhood with the ways of the plains and mountains; he would be a rancher, someone who had put up hay as a child and knew how to move cattle from pasture to pasture; he would have family who suffered the grunt work of mining and homesteading in the early settlements of the West; he would be a scientist, who could approach ecological problems with a scientist's eye; and he would be lovingly intimate with the rocks and wildlife and landscapes of the high country.

Extraordinarily, the movement got all that in Tom Bell.

"It always amazed me to sit down with Tom—this mild, self-effacing, gentle little fellow," says Keith Becker, who now ranches near Thermopolis, Wyo. "He'd get on Hathaway or one of his pet peeves, and the sparks would just fly." Bell says the old days are "just like a world removed" to him now, but just get him talking (about the policies of Ronald Reagan and his public lands managers, say) and his voice rises and the sparks still fly.

In fact, some of the struggles Tom Bell began are not yet over. Louisiana-Pacific, which has a sawmill in Dubois, is fighting attempts by the Shoshone and Bridger-Teton national forests to reduce timber harvests on those lands. The elk are gone from the Fish Creek area on the crest of the Wind River Range, where the scars of roading and clearcuts remain, and Bell has not forgotten that lesson. He recently called down to the *High Country News* offices to have them send him copies of a recent article on failed forest practices. He'll distribute them to local leaders in the Dubois area.

Bell himself is clearly pleased that many of the things he envisioned have come to pass, though a little embarrassed when homage is paid him. He laughs off suggestions that he run for office—and he would probably need a nemesis like Hathaway to motivate him, since he lacks a politician's vanity. Furthermore, he is back at work on his novel about Wyoming, and apart from his work as historian at the Fremont County Museum, he wants few distractions. He is returning to his childhood and the events that shaped his strong views of the land. It's a subject that he touched upon in one of those gentler columns, almost 20 years ago:

"I don't know how I would have fared in this world had I not had the great outdoors in which to roam, seek solace, heal sensitive feelings, and begin to grope my way to adulthood.

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Geoff O'Gara *contributed "Filling in a Missing Link" to the November/December 1986* Sierra.

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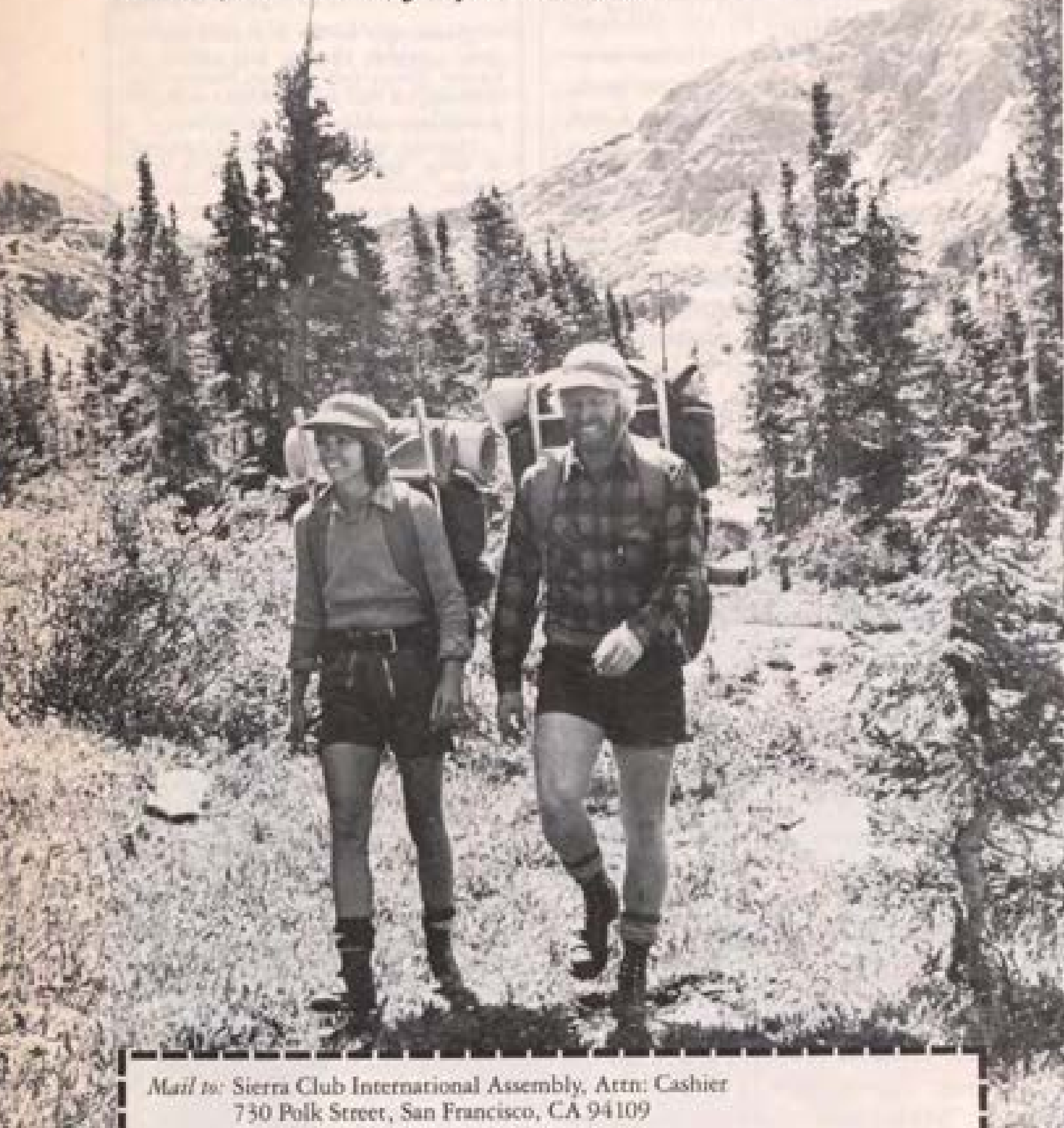

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THE LOST COAST, CALIFORNIA

MORE THAN A DECADE of work and struggle to save some of the few remaining groves of ancient trees along California's Lost Coast has paid off.

As 1986 came to an end, the Trust for Public Land negotiated a purchase by the state Department of Parks and Recreation and the Save-the-Redwoods League that doubled the size of the Sinkyone Wilderness State Park—an area of spectacular beauty some 200 miles north of San Francisco. Included in the deal was the controversial Sally Bell Grove.

The grove was the scene of 22 arrests in 1983 when wilderness activists stood between old trees and loggers' chainsaws. Two lawsuits, intensive lobbying, and many long meetings followed as conservationists tried to win protection for the Sally Bell and other venerable groves near the state park. Loggers in the area were cutting redwood and Douglas-fir trees from 200 to more than 1,000 years old, trees that were standing when the Sinkyone Indians and other, nameless tribes settled here centuries ago.

The purchase of 7,100 acres from the Georgia-Pacific Corporation for an undisclosed price immediately added 3,000 acres to the south end of the 3,500-acre park, including nine miles along the coast.

"Native American people and others will be able to visit an area reminiscent of earlier times," said Ruthanne Cecil of the Environmental Protection Information Center, a Garberville-based group that has spent years working for the Sinkyone.

An additional 450 acres of key old-growth groves—crucial habitat for such sensitive species as the spotted owl and marbled murrelet—are now owned by the Save-the-Redwoods League. The group hopes that these lands can eventually be added to the park. The remainder of the acquisition, some 3,650 acres of logged-over coastal uplands, will be held by the Trust for Public Land until its fate can be determined by the California Coastal Conservancy.

The sale reportedly included a substantial donation from Georgia-Pacific, timed to beat end-of-year federal tax code changes. Company spokesperson Beth Zoffman called it "the best solution for the company, the community, and the environmental groups."

The Sierra Club will continue to be involved in planning for the area, and will work to ensure protection for its wilderness

DANIEL HOFFMAN, COURTESY TRUST FOR PUBLIC LAND

Looking north across Wolf Creek to Bear Harbor in the Sinkyone Wilderness. Recent additions have doubled the park's size, giving it a 17-mile-long shoreline.

values, according to Julie Verran, a Santa Rosa resident who is chair of the Club's Sinkyone Task Force.

"We're quite pleased with the way that things worked out," Verran said. "A whole lot of people worked very hard for a long time to make this happen."

—Andy Alm

Breaking the Dumping Habit

BOSTON HARBOR, MASS.

Each day 435 million gallons of wastewater and 100,000 pounds of solids pour into shallow Boston Harbor. Each day Boston-area residents sidestep tampons and other refuse washed up on nearby beaches.

Meanwhile, the dumping takes its biological toll. Winter flounder, one of the most common harbor fish, is showing an estimated 16-percent incidence of cancerous liver lesions. Shellfish are tainted with dangerous chemicals such as polychlorinated biphenyls, polyaromatic hydrocarbons, and copper. Lobster caught in the area is almost too toxic to eat.

BILL SARGENT, COASTLINES PROJECT

A diseased flounder is one of the signs of habitat degradation in Boston Harbor.

"Most people don't even know that the sewage from 43 cities and towns goes into the harbor," says Hiroko Masamune, chair of the New England Chapter Sierra Club's Boston Harbor committee.

Coordinated by a local group called Save the Harbor/Save the Bay, the Club, Greenpeace, and the Audubon Society are filling the information gap with lobbying, publications, and slide shows. Some groups are helping local officials with enforcement. Last September, for instance, Greenpeace gave the Massachusetts Water Resources Authority (MWRA) a tip on a significant oil spill. The agency hurriedly dispatched investigators; the company responsible is now being prosecuted.

"Environmental groups have been very effective in keeping the pressure on and in building a constituency for a harbor cleanup," says Paul DiNatale, MWRA public affairs coordinator.

