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Sierra

1990
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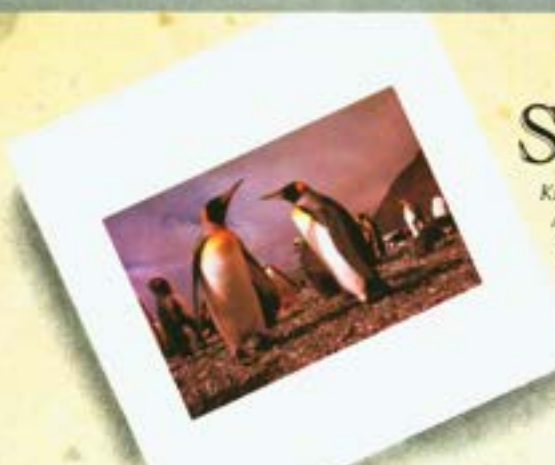
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COVER: The sun casts its spell in Arches National Park, Utah. For journeys to other magical places, see page 47.

Photo by Chris Noble.

10/ LETTERS

Contests, carbon, and *colonias*.

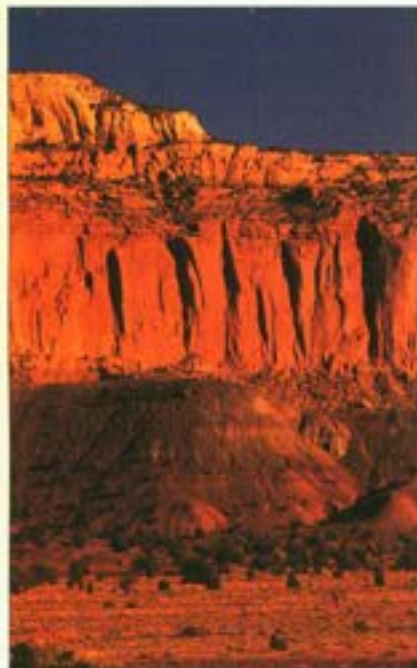
16/ AFIELD

Toxic wrongs and rights; doin' the eco-samba; crimes against creatures; real-life sculptures; and more.

20/ PRIORITIES

Agriculture: Former pesticide addicts discover that some bugs are better trusted than busted.

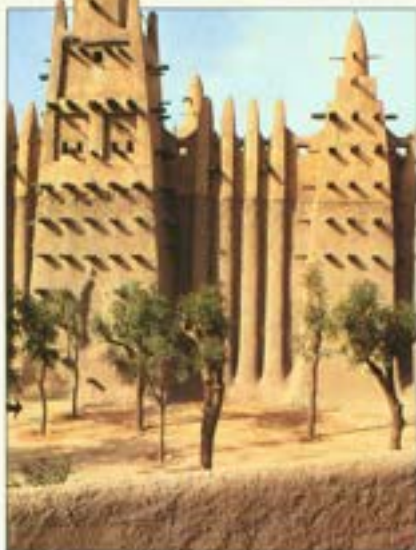
Public Lands: There's gold in that there desert, and miners take a heap of trouble to get at it.



32/ TWO WEEKS TO WANDER

Ray Wheeler

In the variegated wildlands of southern Utah, keeping your feet on the ground can be an out-of-this-world experience.



42/ CAMPING WITH THE PRINCE

Thomas Bass

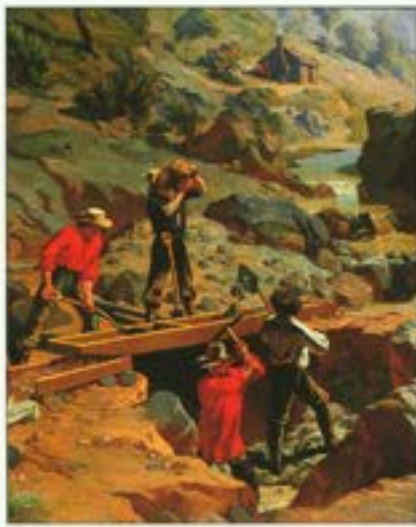
Come to Mali, where the waters ebb and flow while nature's fate pivots on a cucumber sandwich.

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1990's catalog of trips to here and there.

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Reed McManus

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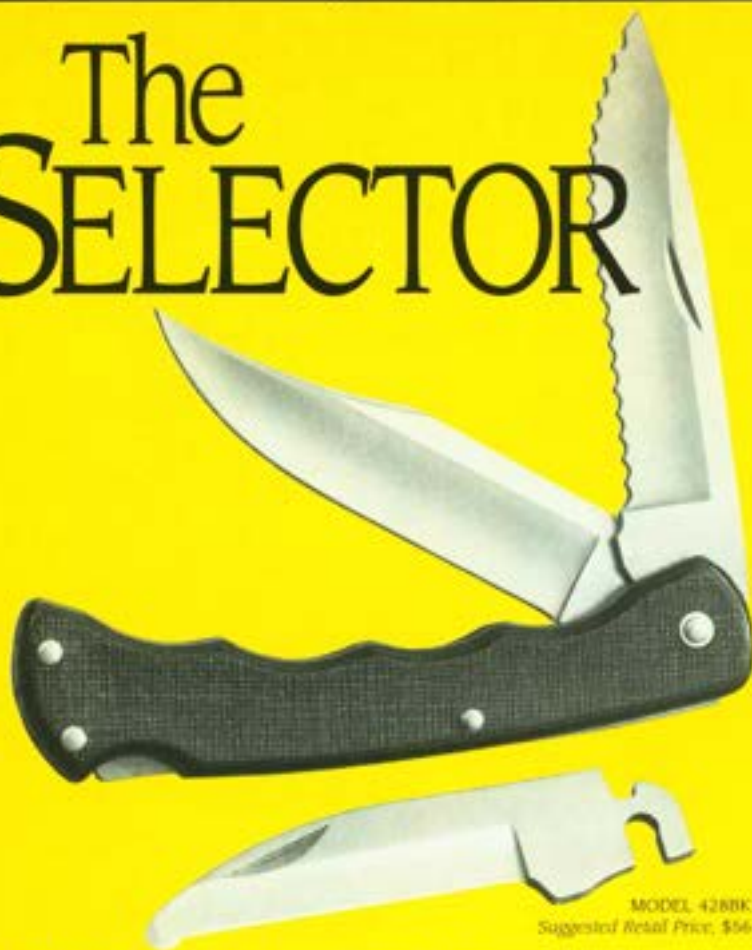
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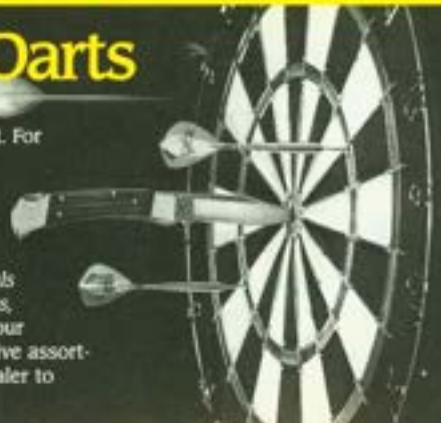