Under pressure from a lawsuit filed by the neighboring city of Quincy, Boston-area officials began rethinking their approach to sewage treatment in 1984. Another lawsuit won by the Conservation Law Foundation and the EPA

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in 1986 pushed officials even farther: They must now find ways to stop the dumping of sludge in the harbor by late 1988. The MWRA is considering several land-based disposal plans, including burning and composting sludge.

Whichever plan is chosen, cleaning up the harbor will be costly. The Clean Water Act reauthorization bill approved by Congress in February would provide the MWRA with $100 million for new sewage treatment facilities. But about $2 billion will be needed to pay for construction and operation of these facilities through the end of the century, Masamune says. As a result, sewage rates, which rose by 54 percent last year, are expected to rise again soon.

Masamune and many other Boston residents are convinced the harbor is worth it. As she puts it: "A dynamic aquatic resource is at stake. It is vital for fish and wildlife as well as for people."

—Mary James

Old Adversaries Guard the Woods

SUPERIOR N.F., MINN.

A dispute here has brought old foes together against a common threat: the Minnesota National Guard.

The Guard wants to build a major military training facility in the Superior National Forest, just a few miles from the Boundary Waters Canoe Area Wilderness (BWCA). The 200,000-acre site would accommodate up to 100,000 soldiers a year, along with tanks, armored vehicles, and heavy artillery.

Minnesota Gov. Rudy Perpich (D), who announced the plan last May, says it could bring jobs to a region still reeling from the decline of the iron mining industry. State planners and the National Guard have begun studying the feasibility of the project.

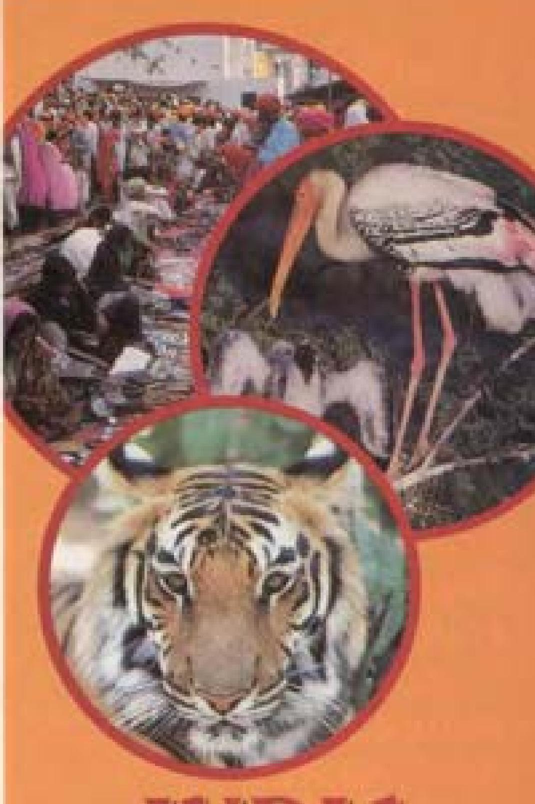
Meanwhile, a broad coalition of Minnesotans who oppose the facility is preparing an independent environmental assessment. North Guard, the group coordinating their efforts, is supported by the Sierra Club's North Star Chapter, Friends of the Boundary Waters Wilderness, the Minnesota Timber Producers Association, and the Minnesota Deer Hunters Association.

"There's a real irony here," says North Guard spokesperson Becky Noyes. "Groups that were at each other's throats over wilderness issues a few years ago are united today."

Russ Allen, executive vice-president of the Minnesota Timber Producers Association, agrees: "We all have good reasons to oppose this development. The military and multiple use don't mix."

The site is prime timber-wolf habitat and contains several important watersheds, including the Kawishiwi, which drains into Boundary Waters, and the Cloquet, a premier canoe river that has been considered for inclusion in the national Wild and Scenic River System.

The Kawishiwi drainage's pristine waters, shown above in the Boundary Waters Canoe Area, could be muddied by a military solution to unemployment in Minnesota's Iron Range.



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Runoff from the disturbed areas could increase siltation and other pollution in these sensitive watersheds.

North Guard believes the military installation could also change the character of its quiet rural community. "The individual and ethnically diverse communities of the [Iron] Range would be overwhelmed by the needs and lifestyles of the new immigrants," says a North Guard newsletter. "Such tourists would favor fast-paced entertainments: pleasure palaces, liquors, and fast food."

The new faces would bring with them new sounds. "When 105-millimeter howitzers go off, they make lots of noise," Noyes says. "With the BWCA within a few miles from the site, the wilderness experience could be blown away."—***Marshall Helmberger***

The Push for a Petroglyph Park

ALBUQUERQUE, NEW MEXICO

In February 1986, Albuquerque's Public Works Department bulldozed a tunnel through a volcanic escarpment just outside of town. The same month, a joint state-city archaeological study documented more than 10,500 petroglyphs on the 17-mile-long slope, establishing it as the world's largest concentration of ancient art near a major city.

To Albuquerque conservationists, it appeared that the city was simultaneously promoting and assaulting a national treasure. They responded by forming Friends of the Albuquerque Petroglyphs.

At first the organization "ran itself ragged fighting brush fires"—proposals to build roads and subdivisions in the area—says Friends' Chair Ike Eastvold. Then the group came up with a proposal of its own: It suggested that the area, the West Mesa, be protected as a national monument.

New Mexico Sen. Pete Domenici (R) was eager to help. Ten days after Eastvold submitted a monument proposal to Domenici's office, the senator reported that $50,000 for a West Mesa study had been added to the Interior Department's appropriations bill.

"The petroglyphs are a rare national treasure," Domenici told *Sierra* in December, after the study money had been approved. "I think it is imperative that the National Park Service be involved."

Most of the West Mesa petroglyphs

ISAAC E. EASTVOLD

Urban sprawl has crept up to the edge of the West Mesa, leaving its petroglyphs extremely vulnerable. Chisel marks on the rock in the foreground indicate that it has been vandalized.

were probably made between 1325 and 1600 by the Anasazi, the ancestors of modern Pueblo Indians. Domenici hopes that the West Mesa can eventually be made part of a regional tourist system linking several Anasazi and Pueblo sites in western New Mexico. Proposed by Park Service Director William Mott, this system has been named the Masau Trail, after the Pueblo god whose giant footprints the Indians are said to have followed when they emerged from the underworld. Giant-footprint petroglyphs are found at many sites in the Southwest, including the West Mesa.

If Congress decides the area is worthy, the West Mesa could become the country's first national park unit devoted primarily to Indian rock art. The Park Service will hold public hearings on that possibility in April. In August, a report on the agency's study must be submitted to Congress.

Meanwhile, West Mesa highway and housing projects continue to be approved. "Our opportunities for preservation are already limited to fragments of the area's original magnificence," Eastvold says. He hopes that Congress will share his sense of urgency and pass protective legislation this year.

—Fiona Urquhart

Public Dismay Over Private Cuts

ST. JOE RIVER, IDAHO

Major environmental legislation in the last three decades has resulted in significant reforms on national forest lands. But those hard-won gains are useless to environmentalists fighting a massive timber cut by Plum Creek Timber Company on 1.5 million acres of private land in Idaho, Washington, Montana, and Oregon.

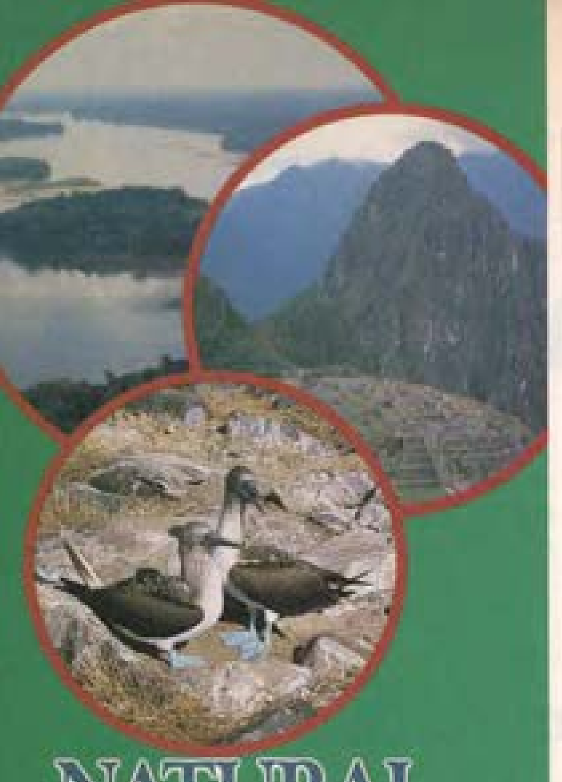
"It's just like the 1800s," says John Osborn, coordinator of the Spokane-based Inland Empire Public Lands Council. "Cut and get out."

Plum Creek, the forestry arm of Burlington Northern, Inc., has decided to liquidate all of its old-growth timber holdings over a 10- to 15-year period. In Washington and Idaho the company is carving out some clearcuts of 640 acres—one square mile—or more. This is in stark contrast to practices on national forests, where the U.S. Forest Service allows clearcuts no larger than 40 acres. Plum Creek is proceeding with smaller, and therefore less controversial, cuts in Montana and Oregon.

"We've determined it's in our best interest to harvest the timber as quickly as we can and sell it, at least until we get rid of this old-growth backlog," says Bob Boeh, Plum Creek's manager in northern Idaho and northeast Washington.

Critics say the cuts will eventually cause erosion and water-quality problems along two of northern Idaho's rivers: the St. Joe and the North Fork of the Clearwater. These problems could threaten "some of the best fishing in the country," Osborn says.

Plum Creek claims that it's not doing any lasting damage to resources. "We worry about those things," Boeh says. He dismisses water-quality questions that the Forest Service has raised by say-



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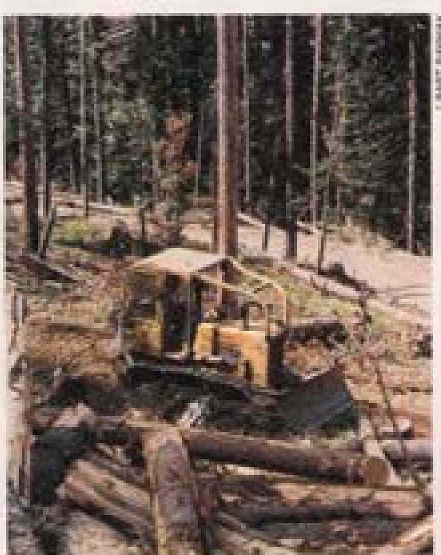
ing, "We don't agree with the [computer] models they're using."

Because the cutting is occurring on private land given to the railroads by the federal government, Forest Service rules do not apply. "One of the real frustrations is how few handles there are to deal with this thing," says Bill Arthur of the Sierra Club's Northwest office.

State laws also seem inadequate. Idaho, for example, places no limits on the size of clearcuts within its borders, and it assesses each cut separately, regardless of the cumulative effects of past harvesting in the same drainage. Environmentalists are trying to persuade Idaho legislators to fund a water-monitoring program that might prove useful in curbing clearcutting abuses on private land. Funding prospects appear dim, however.

Environmentalists are not alone in objecting to the cuts. The commissioners in Washington's Pend Oreille County complain that the company is flooding the local market with so much timber that small operators cannot sell enough logs to stay in business. On a tour of several cutting sites, the commissioners also expressed concern about the environmental effects of increased harvesting, particularly on streams.

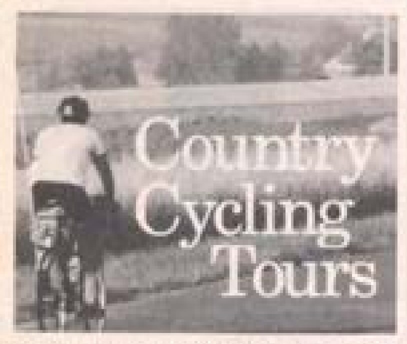
Charlie Raines, national-forest chair of the Cascade Chapter of the Sierra Club, thinks outrage over the cutting will grow: "I just can't believe that a clearcut a mile square fits anybody's definition of being a careful steward of the land."—*Jeff Sher*



J. BART RAYNIAK

An 1800s-style timber harvest in Idaho's St. Joe River drainage.

CATALOG of CATALOGS



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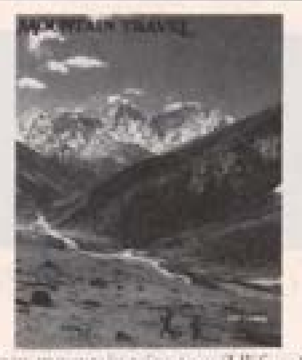

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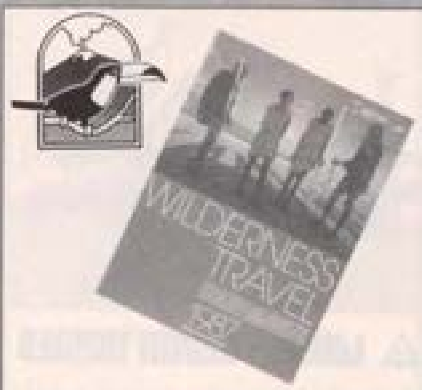

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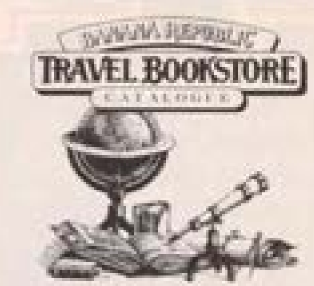

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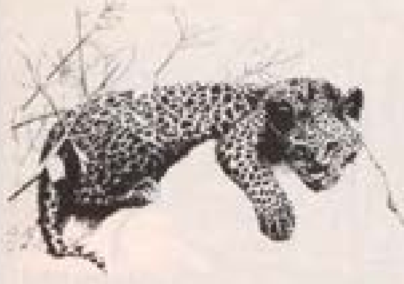

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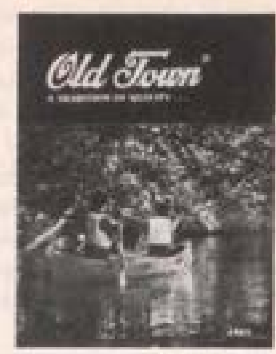

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SIERRA NOTES

Sierra Club Books will celebrate John Muir's birthday this year by releasing a paperback version of Frederick Turner's biographical study *Rediscovering America: John Muir in His Time and Ours* ($10.95) . Most of us are aware that the Sierra Club's founder was a mountaineer, writer, and pioneer conservationist. Turner's book reveals that Muir was also an industrial inventor and amateur scientist.

Beyond Forget: Rediscovering the Prairies by Mark Abley ($16.95, cloth), scheduled for release in March, explores the Canadian provinces of Saskatchewan, Manitoba, and Alberta. Dean Drakel II's *Downriver: A Yellowstone Journey* ($16.95, cloth) takes us on an exploration of the last major free-flowing river in America.

The Climber's Handbook by Ron Fawcett, Jeff Lowe, Paul Nunn, and Alan Rouse ($29.95, cloth; $18.95, paper) is a comprehensive guide to rock, ice, alpine, and expedition climbing. *Words for the Wild: The Sierra Club Trailside Reader*, edited by Ann Ronald, contains selections from the best in American nature writing—from Emerson and Thoreau to John McPhee and Annie Dillard—and is being published in the popular Totebook® format. Both books round out the list of recent releases, along with a new paperback edition of David Rains Wallace's mystery novel, *The Turquoise Dragon* ($6.95).

These books may be ordered by mail from the Sierra Club Store, Dept. T-150, 730 Polk St., San Francisco, CA 94109. Include $3 per order for shipping and handling. California and Arizona residents should also enclose applicable sales taxes. Members may subtract a special 10-percent discount from prices listed. Allow four weeks for delivery.

The Sierra Club Board of Directors voted in November to increase the level of dues paid by regular members of the Sierra Club. (A spring 1986 vote by the membership empowered the Board to do so.) Effective January 1987, a one-year individual membership will cost $33, and a joint membership will cost $41. The Board also created a new limited-income membership category. Those who feel they qualify may join for $15 per individual, $23 per couple, the same rates that apply to student and senior categories. Membership materials reflecting these dues changes are now being distributed to groups and chapters.

The Fourth World Wilderness Congress will meet at Colorado State University, September 11-18, to help launch a new initiative in worldwide conservation. The congress, open to the public, brings together ecologists, politicians, industrialists, scientists, sportsmen, artists, and concerned individuals to discuss a variety of conservation issues. Participants are expected from Latin America, Asia, Africa, Europe, and North America, and speakers will include the prime minister of Norway, the director of the United Nations Environment Programme, and the director of the International Union for the Conservation of Nature.

The cost of participation in the entire congress is $200 if registration is recorded before July 1, 1987, and $250 after that date. Limited-participation rates are available. For information, write: Fourth World Wilderness Congress, Colorado State University, Fort Collins, CO 80523.

The Sierra Club Annual Dinner is scheduled for Saturday, May 2, at the Hyatt Regency Hotel at Embarcadero Center in San Francisco. The reception begins at 5 p.m., dinner begins at 6:30, and the honors and awards program, including a keynote speaker, will be from 7:30 to 10.

For more information, contact the Sierra Club's administrative office at (415) 776-2211.

The Sierra Club Mountaineering Committee has produced a series of quality slide shows drawing upon its members' experiences around the world. Three slide shows are now available for rental:

"Annapurna South Face Expedition" traces the ascent of this Nepalese peak to its summit at 26,545 feet by several Sierra Club members. The color slides explore setting up high camps, relaying loads, and the technical skills required to surmount a 4,000-foot rock face.

"Hard Rock & Ice" illustrates 40 of the finest rock and ice climbs in North America, including Yosemite, the Tetons, Mt. McKinley, the Canadian Rockies, Garden of the Gods, and Glenwood Canyon. Some climbs in the Andes, Pamir, and Himalaya are included as well.

"Call Out" is a technical presentation of rescue techniques perfected by the Sierra Club and Mountain Rescue Association specialists.