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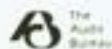
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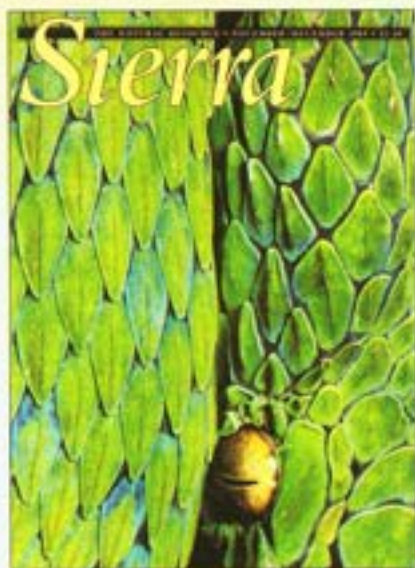
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LETTERS



ARTS AND LETTERS

One picture may be worth a thousand words ("Viewpoints: Sierra's Tenth Annual Photo Contest Winners," November/December 1989), but in this case I'd prefer the thousand words: Where exactly is the pit viper on your last cover? And what's that little brown thing with the hole in it?

Roberta R. Wallach
Brooklyn, New York

Grand Prize winner David Barker took this photo with a 90mm macro lens while visiting the herpetology exhibit at the Dallas Zoo. The coiled pit viper's green scales against its blue skin caught his attention, and when Barker opened the top of the enclosure to shoot directly downward the snake cocked its head slightly, allowing a fuller view of its right eye ("that little brown thing").

Imagine extending the lower right corner of the photograph. You'd see the rest of the snake's head—the other eye to the far right and the nose below, pointing down. From the head, if you follow the direction in which the scales point, you would see the snake's body continue on, then curve around in a coil to come back along the upper portion of its body.

You talk of yours as "one of the premier amateur photo contests in the nation." I was surprised, therefore, to

see that one of the first-place winners this time is John Gerlach of Shingleton, Michigan. John and his partner, Rod Planck, have sold many beautiful nature photos for publication, and they give seminars and workshops on nature photography. I haven't seen the contest rules, but I don't believe John can be considered an amateur, and it seems a little unfair that true amateurs have to compete with pros.

Patricia Schmid
Austin, Minnesota

In past years we've always been careful to state that Sierra's photo contest is open to amateurs and professionals alike. That policy, in our experience, makes for a wider selection of photos at no apparent disadvantage to talented amateurs, many of whom win first, second, and grand prizes each year. And there's been no change in that policy; we just failed to catch the editorial error you (and several other readers) promptly brought to our attention.

I just finished reading the winning pieces in your nature-writing contest ("Foxglove Laughter, Hard Listening, and The Cut," November/December). I found Robert Crum's "Calling the Owls" to be passable, and JoAnn Metzler's "Succession" quite good, but Kim R. Stafford's "Many Pleasures Without Names" was about as bad a piece of tripe as I have ever endured. If he is teaching this kind of writing to his students at the Northwest Writing Institute, I can only hope no one is learning.

Walt Marsh
Sunmyvale, California

FAVORING CURRY?

The inability of the National Park Service to implement the general management plan for Yosemite ("Priorities," November/December) is rightly blamed on "budget constraints." Why does this world-famous tourist attraction suffer from budget constraints? Staying in Yosemite is not cheap.