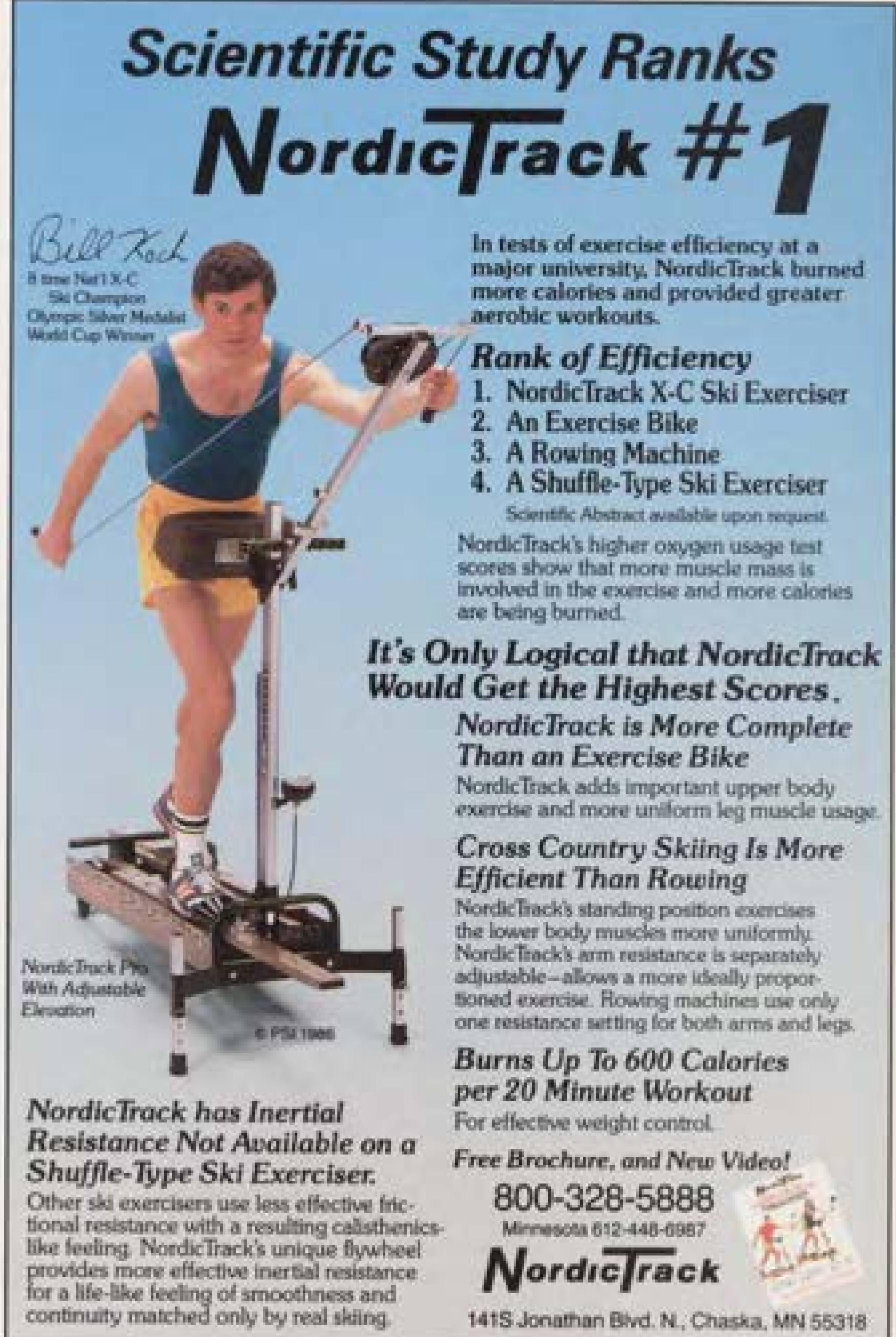
Information about rental price and availability may be obtained from the Sierra Club Mountaineering Committee, Box 262, La Canada, CA 91011.

The Western Canada Chapter of the Sierra Club is utilizing a Canadian government grant to develop and market environmentally and socially sound products useful in the outdoors. The first product will be a "Handi Hoist," which utilizes a block-and-pulley system to hang food from tree limbs in order to keep it safe from bears and rodents. Other products being tested include a bug bonnet and a survival belt. Sharon Chow at the chapter is interested in receiving ideas and designs. She can be contacted through The Sierra Club of Western Canada, 420-620 View St., Victoria, B.C., V8W 1J6 Canada; (604) 386-8644.

The Fifth Annual Western Public Interest Law Conference will be held at the University of Oregon School of Law in Eugene, March 13–15. Sponsored by the Western Natural Resources Law Clinic, the conference will offer more than 15 panels exploring such topics as Native American rights, old-growth timber, pesticides, acid rain, recovering attorneys' fees in environmental cases, and conflict between bureaucrats and grassroots environmentalists. Featured speakers include Sierra Club Directors Brock Evans and David Brower, as well as Dave Foreman of Earth First! and Charles Wilkinson, professor of law at the University of Oregon.

Lawyers pay a registration fee of $20 in advance or $30 at the door; all others register for free. Contact Western Natural Resources Law Clinic—L.A.W., School of Law, University of Oregon, Eugene, OR 97403; (503) 686-3823.

Hawaii Volcanoes National Park and vicinity are the subject of a new multicolored topographic map published by the U.S. Geological Survey in cooperation with the National Park Service. One side of the 30" × 42" map depicts about 2,100 square miles of the central and southeastern regions of the island of Hawaii, including the park. The map, at a scale of 1:100,000, has contour lines at 200-foot intervals. The opposite side of the sheet contains a shaded-relief topographic map of Hawaii Volcanoes National Park itself, more detailed at a scale of 1:24,000. The map is available for $4 from the U.S. Geological Survey, Map Distribution Center, Box 25286, Federal Center, Denver, CO 80225.



Feathers

are truly one of nature's great inventions. It's hard to imagine that they evolved from the scales that cover earthbound lizards. Feathers allow birds to soar over mountains and make 200-mile-per-hour dives. Their clever design has turned birds into the freest of creatures.

Feathers are used for both flying and keeping a bird warm. Soft down feathers trap air next to the bird's body, creating a layer of insulation from the cold. Rigid outer feathers cover the down. They are strong, yet very light. If you look closely at one of these feathers you can see that it is made of strands that "lock" together to make a smooth surface on both sides of the feather's central shaft. The wear and tear of flying causes these strands to "unhook," creating gaps. Luckily, a bird can easily fix these by zipping the feather through its bill.

Birds must keep their feathers in excellent condition for flying, which means cleaning or "preening" them every day. Birds also shed their feathers at least once a year, and replace them with new ones. Some birds grow their most colorful feathers during the mating season. The sex that sits on the nest—usually the female—often has drab-colored feathers to help it hide from predators.

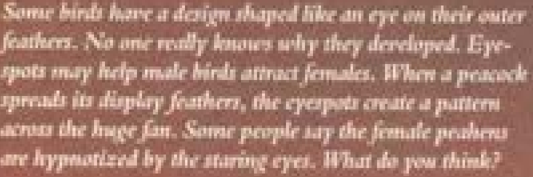
Alas, brilliantly colored feathers have meant a sad end for many a bird. Throughout history, humans have killed these animals and used their feathers to decorate everything from hats and necklaces to sweaters and shoes.

This colorful feather belongs to the resplendent quetzal, a bird that lives in the rainforests of Central America. Many people believe the quetzal is the most beautiful bird in the Western Hemisphere. Its feathers are iridescent, meaning that the shades of color change depending on how light hits the surface. Iridescent colors look shiny and metallic.

A young pigeon gets its first set of outer feathers. Before the bird hatched out of its egg, it developed pimple-like bumps on its skin. These small bumps grew into feather follicles, which are something like the hair follicles on your head. By the time the bird hatched, it was covered with wispy down feathers. This covering lasted only a short time, though, before the first set of outer feathers began to peek out of the feather follicles.

This small piece of fluff is a down feather. Unlike a bird's outer feathers, down is made of thin, floating strands. Bunched together, these feathers create little spaces where warm air can be trapped next to the bird's body. Down is so warm and light that humans use these feathers from the breasts of ducks and geese to stuff pillows, jackets, sleeping bags, and comforters.

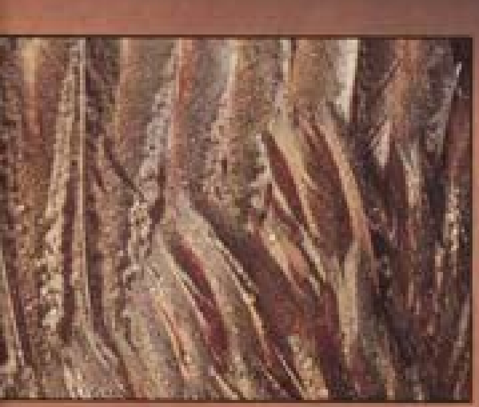
Text by Larry Minden ■ Photographs by Frans Lanting



Some birds have a design shaped like an eye on their outer feathers. No one really knows why they developed. Eyespots may help male birds attract females. When a peacock spreads its display feathers, the eyespots create a pattern across the huge fan. Some people say the female peahens are hypnotized by the staring eyes. What do you think?

Birds preen their feathers to keep them waterproof and prevent them from getting dried out and brittle. The preen gland, a little sac found under the tail, contains a special oil that birds spread on their feathers. This albatross is squeezing oil out of its preen gland. Most birds preen after splashing around in the water. Getting the feathers wet probably helps spread the preen oil.

Some birds have lost the ability to fly, while others never had it. Rheas, ostriches, and emus are birds that now rely on their strong legs to carry them from danger. Many water birds are weak fliers and spend their time swimming instead. The great kiwi bird used to fly, but not anymore. It lives on islands in the ocean, far from most predators. As flight became less and less important for survival, kiwi feathers evolved without the features needed for flight. Modern kiwis, like this one, don't even have wings!



You've heard that water rolls off a duck's back. Well, water beads up and rolls off these pheasant wing feathers, too. Some birds have feathers that are naturally waterproof. Other birds must oil their feathers—part of preening—to keep from getting soaked by the next storm. Some water birds preen their feathers as often as 17 times a day to keep their bodies dry and buoyant (able to float).

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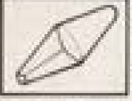

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BOOKS

Crossing Natural Thresholds

State of the World 1987
by Lester Brown et al.
Norton, 1987. $18.95, cloth; $9.95, paper.

Michael Philips

LAST FALL, Lester Brown, president of the Washington, D.C.–based Worldwatch Institute, received a letter from the Library of Congress asking him to donate his private papers to the Library. "Your writings and the work of the Institute under your direction have already strongly affected thinking about problems of world populations and resources," the letter said.

Brown has agreed to the Library's request, and thus his writings will share shelf space with those of such other contributors to our environmental awareness as Barry Commoner, Frederick Law Olmstead, Gifford Pinchot, and Theodore Roosevelt.

Although Brown, 52, has written seven books and the Worldwatch Institute has issued dozens of monographs since its establishment in 1974, the Library's recognition is no doubt due in large part to the Institute's annual *State of the World* reports, initiated in 1984. The reports, produced by Brown and a small cadre of researchers, are subtitled "Progress Toward a Sustainable Society," but they end up documenting not progress so much as deterioration: of forests, grasslands, agricultural lands, wildlife habitats, and the like—in short, the deterioration of the resource base that underpins the global economy and maintains the planet's livability.

If you were to dismiss *State of the World 1987* as little more than a bible for doomsayers, you'd be insulting an increasing share of the world's leaders, scientists, and educators, and you'd be hard pressed to amass contrary evidence. There has been only one notable attempt in recent years to rebut the basic thesis of global-trend analysis, and that was directed not against *State of the World* but against *The Global 2000 Report*, which the President's Council on Environmental Quality issued at the end of the Carter administration. *Global 2000* warned that if current trends (as of 1980) continue, the world in the year 2000 will be more crowded, more polluted, less ecologically stable, and more vulnerable to resource-supply disruptions. The rebuttal came from *The Resourceful Earth*, a 1984 book funded by the ultraconservative Heritage Foundation. That book was a ludicrous exercise in the manipulation of statistics to shed the best possible light on resource consumption and depletion. Brown, who feels the conservative critics have been largely discredited, seems uninterested in responding to them—perhaps because there are fewer critics today than when *Global 2000* was released.

It's certainly true that we've become familiar with many of the scarifying trends that *State of the World* addresses. Worldwide, deforestation claims an area the size of Austria annually. An area of cropland and grassland the size of Maine is becoming barren desert each year. Forty percent of non-desert Africa is at risk of desertification; of Asia's land area, 32 percent is at risk, while the figure in South America approaches 20 percent. At the current rate of tropical forest destruction, a million plant and animal species—10 to 20 percent of Earth's total—will be lost between now and the end of the century. As a result of population increases and soil erosion, the amount of topsoil per person is projected to drop 32 percent by the year 2000, even as food demand increases by a third to a half. The atmospheric buildup of carbon dioxide, thought to trigger the "greenhouse effect," increases by 1 percent per year, while ozone-damaging chlorofluorocarbons, also thought to contribute to global warming, are increasing by 3 percent per year.

Add to all of this the planet's growing problems of nuclear waste, acid rain, and declining water tables, and you have

a virtual encyclopedia of tragedy. There are, furthermore, the cumulative effects of these trends—economic decline, famine, political unrest, and war.

The distress one may feel when facing such a litany of discouraging trends is perhaps comparable only to the difficulty of contemplating nuclear war. The enormity is almost beyond belief. But unlike nuclear war, environmental destruction is not just something that *could* happen—it *is* happening. According to Brown, "Never have so many systems vital to Earth's habitability been out of equilibrium simultaneously." The imbalance is all the more insidious because it is fueled largely by everyday human activities, like driving cars, growing food, and generating electricity.

Worldwatch specializes in interdisciplinary research, and *State of the World* is at its best when it crosses the boundaries of established fields of inquiry to examine relationships between land degradation and human nutrition, population growth and climatic alterations, ecological devastation and refugee movements. Brown is critical of the international research community for its failure to focus sufficiently on such interrelationships: "I can't think of a single demographer who's looking at the effect of population growth on the hydrological cycle, or a single meteorologist who is trying to analyze the effects of changing land use on the hydrological cycle."

One of the most interesting interrelationships examined in the most recent report is between oil and food production. The technologies used to expand food production are all oil-intensive, from petroleum-based fertilizers and pesticides to fuel for tractors and irrigation pumps. The best indicator of the rising energy intensity associated with food production is the amount of energy used to produce a ton of grain. Since 1950 this figure has almost tripled.

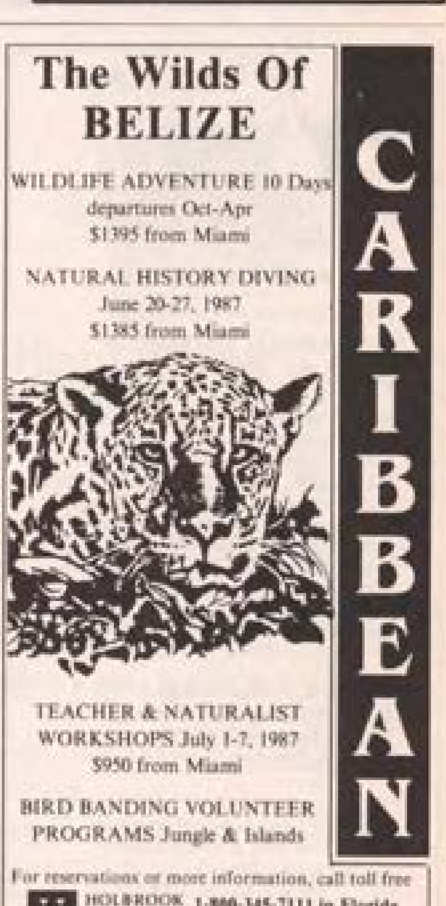
Brown points out that four fifths of all the oil discovered to date in North America has already been burned, and that current proven U.S. reserves total 36 billion barrels, enough to supply this country's needs for fewer than eight years at today's level of use. Given the rapid rate at which non-OPEC oil is being both produced and consumed in the 1980s, Brown predicts, "Sometime in the early '90s we'll see a situation where world oil supplies tighten and where the Middle East will control a far larger share of the world's remaining oil reserves than it did in 1973 or 1979."

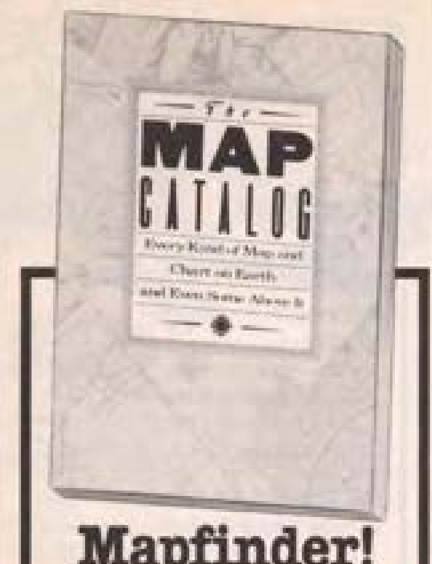
With food production increasingly oil-intensive, a new energy shock will effect not only the world's energy security but its food security as well. Add to this the projected food-production needs of an expanding world population, and the implications of oil price hikes and scarcity become even more serious. Without the oil inputs they've come to rely on to increase yields, farmers may seek to increase production by expanding the acreage under cultivation to include marginal lands subject to severe soil erosion. (This practice has recently been discouraged in the United States by legislation on the federal level, but other nations have not taken such precautions.)

Although some problems, like deforestation and soil erosion, are discussed to some degree in all the *State of the World* reports, Brown and his colleagues try to structure each report with a unique and overriding message or theme in view. Two years ago it was that land degradation was so intensive, particularly in Africa, that it was causing broad climatic changes and helping drive some cultures "back to the bush." Last year it was that the accepted definitions of national security should be expanded to account for the impact of environmental degradation on economic and political stability.

The theme of *State of the World 1987* is that Earth's capacity to sustain human life is being impaired by the crossing of key "thresholds" in natural systems. According to Brown, the thresholds theme is a timely one in that several thresholds have recently been crossed: "holes" have apparently been created in the ozone layer over both poles as the result of years of chlorofluorocarbon pollution; the theorized warming of the planet, presumably due to carbon-dioxide buildup and trace gas emissions, is indeed occurring; and the world's population, as of July 1986, passed the 5-billion mark.

In addition, a number of regional thresholds are being crossed at an accel-





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erating rate. Temperate-zone forests are being pushed beyond a threshold of pollution tolerance, while those in the tropics are being pushed below a critical moisture threshold. Meanwhile, the buffering capacity of the soils of Western Europe is being overwhelmed by the discharge of pollutants from power plants and automobiles.

Conceptually, threshold-crossing is an interesting way of visualizing the limits to human-imposed stresses on the land, the oceans, and the atmosphere. Brown says the concept also helps add cohesiveness to the book, otherwise a set of self-contained articles by different authors. But the threshold theme, while sounding nice in a press release, isn't really necessary and may even be distracting. Thresholds or no thresholds, it's clear from the individual chapters in *State of the World 1987* that degradation of natural systems throughout the world is getting worse, not better, and perhaps the theme is as simple as that.

One thing that is getting better is the Worldwatch Institute itself. The organization now derives 50 percent of its budget from earned income, much of that from the sale of *State of the World* reports. (The other half of the budget comes from foundation grants.) Demand for the reports has expanded each year; the 1986 edition was published in Spanish, Chinese, Indonesian, Polish, and Arabic, among other languages. It was also adopted for coursework in 180 universities in this country.

While a number of think tanks study global trends, the emphasis on interdisciplinary research sets the Worldwatch Institute apart. According to Brown, a growing feeling within the foundation community that more interdisciplinary research is needed means that "there's an increasing tendency for them to turn to us and encourage us to do more." This is certainly a positive sign, and as worldwide interest grows it may spark the necessary political resolve—and action—that will eventually permit the Worldwatch Institute to subtitle its annual reports "Progress Toward a Sustainable Society" without that being more an expression of hope than of reality.

MICHAEL PHILIPS *has written for* Amicus Journal, Rain, *and* Not Man Apart. *He is an environmental policy analyst for the House Interior Committee in Washington, D.C.*

Saving Rivers Again and Again

Endangered Rivers and the Conservation Movement
by Tim Palmer
University of California Press, 1986.
$24.95, cloth

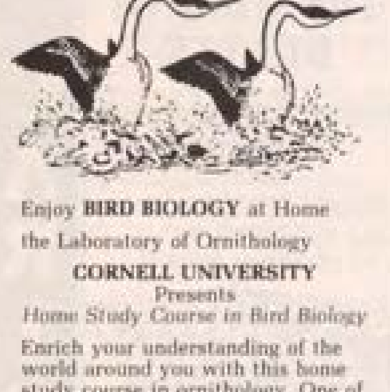
Larry Anderson

"THE TWO-CAR GARAGE is one American dream, and Huck Finn is another," Tim Palmer writes of the divergent social attitudes that have influenced how the nation has used and abused its rivers. To those who are familiar with Palmer's previous writings on the subject, it will come as no surprise that he casts his lot with Huck Finn.