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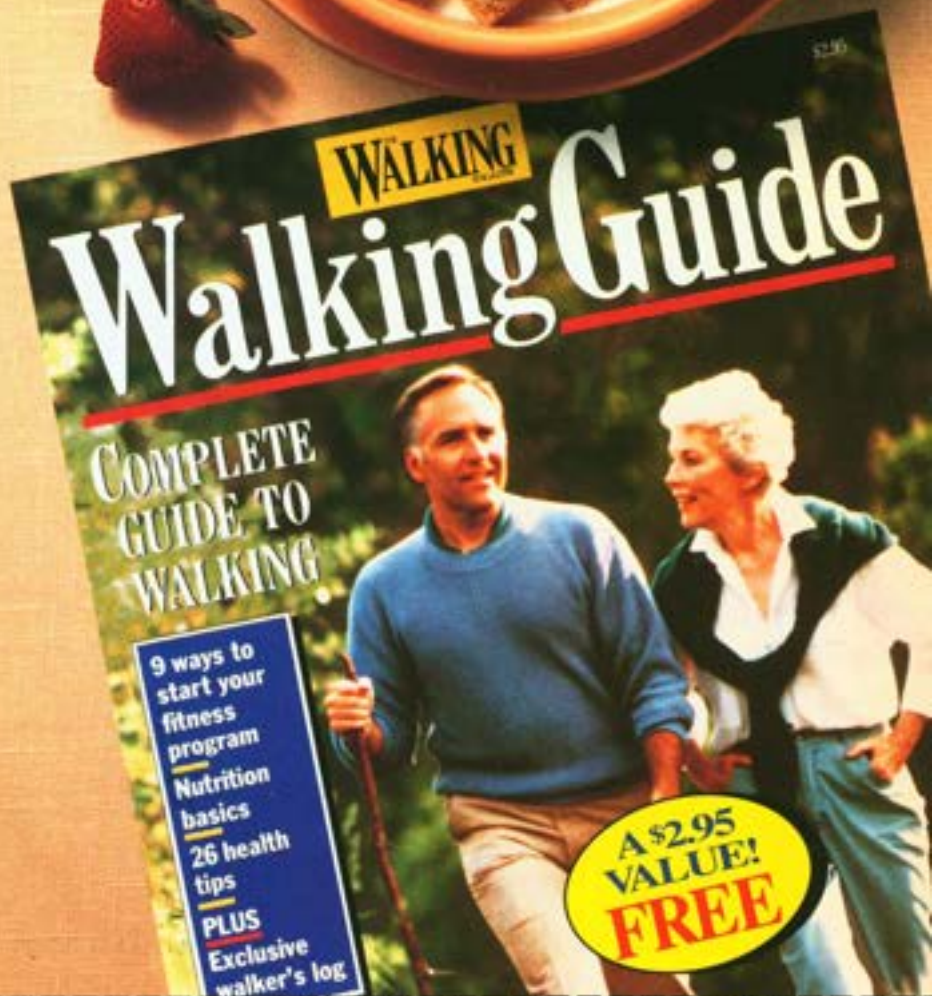
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discovered that the sole concessionaire, the Yosemite Park and Curry Company, pays less than 1 percent of its receipts to the U.S. government—only 75 cents of every \$100 a visitor spends in the park. Even that miserable 75 cents doesn't go directly back to Yosemite. The park is crowded nearly every day, guaranteeing more profits to the concessionaire while placing more burdens on Park Service staff and the park's natural systems.

What can we do between now and 1993 to ensure that the concessionaire pays a fairer percentage of its receipts, and that the money goes directly to the Park Service in Yosemite itself?

Robert Greenwood
Carmel, California

The National Park Service's Western Region office responds: *Mr. Greenwood points out a feature of Yosemite's 26-year-old concession contract. On the other hand, the park shuttle system is run by the concessioner without benefit of government funds or farebox revenues. The new contract, beginning October 1, 1993, will include financial arrangements beneficial to the park, including adjustment of fees every five years on the Park Service's determination. Cash payments are currently calculated after consideration of the financial effect of other contract requirements. By law, cash payments received cannot be retained by the NPS for park improvement or operations.*

A NO-COLONIA CORRIDOR

I want to make a small correction in an otherwise fine article in the September/October 1989 issue. In "Don't Seek Refuge Here" ("Priorities") there is a one-paragraph description of the authorized-but-not-yet-secured 125,000-acre wildlife refuge being pieced together along the final 190 miles of the lower Rio Grande in Texas. So far south that it reaches the subtropics, this refuge, the "Wildlife Corridor," seeks to preserve more than a hundred endangered, threatened, or peripheral animal species. This biodiversity is so rich, and the habitat destruction so accelerated, that the Interior Department has made this refuge its number-one land-acquisi-

tion priority in the entire nation for three straight years.

One sentence in your article is false, and may do harm: "The refuge has 26,200 acres now, much of it in the path of the advancing citrus industry and under siege from pesticide drift." First, the citrus industry has been in decline since a severe freeze in 1983, and furthermore there is very little citrus planted adjacent to the river, which is where most land acquisition (from willing sellers) is taking place. Second, while the intense use of pesticides in the lower Rio Grande Valley presents a number of concerns with respect to wildlife, environmental quality, and human health, pesticide use is simply not a significant factor in the drive to complete the Wildlife Corridor. Indeed, the agriculture community has been fully supportive of the Corridor campaign, and this support has even spun off a successful collaborative effort between farmers, legislators, and environmentalists to reduce pesticide usage on cotton, the most heavily sprayed of crops.

The number-one threat to completion of the Corridor is urbanization. Once RV parks and unincorporated rural housing developments (*colonias*) reach the river's edge, that land is forever lost for wildlife, and the corridor effect is irrevocably broken.

Lastly, an update on your figures. Refuge acreage now exceeds 40,000. Nearly two thirds remains to be saved.

*Jim Chapman, Chair
Lower Rio Grande Regional Group
Sierra Club Lone Star Chapter
Weslaco, Texas*

TO SLEEP WITH JEEPS

Simply put, what the hell's going on? I open the September/October issue of *Sierra* and what to my wondering eyes should appear but a two-page ad for the Geo 4x4 sports/utility vehicle. You know, one of those go-everywhere machines so adept at tearing up forest and desert that they can assure the area won't be classified as wilderness. Following are numerous articles extolling the wonders of the wild, the peace and quiet to be found there (ex-



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cept, of course, for the 4WDs), and how we need to save it. The issue closes with a quote from Ed Abbey that advises us to "... abandon your cars, and walk out into the mountains, the deserts, the forests, the seashores." And facing this is a full-page ad for the Toyota 4-Runner saying, "Forget it, Ed; don't walk, drive."

It's not what you say; it's who you sleep with that counts!

David M. Clayton

Kingston, Rhode Island

A substantial number of Sierra Club households report owning one or more sports/utility vehicles of this sort. Presumably, this is why the manufacturers purchase ad space in Sierra. Also presumably, Sierra Club members operate these vehicles in a more responsible manner than the yahoos whose selfishness and recklessness cause the physical and political damage Mr. Clayton rightly abhors.

OLD-GROWTH CARBON

In a September/October letter about the effect that cutting Alaska's Tongass National Forest might have on global warming, Lawrence Hamilton asserted that in a temperate rainforest the regrowth after logging "has a higher rate of carbon dioxide removal and carbon fixation than did the mature forest."

Two Oregon State University forestry scientists and the nation's preeminent old-growth expert have recently written a scientific paper that refutes this assertion. These experts state: "The belief that conversion of old-growth forest to young, fast-growing forests will decrease atmospheric CO₂ is mistaken. During timber harvest, on-site carbon storage is reduced considerably and does not approach old-growth storage capacity for at least two centuries."