In this ambitious new book, Palmer combines scholarly thoroughness with a firsthand knowledge of rivers throughout the country. From Alaska's Susitna to Louisiana's Atchafalaya, from the West Branch of the Penobscot in Maine to the North Fork of the Stanislaus in California, he surveys the American river scene and, unlike the authors of some gloomy environmental tracts, leaves the reader with a glimmer of hope and optimism about the fate of the country's remaining free-flowing rivers.

More than virtually any other natural resource, rivers attract a multitude of eager potential users. River by river, dam by dam, issue by issue, in a series of concise case studies, Palmer traces the co-evolution of the nation's water development policies and the countermovement to protect American rivers from thoughtless despoliation.

River politics are complicated by the fact that the public, through the federal government, holds rights to the country's navigable rivers; these waterways are, in effect, socialized institutions in a nation that proclaims the sanctity of private property. Palmer is alert to this par-



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adox as he describes the system of pork-barrel politics, bureaucratic empire-building, and boosterism that held sway over the exploitation of American rivers into the 1960s. In recent years, though, changing cultural attitudes have led to the consideration of the qualitative values of rivers in addition to those factors that can be plugged into cost-benefit equations.

River preservation, by Palmer's account, has been the stepchild of other causes in the conservation movement. The notorious Hetch Hetchy controversy early in this century, though it resulted in the damming of the Tuolumne River in Yosemite National Park, loosed a torrent of nationwide protest. But "the struggle was not so much to save a river as to save a national park," Palmer writes. "Among the preservationists, the land was the main issue. Rivers for their own values would not receive much attention for many years."

This attitude, conservationists eventually learned, cut two ways. In the 1950s the Sierra Club and The Wilderness Society helped thwart the damming of the Green and Yampa rivers at Echo Park and the flooding of Dinosaur National Monument; but the lamentable tradeoff turned out to be the flooding of the Colorado River's spectacular Glen Canyon, which was not part of a national park.

Park supporters, fishermen, and riverside landowners were among those who found a common interest in the issue of river protection. The throngs of canoeists, kayakers, and rafters who took to American rivers in the 1960s and '70s added strength and passion to this growing coalition. As more people came to know rivers, Palmer observes, "a river culture was quietly born. People began to talk more about the joy, the wonder, and the spirituality" that rivers bring.

River guides—who have had their own livelihoods to protect—have been the heroes of several battles to protest development schemes on popular whitewater rivers. Palmer profiles dozens of other key figures as well, including former Secretary of the Interior Stewart Udall, whose conversion from a provincial booster of dams to an advocate of river protection "personified the

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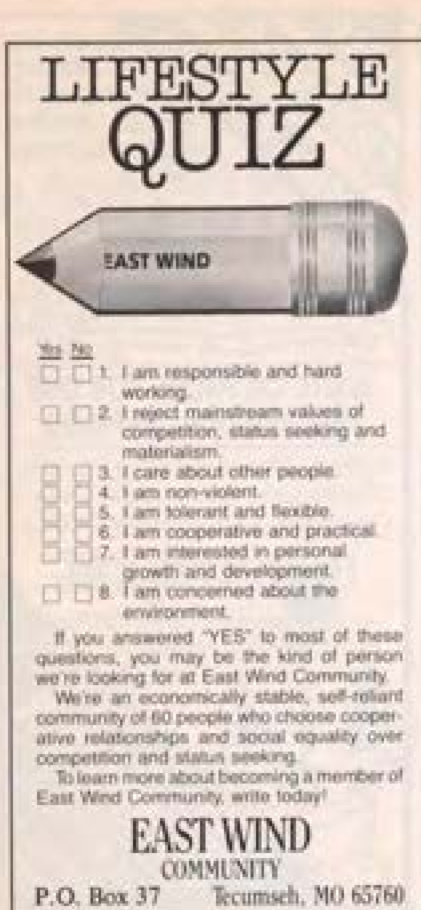
upheaval in water development philosophy" during the 1960s; Reps. John Saylor and Robert Edgar; environmental lobbyists Brent Blackwelder and Jerry Meral; wildlife biologists Frank and John Craighead, among the first and most articulate advocates of a national wild-river system; and activist Mark Dubois, who in 1979 chained himself to a rock along the Stanislaus in a dramatic attempt to halt the filling of a reservoir.

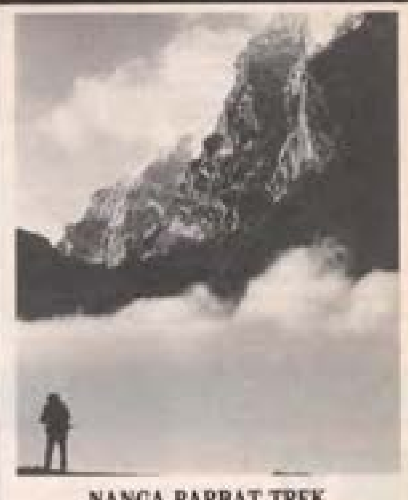
With the passage of the National Wild and Scenic Rivers Act in 1968, "river supporters now had a program of their own." But the process of designating a river for federal protection was cumbersome, opening up many opportunities for political and bureaucratic obstruction. The American Rivers Conservation Council, formed in 1973 by a group of environmental activists who saw the need for an organization committed solely to the rivers cause, helped press for more aggressive implementation of the rivers act. As of 1985, some 7,250 miles of 66 major river systems had won protection under the law—only 0.2 percent of the total mileage of American rivers.

Many of the nation's remaining free-flowing rivers are, of course, still under threat of development. The Public Utilities Regulatory Policies Act of 1978, originally lauded by many environmentalists for its conservation provisions, resulted in a wave of proposals for private hydroelectric dams. Engineers and public officials tout the potential of a water megaproject that would reach from Southern California to Alaska and transform western rivers into a transcontinental plumbing system. And many projects long ago authorized by Congress are still under construction or on the drawing boards.

Palmer worries that future generations, who may view the national river system as "simply a savings account where rivers are banked for future development," could wipe out the gains made in recent years. But he also foresees the possibility that saving rivers might become "the major natural area protection program" as designation of new national parks and wilderness areas becomes politically more difficult.

Endangered Rivers is packed with data that will make it an essential resource for





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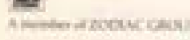
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activists and scholars alike. Chronological charts listing key events accompany each chapter; appendices summarize the current status of more than a hundred endangered rivers and the extent of the National Wild and Scenic Rivers System; and the author's proposals for innovative water development policies and practices provide the basis for a positive alternative to traditional programs.

Palmer makes no effort to conceal his enthusiasm for free-flowing rivers and the pleasures and spiritual nourishment they provide. The progress made in river protection has been the result of the efforts of dedicated amateurs, hardworking environmental lobbyists, and far-seeing public officials. Besides documenting the successes and setbacks of these individuals, Palmer's book should serve as a guidebook and call to arms for a new generation of river-protection advocates. Persistent vigilance is essential, Palmer concludes, "because, even at our best, we save rivers only for a while. Then they need saving again."

LARRY ANDERSON *reviewed Donald Worster's* Rivers of Empire *for the July/August 1986* Sierra.

Another Rush for the Ark

The Last Extinction
edited by Les Kaufman and Ken Mallory
The MIT Press, 1986. $16.95, cloth.

Mark Mardon

IT WASN'T SO LONG AGO that for John Muir and the likes of him, it sufficed to protect wilderness because it was "Godful," a beautiful "celestial city." But modern conservationists, Rutgers biologist David Ehrenfeld laments in his contribution to *The Last Extinction*, seek to preserve wilderness primarily to protect "a potential source of new drugs to cure cancer, of hydrocarbons and fuel oils from plants, of natural rubber, of genes for insect resistance of crop plants," and so on, intoning the whole litany of "useful" purposes wilderness serves for humankind. This is dangerously close to adopting the ideological rationale of the enemy,

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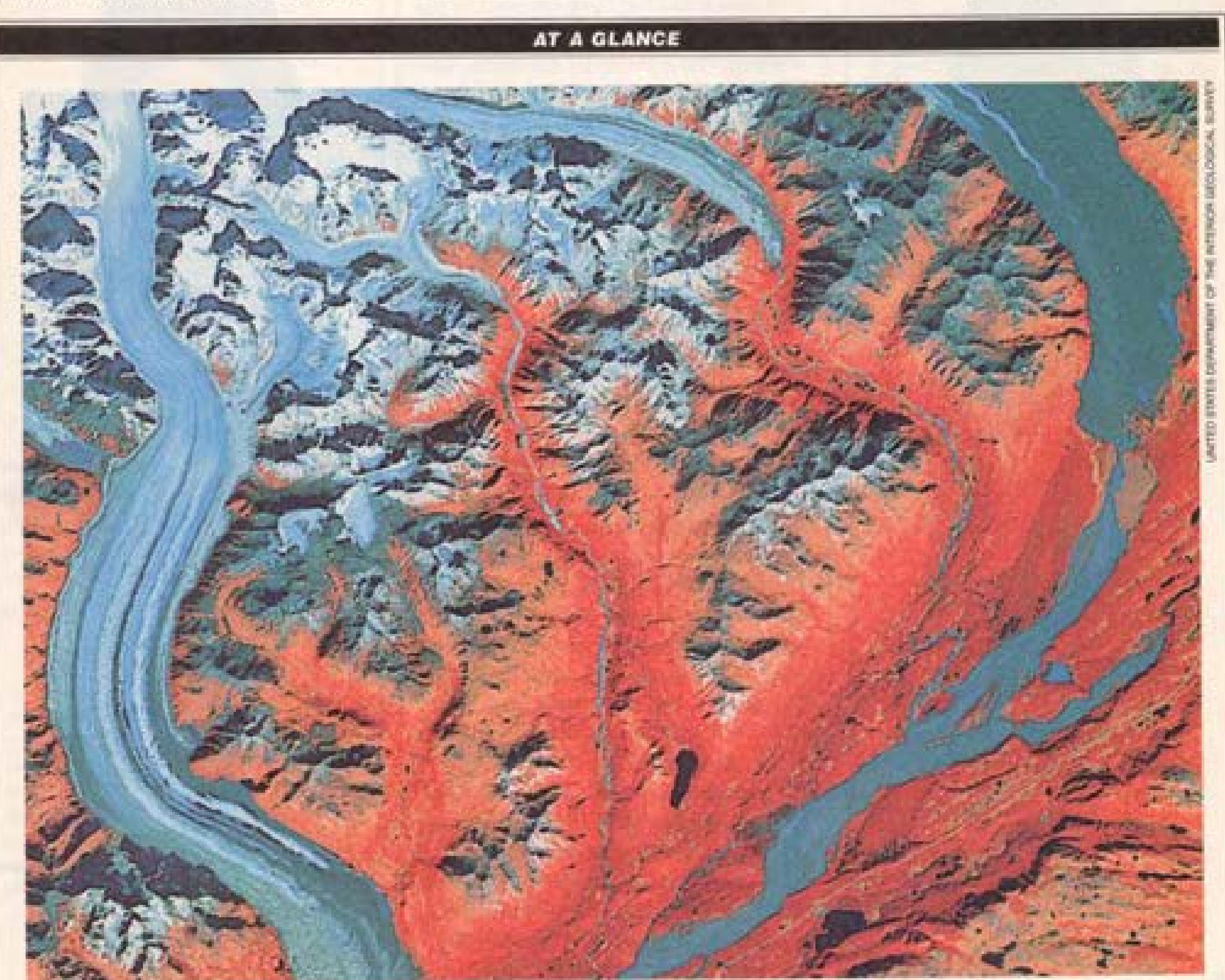
Ehrenfeld says, echoing the sentiments of the deep ecology movement. One supposes that for him the enemy consists of developers and industrialists, exploiters of the natural environment.