I'd like to add another important point. Most of the carbon being stored in the old-growth forests of the Tongass is released when the trees are cut. Although a small amount of Tongass timber may retain its carbon-storage capacity by becoming long-lived furniture or building materials,

most of the organic matter—in the form of roots, sawdust, limbs, leaves, and bark—rots quickly and releases large amounts of carbon to the atmosphere. In addition, much of the Tongass timber is turned into pulp. This process itself releases carbon to the atmosphere, but more important, pulp products are often quickly discarded and then burned or left to decay, releasing more carbon to our atmosphere.

Susan Warner

Southeast Alaska Conservation Council
Juneau, Alaska

THREE CHEERS FOR THREE P'S

In "Save the World! Earn Big Money!" ("Priorities," July/August 1989) it is noted that the Council on Economic Priorities, a public-interest research organization, has recommended as big-name corporate good guys on environmental issues 3M (Minnesota Mining and Manufacturing), Clorox, and AT&T. The CEP did not look very hard at 3M: The company has polluted the entire United States with litter on a stick in the form of billboards. 3M should not be included in any list of environmental good guys as long as it persists in this type of visual pollution.

Richard H. Montgomery

Indiana Chairman, Scenic America
Seymour, Indiana

Jonathan Schorsch of the Council on Economic Priorities responds: *After months of intensive research, CEP nominated 3M for an environmental award for the 1988 America's Corporate Conscience Awards. A blue-ribbon panel of independent judges selected 3M as the winner among several other nominees because of 3M's innovative "3P" waste-reduction program ("Pollution Prevention Pays") begun in 1975, its extensive energy-saving program, and the waste-recovery and recycling efforts at company facilities. The 3P program especially has become a prototype for corporations looking to reduce their use of hazardous materials and wastes. While there may be some blemishes in a company's record, America's Corporate Conscience Awards are given for overall achievement in an issue area. ■*



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TOXIC TIPS: KNOW THE RIGHT THING

The oily sheen and strange color of the water were strong indications of pollution in the Houston Ship Channel. But until recently, worried Texans lacked the hard facts they needed to control the toxins that petrochemical plants dumped there.

In 1986 Congress passed the Emergency Planning and Community Right to Know Act, which directed the Environmental Protection Agency (EPA) to make public who was releasing what toxics, and where. In July 1989 the agency made its first company-by-company, state-by-state report. The grand total: 22.5 billion

pounds of toxic materials were released into the U.S. environment in 1987.

Activists are taking the inventory directly to polluters and politicians. "The law gives us the facts to fight the battle," says Don Hammer of Clean Water Action, a national environmental group. Armed with reports that showed releases of more than 200 million pounds of benzene, lead, chromium, and other toxic chemicals into the Houston Ship Channel in 1987, the organization was able to credibly counter the Texas Water Commission's claims of "insignificant" levels of water pollution. In January



DAVE C. PERKINS, JR.

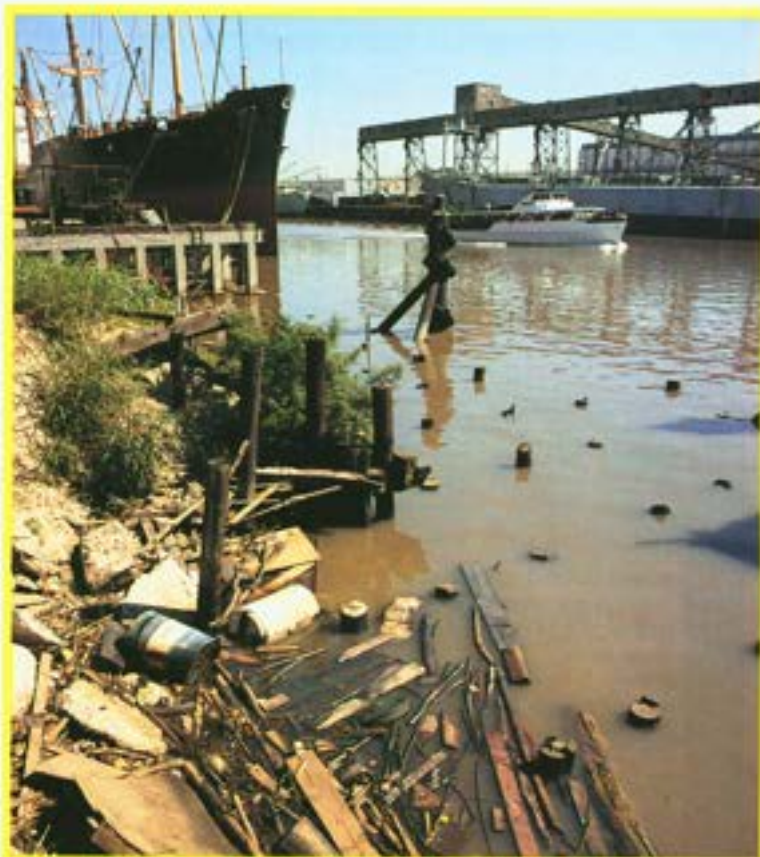
the EPA will decide if the channel and its outlet, Galveston Bay, merit toxic "hot spot" status under the federal Clean Water Act. Such designation would mean tighter controls on the discharge of toxics into the waterway.

In Chicago, Citizens for a Better Environment and the Chicago Lung Association have teamed up to

teach community groups in the city's heavily polluted southeast side how to use the right-to-know law. A policy analyst for CBE began meeting with the groups last fall to train them in obtaining toxic-release data on neighborhood steel mills, chemical plants, and other heavy manufacturers. Community members will then negotiate with the plant managers to reduce the 4 million pounds of toxics released in that part of Chicago each year.

Activists who want to learn what chemicals are fouling their own communities can obtain Toxic Release Inventory (TRI) data from state environmental agencies, EPA regional offices, or federal depository libraries (found in universities and large cities). Also, the EPA sells floppy disks with each state's TRI data, and has set up a public TRI data base through the National Library of Medicine. For information contact the EPA's Right-to-Know Hotline at (800) 535-0202 or (202) 479-2449; or the Working Group on Community Right-to-Know, an activist coalition, at (202) 546-9707.

—Susan D. Borowitz



DAVE C. PERKINS, JR.



BLU PERIN

Each spring, in the days before Lent, the glitz and glitter of Carnival shake Brazil in a ritual of abandon and fantasy. For two nights in Rio de Janeiro, spectacular parades last from 8 p.m. until 11 the next morning, a revelry during which few people sleep.

While Carnival is traditionally a celebration of Brazilian culture, last year one of the city's top parade groups, or "schools," chose a green theme. The Unidos da Ponte school used the words to its samba, the de-

DANCING THE BLIGHT AWAY

sign of its giant floats, and the costumes of its 3,000 dancers to portray environmental threats ranging from illegal hunting to the U.S. Strategic Defense Initiative. One float was in the shape of a giant crocodile shoe, a protest against the illegal export of jacare skins. Another highlighted the danger of radioactive waste, a prominent issue in Brazil since 1987, when men looking for salvageable machinery in an abandoned hospital took

a cylinder containing cesium-137. Four people died when curious friends opened the cylinder, and the contaminated neighborhood was bulldozed.

"We will alert Brazil," Unidos da Ponte President Edson Tessier said before last year's parade. "We have only one message: harmony between technological development and ecological preservation."

The alert will be sounded again in this year's Carnival, for which another large

school is preparing to honor Chico Mendes in its parade. Mendes, who worked to preserve the Amazon rainforest, was assassinated in 1989.

The organizers of the schools say they are not trying to turn the Carnival parades into protest marches. According to one of Unidos da Ponte's directors, "We aren't going to avoid criticizing, including criticizing the government, but neither are we going to forget . . . the feelings of hope and optimism."

—Arthur Anderson

MESSAGE CAST IN STONE

His permanent address is the Forbidden City in Beijing, but for sculptor Lu Huan, China's only living National Treasure, San Francisco will be home for the next few months. Lu Huan's goal before returning to China is to make rock carvings of small endangered animals, and then donate them to U.S. museums.

The idea of preserving in stone the likenesses of species threatened with extinction first came to Lu Huan in 1984, when one of the few surviving Chinese ironhead vipers became ill at the Beijing Zoo. Before the snake died, Lu



WONG MI QIAN

A TREE BY ANY OTHER NAME

The following letter was sent to James Ridenour, Director of the National Park Service, by H. L. Thornton of Santa Barbara, California. You have in Sequoia National Park an incongruity that should irritate or puzzle most people. This park protects and displays a tree that you describe as the largest of any living thing on Earth. Why must this marvel of nature be saddled with the name of an inconsequential spoiler who is most often remembered for destruction, certainly never for preservation or ecology?

The General Sherman Tree! That name must be

Salute to a ruffian?



Huan had carved its form in exquisite detail in pyrophyllite, a metamorphic rock he had found in Mongolia.

The uncannily lifelike quality of even the smallest of Lu Huan's carved creatures is the result of years of meticulous study. From the age of nine, the artist has filled countless notebooks with sketches and drawings of animals. Today he sculpts only from real life, believing that models preserved in formaldehyde don't convey an animal's true character. Indeed, just inside the walls of the Forbidden City, Lu Huan has set up a nursery for his collection of poisonous snakes, each of which he has immortalized in stone at least once.

Lu Huan revived the carving technique of *qiao zhuo*, which flourished during the middle and late Qing Dynasty of the 18th and 19th centuries. This technique takes advantage of the veins of imperfection found in rocks, deftly integrating them into the design. Lu Huan selects the most promising defect and carves it into the animal; the frog that appears to have just hopped onto a black rock, for example, is in fact part of the same stone.

The Palace Museum of China acquired Lu Huan's masterpieces for its permanent collection in 1983, making him the first living Chinese artist to be so honored.

A sad testament to our natural history, an abundant selection of endangered creatures is available for Lu Huan to sculpt. As of January 1989, the U.S. Fish and Wildlife Service had listed some 400 species as endangered and 130 as threatened. —*Marisa Gaines*

anathema to a significant population below the Mason-Dixon line. This tree of ages is being used to immortalize a relic from a war that was a national tragedy, a war that left enduring bitterness.

Had nature placed this *sequoia gigantea* between Atlanta and the sea we must assume he would have tried to burn it. The tree is worthy of a fresh name, I gladly volunteer some suggestions. . . .

Consider the Henry Thoreau-Rachel Carson-General John Miller Tree. This name will take care of the regional issue, the feminist issue, the sentimentalists, the environmentalists, and last but not least, the politicians: John Miller of California introduced in Congress the first bill to establish a national park. There, nearly all of the bases are covered. . . .



WONG MI QIAN

GALEN ROWELL MOUNTAIN LIGHT



JAMIE BENNETT

While more than 350 pathology labs in the United States work to crack crimes against *Homo sapiens*, only one tackles transgressions against all other animal species.

Last June the U.S. Fish and Wildlife Forensics Lab opened for business in the peaceful town of Ashland, Oregon. Its methods are similar to those used in any big-city crime lab, but its victims are bears, eagles, elephants, owls, rhinos, whales, elk, cougars, and any other creatures that are killed illegally. And it's the victims—or parts thereof—that make the work of the lab so complex. Forensic scientists and technicians often have only a beak, a

CRIME STORY...WITH A DIFFERENCE

scrap of skin or fur, a chip of bone, a feather, or blood on a spent bullet from which to draw a conclusion that can stand up in a court of law.

The rooms of the \$4.5-million laboratory are filled with chromatographs, spectrometers, electron microscopes, and computers. Freezers hold animals, animal parts, and other possible evidence awaiting analysis that may then lead to criminal investigations.