As an alternative to this utilitarian approach to conservation, Ehrenfeld urges us toward stewardship of the planet, an ancient concept that most can be comfortable with. But in so doing he seems inadvertently to admonish and contradict some of the other contributors to *The Last Extinction*. Editors Les Kaufman and Ken Mallory have brought together seven authors with conflicting styles and viewpoints in this wide-ranging, uneven, sometimes clumsy discussion of the extinction crisis. The result is a hodgepodge of opinions in a book that never quite hangs together.

Kaufman, a curator at the New England Aquarium, reminds us that plant and animal species worldwide are vanishing at a rate approaching and possibly exceeding that of the Late Cretaceous, when all dinosaur lineages abruptly ceased. This mass extinction, he says, demands immediate attention as one of the most serious problems facing the world today.

Most environmentalists could not agree more. Just to make sure we get the point, though, the editors include an entire chapter devoted to paleontological evidence of mass extinctions. David Jablonski concludes that the current extinction of species is not only occurring earlier (by half) than it ought to in the usual 26-million-year cycle, it is also being caused primarily by humans. Good information—but for conservationists, merely an update on old news.

AT A GLANCE



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The Denali map (#63148-F8-SI-250) costs $7 and may be ordered by mail from the USGS Map Distribution Center in Denver, CO 80225. Make checks payable to Department of the Interior—USGS, and include $1 for postage and handling for orders under $10.

The next chapter, focusing at length on the endangered Amazon, reflects the book's spotty coverage of its topic, neglecting vast bioregions of the world in favor of an almost exclusively Western Hemisphere approach. "Just as the Garden of Eden was given to Adam and Eve to use," Ghillean T. Prance writes about the disappearing rainforests, "the Amazon comprises a wealth of useful species that we cannot ignore."

This is exactly the sort of materialism that Ehrenfeld warns against. Even so, the motive to secure a potentially infinite supply of medicine, food, and fuel plants becomes compellingly clear in light of the vast number of animal and plant species that stand to be lost in the spreading destruction.

The question, then, is how to allow for essential development while maintaining the integrity of fragile rainforest ecosystems. The answer, Prance says, "is not to create a vast biological reserve as a playground for naturalists and rich tourists," but to practice a balance of conservation and utilization. This means exploring the rainforests to learn "as much as we can from what is left of their indigenous culture." It means that botanists and zoologists must conduct an urgent inventory to discover the "useful" native plants and animals: capybara, turtle, deer, tapir, agouti, and others. It means developing sustainable agricultural systems, relying more heavily on trees and perennial crops than on exposing areas of fragile soil to the leaching, compacting power of tropical rains. The emphasis of all programs must be on maintaining diversity. Otherwise, mass extinction will spread at an irreversible rate.

A well-written but philosophically disturbing part of *The Last Extinction* comes toward the end of the book: a discussion about the role of zoos and aquariums as repositories for genetic material during the coming centuries of habitat upheaval.

In a chapter entitled "Riders of the Last Ark," Thomas J. Foose of the Minnesota Zoological Gardens observes that the "demographic winter" now settling in will last anywhere from 200 to 1,000 years. This will be a period characterized by enormous, uncontrolled human population growth, resulting in

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the devastation of wildlands, the disappearance of wildlife, and the disruption of ecosystems. We will be unable to prevent the destruction of many habitats; so zoos and aquariums, Foose argues, must serve as animal and plant refugee camps. These institutions must equip themselves to preserve examples of animals and plants against the day when their lost habitats can be restored. But since it is neither physically nor economically feasible to keep captive and alive all the species whose habitats are being destroyed, Foose maintains, it will be necessary to preserve them in another way: as germ plasm in a "frozen zoo." The raw genetic material of as many animals and plants as possible must be preserved.

This is an extremist concept that demonstrates the severity of the extinction crisis, and Foose argues it well. Genetic diversity is vital to the survival of species. Large habitats allow for large gene pools, but "gene pools are being converted into gene puddles." Already, remaining wildlands have become virtual "megazoos," islands of unspoiled habitat in an expanding sea of human settlement. These megazoos are important because of the genetic diversity they harbor. This is why the American Association of Zoological Parks and Aquariums has developed a "species survival plan," which has species coordinators deciding which plants and animals may board the ark of survival. When there is not enough space, hard decisions will have to be made about whether to preserve a species or let it go—a decision Foose and others call euthanasia.

"Many zoo professionals believe euthanasia will be essential if the conservation responsibilities of captive facilities are to be fulfilled," Foose says. But equally appropriate and less euphemistic would be the war-related term "triage," the allocation of treatment to disaster victims according to a priority system designed to maximize the number of survivors. This is what Foose and his colleagues are advocating.

Ultimately, one has to wonder to what extent this view is wound up with the author's intimate involvement with and faith in zoos. After all, they are by no means universally accepted by conservationists. To some, the mere pres-

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ence of zoos encourages the perception that we can safely allow the disappearance of natural habitats while maintaining zoos as our arks. The reassurance this notion offers is deceptive, in that it allows us to be complacent in the face of continuing environmental destruction.

Conservationists will have to face this issue squarely. Have we appointed our zoos and aquariums to act as arks? Can we believe that after a thousand years the "frozen zoos" will be able to release reconstituted species into rejuvenated wildlands? The answers to these questions are based on countless assumptions that must be sorted out. The public must take responsibility for decisions that will shape the environment of the next millenium.

MARK MARDON *is* Sierra*'s editorial secretary.*

BRIEFLY NOTED

Island in the Sky: Pioneering Accounts of Mt. Rainier, 1833-1894, edited by Paul Schullery, is new from The Mountaineers ($10.95). . . . The two-volume 1901 edition of ***Alaska*** to which John Burroughs and John Muir both contributed has been reprinted in facsimile as ***Alaska: The Harriman Expedition, 1899*** (Dover, $11.95). A total of 367 pen-and-ink and photogravure illustrations are reproduced in this one-volume paper edition. . . . Present-day visitors to Alaska will want to carry along the third edition of Lonely Planet Publications' ***Alaska: A Travel Survival Kit*** ($8.95 from 1555D Park Ave., Emeryville, CA 94702), with its updated information on campgrounds, parks and trails, canoe routes, ferry schedules, and other key features of life on the last frontier. Also new from Lonely Planet is a 768-page guide to Indonesia ($14.95), much expanded from the section on the exotic archipelago that was part of the publisher's unique budget bible ***South-East Asia on a Shoestring*** through five editions. . . . Ben Gadd is a naturalist, teacher, graphic artist, and founder of Corax Press, through which he has produced (using desktop publishing technology) a massive ***Handbook of the Canadian Rockies*** ($19.95 in U.S. funds, $25 Canadian from Box 1557, Jasper, Alberta T0E 1E0 Canada). The emphasis here is on natural history—