Refinements in the identification of ivory, for example, are being pioneered at the lab. Is the evidence a fragment of elephant ivory? Asian or African? Or is it

walrus ivory, and if so, is it old and therefore legal or from a recent kill and made to look like fossilized mastodon by an unscrupulous trader? A beautifully carved piece lies on the worktable. Not ivory at all, according to Senior Forensics Specialist Ed Espinosa, but the horny forepart of the head of a helmeted hornbill, an endangered bird from Borneo. Because it is rare and illegal to possess, the curio is worth more than \$5,000 to collectors.

The lab also serves as the U.S. repository for items forfeited by violators of wildlife laws, and for some goods seized by the U.S.

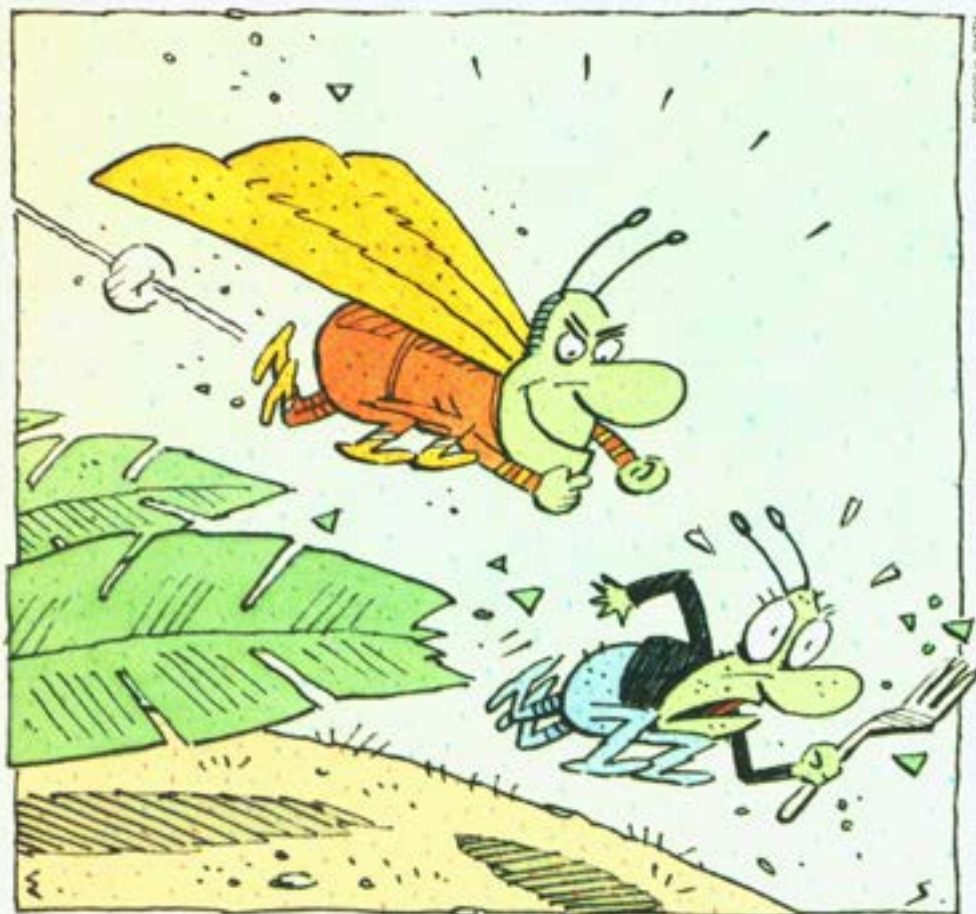
Customs Service from persons attempting to take banned wildlife items into or out of the country. The collection ranges from leopard coats to crocodile shoes, exquisite ivory carvings to boxes of pulverized rhino horn. And as the National Eagle Repository, the lab holds carcasses of the bird killed illegally or accidentally; parts of these eagles are then given to Native Americans for use in religious ceremonies.

Recognizing that crimes against nature know no borders, eventually the lab will extend its services to the international conservation community.

—Michael and
Laura Murphy

Looking for Mr. Goodbug

As consumers' fears of pesticides grow, farmers turn to an age-old, nonchemical ally—and find that their fields remain fruitful.



Dwight Holing

IT'S HARVEST TIME in Arizona's lush Harquahala Valley, and grower Stephen Pavich is inspecting his vines. The shoulder-high, leafy rows are festooned with pendulous bunches of plump table grapes. "Taste these," he says, proffering a handful of sweet, succulent fruit. The shadow from his straw cowboy hat barely conceals the look of pride creasing his sun-browned face. "Better living through chemistry? Who says?"

Pavich is among the increasing

number of commercial farmers who have shunned chemical pesticides. One alternative they've adopted is integrated pest management (IPM). Rather than attempt to eradicate all pests, IPM assumes that natural processes and natural enemies are essential to a healthy farm. Experts liken it to using a scalpel rather than a cleaver—by monitoring and sampling their fields more closely, farmers can employ highly focused suppression programs that take aim at specific pests using few or no chemicals.

Frank Zalom, statewide IPM director for the University of California's agriculture program, explains why farmers are seeking alternatives to chemicals: "First, government regulations have placed increasing restraints on the use of pesticides, forcing farmers to figure out ways to cut down their sprays. Second is the public outcry about pesticides. Farmers are reacting to consumer concerns."

Zalom says that 60 percent of California tomato growers now practice some form of IPM, and that in the state's strawberry fields the use of biological controls to manage pests is up nearly 70 percent in five years.

Biological control is one of the most promising tools in the IPM arsenal. Its premise is simple: Naturally occurring predators, parasites, and pathogens are used to fight pests, weeds, and disease. Strawberry growers in California, for instance, deploy predatory mites in their fields to control the pesky Pacific spider mite.

Using good bugs to eat bad bugs is hardly new. As early as 324 B.C., Chinese farmers placed nests of the predatory ant *Oecophila smaragdina* in citrus trees to dominate caterpillars and boring beetles. The growers even went to the trouble of linking each tree with tiny bamboo bridges to make the patrolling ants' job easier. Today China is the world's leading practitioner of biological control, relying on beneficial insects to manage pests on more than 21 million acres of cropland.

Citrus trees were the target of the first successful attempt at biological

control in the United States as well. In the 1880s a devastating insect known as cottony-cushion scale attacked California's orange groves. The infestation was so thick in some regions that the trees looked as if they were covered with snow. Relief finally came when entomologists discovered an Australian ladybug that was the scale's natural enemy. Other triumphs followed: "Good" bugs were used to protect sugarcane in Hawaii, citrus in Florida, walnuts in California, and 2 million acres of rangeland in the West.

Despite these successes, biological control never caught on in the United States because of the invention of DDT 50 years ago and the ensuing national addiction to chemical pesticides. But as growing concern over air, water, and food quality has brought about stiffer pesticide regulation, biological control is helping many farmers kick their chemical dependencies.

Take grape grower Pavich, for example. In the late 1970s his farm was hit by recurring waves of voracious grape leafhoppers and Pacific spider mites. "Just like I was taught to do in college," he recalls, "I called in a representative from a major chemical company. It almost ruined us."

The salesperson prescribed bombarding the farm with a lethal chemical. The result was instantaneous—nearly all the pests were killed—but those that survived succeeded in spawning a new generation resistant to the poison. A kind of superbug evolved, overrunning the farm in no time. Additional spraying of more potent pesticides just made matters worse.

Pavich found himself on a treadmill. He was being forced to pay more and more money for pesticides that were less and less effective. Out of desperation he looked for an alternative, and began to read up on biological control. Deciding to give it a try, he drove to the nearby mountains, collected thousands of ladybugs, and released them in his fields. The gentle red beetle of nursery-rhyme fame is actually a bug-munching machine that begins feeding

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the moment it leaves its orange egg, consuming 40 aphids an hour. To augment his entomophagous army, Pavich enlisted Chinese praying mantises.

"It was trial and error at first," he says, "but we finally were able to restore the farm's natural balance." The success induced Pavich to try other benign pest-control techniques nearly forgotten in the chemical age: crop rotation, intercropping, soil flooding, improved tillage, and building up the soil with natural nutrients. Six years ago he made the complete transition to organic farming, banning chemicals from his entire operation.

Pavich says the benefits far outweigh the costs. "For one thing, we don't have to support a big chem bill anymore," he explains. Grape growers routinely spend up to \$600 per acre for a chemical mix of fungicides, insecticides, and herbicides. "Now we put that money into other areas, like nutrients. The result is that our fruit tests 100 percent to 400 percent higher in nutrition." That is one of the reasons why Pavich can sell his grapes for 10 to 15 cents more per pound than non-organic grapes.

Production hasn't suffered either. The National Research Council, an agency sponsored in part by the National Academy of Sciences, issued a study in September 1989 reporting that farmers who apply few or no chemicals to crops usually get as great a yield as those who use pesticides and synthetic fertilizers. Pavich says his lands are even more fruitful than they used to be.

Farming without chemicals does have some drawbacks. It is more labor-intensive and requires a much higher level of field management. Benign alternatives don't act as quickly or as powerfully as chemical pesticides, nor do they last as long. But Pavich is able to save some of his additional labor costs by not having to monitor his field hands for exposure to pesticides.

The federal government has recently launched several new IPM research programs. One of the biggest is the Low Input Sustainable Agriculture

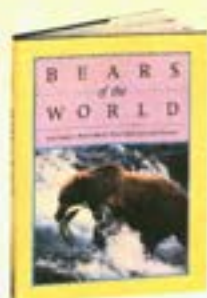
program, or LISA. Approximately \$5 million a year funds nearly 50 different projects.

Private research is also under way. Dozens of companies with an eye on capturing part of the \$16-billion worldwide pesticide business are working to create chemical-free alternatives. They include commercial insectaries and biotechnology labs. Rincon-Vitova of Ventura, California, is already selling \$1.5 million worth of beneficial insects a year. "Our *Trichogramma* bee attacks 250 species of moth and butterfly eggs," says company spokesperson Jake Blehm. "We sell bugs to everyone from Walt Disney World to the country's largest pecan ranch."

Biosys, a Palo Alto, California, firm, hopes to sell \$50 million worth of nematodes five years from now. The company has hit upon a way of growing the half-millimeter-long parasite by the hundreds of billions. The worms are dried but kept alive under carefully controlled conditions, allowing them to be packaged and stored for up to six months. They can be sprayed on gardens to kill white grubs and cutworms.

Much of today's biopesticide development is focusing on a common soil bacterium called *Bacillus thuringiensis*, which has a seemingly unlimited supply of natural toxins. It is lethal to plant-gobbling pests, but, according to both the U.S. Department of Agriculture and the Environmental Protection Agency, it is safe for human and animal consumption. Several companies are modifying naturally occurring strains with gene-splicing techniques to beef up toxicity, prod them into producing more effective offspring, and make them tastier to bugs.

Classical biological-control experts such as the University of California's Donald Dahlsten are not convinced that genetic engineering is the way to pursue pests. "If you believe in evolution, you know that things adapt," he explains. "Put a genetically altered plant in the field and in time the pests will adapt to it. Then what will we have? Biotechnology isn't going to



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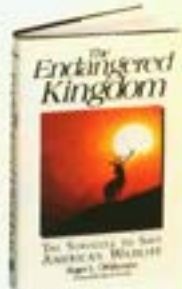


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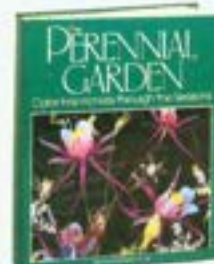
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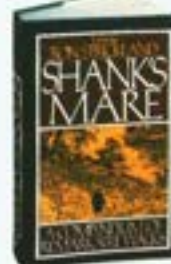
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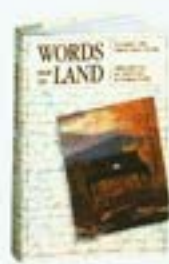
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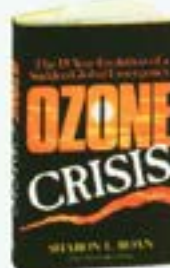
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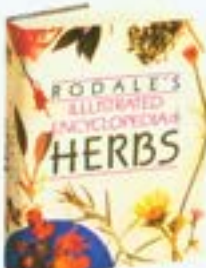
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DWIGHT HOLING is a freelance writer in Oakland, California.