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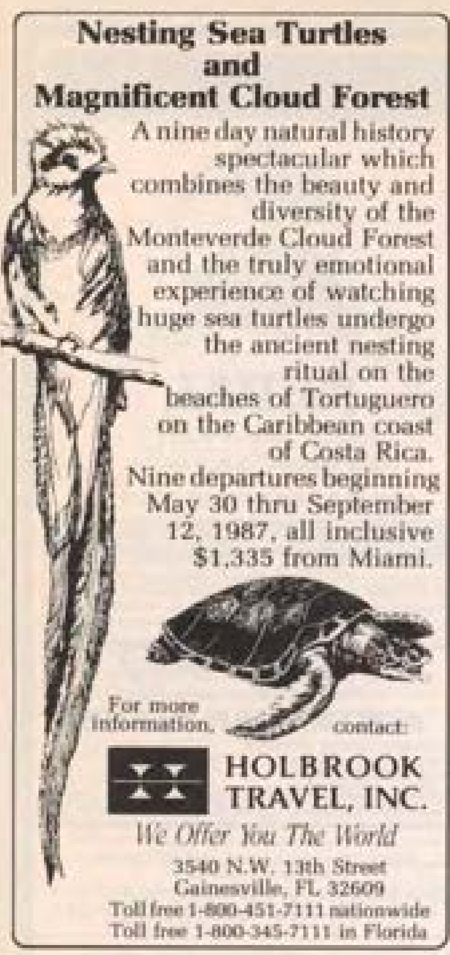
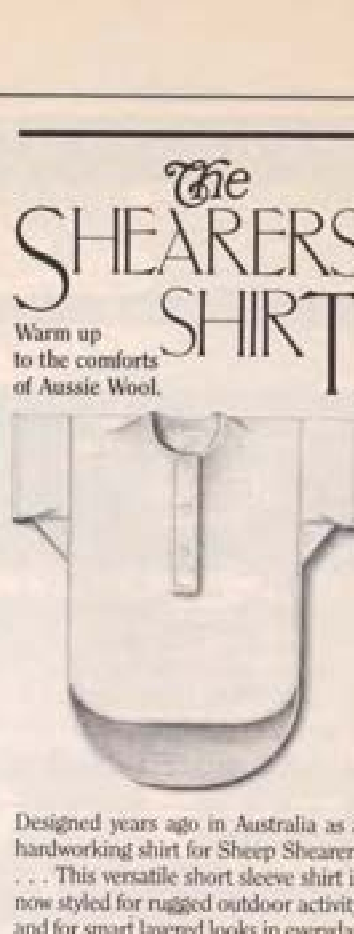


particularly geology, botany, and wildlife—but there's plenty of useful data on backcountry travel, hikers' trails and huts, cyclists' and rockclimbers' routes, mountain safety, and more. . . . Much geological savvy informs Michael R. Kelsey's hiking guides to the mountains and canyons of Utah, distributed by Wasatch Publishers (4647 Idlewild Road, Salt Lake City, UT 84124). In 1986 the globetrotting Kelsey—129 countries and counting—published first editions of his ***Canyon Hiking Guide to the Colorado Plateau*** ($9.95 + $1 postage) and ***Hiking Utah's San Rafael Swell*** ($7.95 + $1), and a second edition of his ***Utah Mountaineering Guide*** ($7.95 + $1), describing a total of 221 backpacks, hikes, and climbs throughout this often rugged but highly scenic part of the country. Each book is illustrated with black-and-white photos and Kelsey's own detailed maps. . . . California's Mendocino coast, north of San Francisco, is attracting an increasing number of hikers, who come to roam the redwood forests, admire the crashing surf, or scan the horizon for migrating whales. Whether you'd prefer a rigorous ramble along the remote Lost Coast of the Sinkyone Wilderness or a relaxing town stroll around Fort Bragg or Mendocino, Bob Lorentzen's ***Hiker's Hip Pocket Guide to the Mendocino Coast*** ($11.30 for California residents, $10.70 for out-of-staters from Bored Feet Publications, P.O. Box 1832, Mendocino, CA 95460) will show the way. . . . The challenges presented by 1,150 peaks in 34 mountain ranges can readily be assessed by readers of Pat Caffrey's ***Climbers Guide to Montana*** ($9.95 from Mountain Press Publishing Co., 1600 North Ave. W., Missoula, MT 59806). Many of the peaks are accessible by trail or relatively easy scrambles, so this book is by no means for technical climbers only. . . . In March the University of Nevada Press (Reno, NV 89557-0076) publishes ***Shrubs of the Great Basin*** ($27.95 cloth, $16.95 paper), the fourth volume in its Great Basin Natural History series. Previous titles in the 10-volume series include studies of the basin's trees, birds, and geology; upcoming books will cover rivers and lakes, fishes, butterflies, ecological zones, anthropology, and mammals. ■



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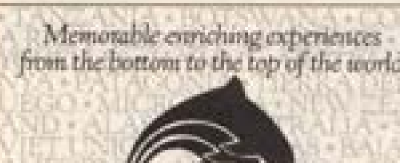

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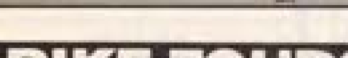

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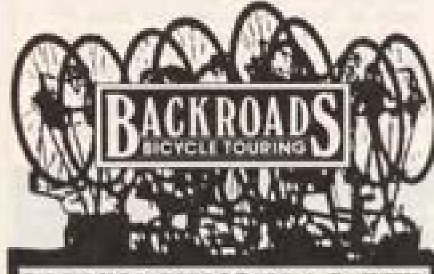

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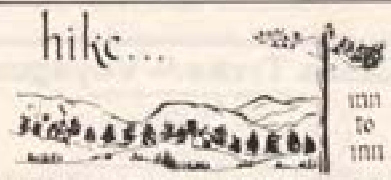

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The amount of paper, plastic, and other packaging materials used by the fast-food industry must be enormous. Any figures? (Ellen Sanders, Cincinnati, Ohio)

All those cups and lids, plastic wrappers, and box carriers are counted in the billions of units, according to a 1982 study by Technomic, an international marketing and consulting firm. Their study revealed that on-premise paper use, even excluding napkins, constituted 23 to 27 billion units per year. Plastic containers (such as the familiar burger "clamshell"), plates, and wrappings added another 10 to 12 billion individual items. Factoring in foam and foil, 60 to 70 billion units of on-premise fast-food packaging are distributed each year.

Carry-out packaging adds another 28 to 32 billion units of paper products to that already staggering total, plus 3.5 to 4.5 billion plastic items. The annual carry-out total: 38 to 42 billion units.

Disposal of this material makes for a big environmental problem. Plastic packaging is not degradable on the streets or in a landfill. Although paper *is* degradable, once it's been handed over the counter (and stained with burger grease and catsup), it is no longer recyclable.

How many whooping cranes remain in the wild? (Barbara Jean Scott, St. Paul, Minn.)

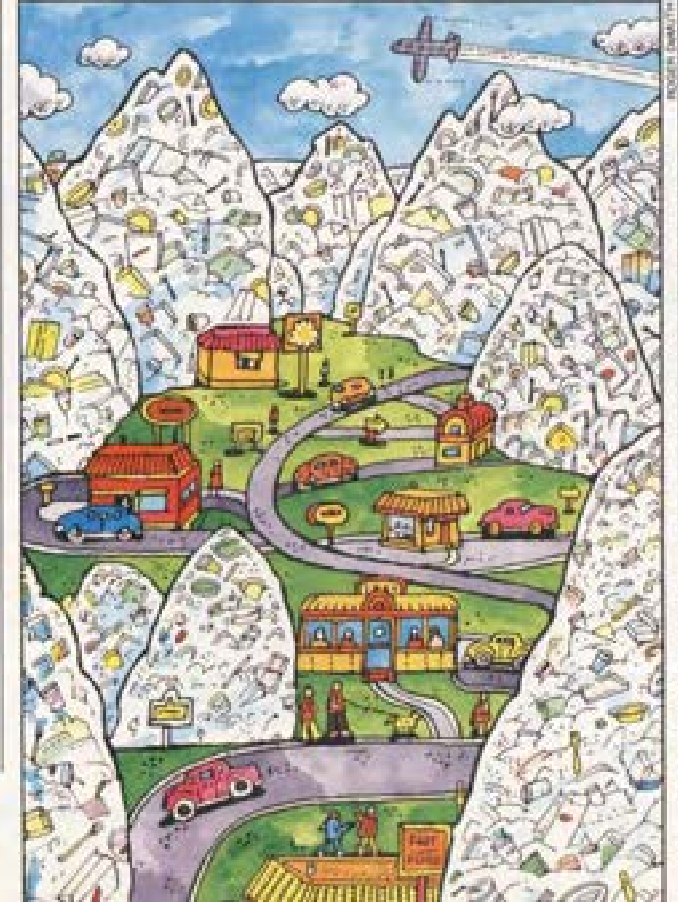
One hundred five whooping cranes were counted in the main flock wintering in Texas this year—the largest population since conservation efforts began in 1945. A smaller flock, hatched by sandhill crane "foster parents," numbers 25 to 30 birds and winters in New Mexico. In addition, there are 40 whooping cranes in captivity, bringing the total number left in the world to around 170.

Is it true that the U.S. government has agreed to receive nuclear wastes from Taiwan in exchange for that country's purchase of our technology? (Jerry McGowan, Elko, Nev.)

The U.S. has been supplying nuclear fuel not only to a Taiwan research reactor but to nuclear facilities throughout the world. However, because spent nuclear fuel can provide the material to manufacture nuclear weapons, current U.S. policy dictates that this country receive the spent fuel from all nations to which it has exported nuclear technology.

Controversy over this policy erupted in 1985 when the Department of Energy (DOE), which oversees these international nuclear transactions, announced plans to bring back the first shipment of spent fuel from Taiwan. Longshoremen from Seattle to Los Angeles refused to unload any high-level wastes that darkened their docks. Then, in September 1986, the Seattle-based Northwest Inland Water Coalition won a suit against the DOE in which it demanded a site-specific environmental impact statement to evaluate the possible consequences of a worst-case accident during unloading. The DOE is appealing that ruling.

Meanwhile, spent nuclear fuel continues to be generated by U.S.-supported reactors overseas. Spent-fuel storage capacity at many of these reactors is filling up rapidly, to say nothing of the high-level wastes that will be generated by other reactors planned for the future. It is not yet clear how the impasse between perceived national security needs and domestic environmental opposition to the importing of nuclear wastes will be resolved.



Am I at risk from vinyl-asbestos floor tile in my home? I understand the EPA has ordered a ban on its manufacture, yet an agency representative has told me there's very little danger. (Bruce Jennings, Hedgesville, W. Va.)

In 1986 the EPA proposed a phasing-out of certain products containing asbestos, including floor tiles. A final ruling is expected sometime this year; it would affect production only, and would not involve the removal of tiles already in place.

Consumers with vinyl-asbestos floor tiles in their homes or offices needn't worry as long as the tiles are bonded in place, the EPA says. When tiles are glued securely to the floor, it seals in the asbestos so that no fibers can be released. However, if you're planning to renovate your kitchen, it's likely that sanding or removal of tiles can free the fibers. That's why the EPA recommends laying fresh tile (or linoleum, or what-have-you) over tiles containing asbestos, rather than risk unsettling the dangerous material.

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