PUBLIC LANDS

The Rush for Invisible Gold

Poison ponds and a pitted landscape are left behind as miners extract the last bit of gold from western wilds.

Craig McLaughlin

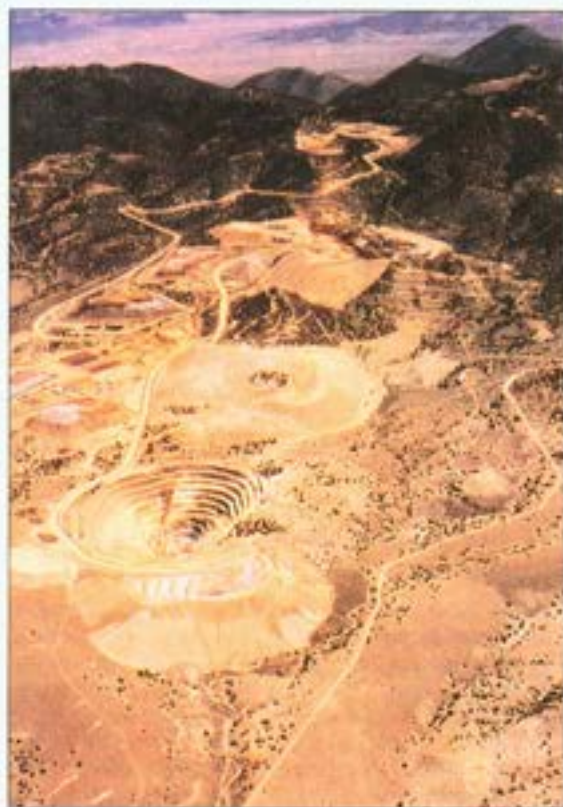
GOLD MINING HAS BEEN a fact of life in the California Desert since the 1780s, when Spaniards began working the Cargo Muchacho Mountains in the southeastern quarter of the state. Now a modern gold rush, fueled by high prices and a new technology called heap leaching, is tearing up huge areas that were once unattractive to large-scale mining operations. By the end of 1988, the California Desert had nine active heap-leach operations, and four more in the permit process.

Elsewhere in the country, gold-mining activity is equally feverish. According to the U.S. Bureau of Mines, by 1987 there were some 150 heap-leach operations in California, Nevada, Alaska, Idaho, Montana, South Carolina, South Dakota, Utah, and Washington. Some of these mines use heap leaching to remove the gold from the abandoned tailings of old mines, but others might never have existed without the new technology.

Developed in the mid-1970s, heap leaching makes it economical for

mining firms to work ore that contains fewer than .03 ounces of gold per ton of rock. To reach this disseminated gold, miners excavate huge ore deposits, creating pits the size of football stadiums or larger. The crushed ore is then stacked in giant heaps, a cyanide solution is dripped through the heaps, and the solution—now "pregnant" with gold—is collected in ponds.

At one such mine—the Mesquite Project, run by Gold Fields Operating



A heap-leach operation makes its mark on Nevada.

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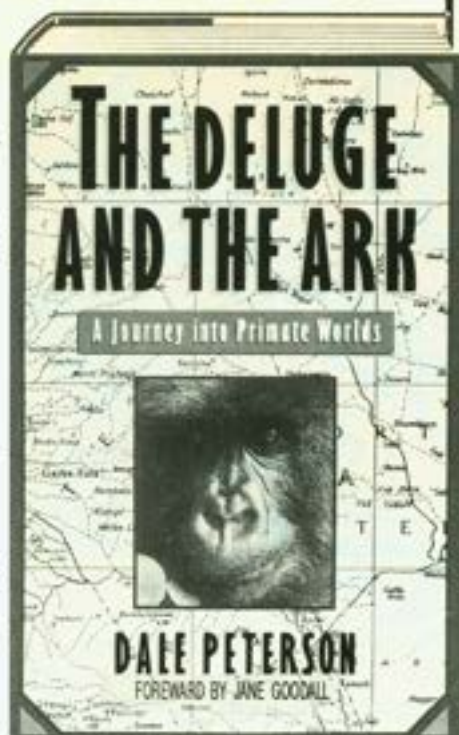
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Company in California's Imperial County—plans call for six pits, each 450 feet deep, and hundreds of acres of discarded rock piled 270 feet high. The pits would sprawl across about a quarter of the six square miles that would be disrupted by the project.

When the mine's operators leave after 20 years, they will not have to fill in the pits or level the discarded rock. The reason, explains mine manager Bob Filler, is that other technologies may be developed to remove even more gold from rock hauled out of the pits—and because backfilling would be too expensive.

The new technology leaves behind more than an altered landscape. In Nevada, the state with the largest number of heap-leach operations, gold "collecting ponds" have been responsible for the deaths of more than 6,440 migratory birds in the past five years, according to a report released last April by The Wilderness Society. The roster of the dead also included deer, kit foxes, and coyotes.

The Wilderness Society report also describes several cyanide leaks, some of which have contaminated nearby water supplies. For example, in November 1986 a pipe containing cyanide wastewater ruptured at the Dee Gold Mining Company near Carlin, Nevada, contaminating water for about three miles.

The California Desert's dry climate poses another problem: Mines often compete with local wildlife for scarce water. In one case, developers of the proposed Castle Mountain Mine in the East Mojave National Scenic Area have suggested pumping 1,650 acre-feet of water from underground reservoirs. Critics charge the plan could threaten Paiute Springs, the area's only year-round stream.

A desert pockmarked with pits is a frightening vision for longtime desert activist Jim Dodson, a director of the California Desert Protection League, which comprises groups like The Wilderness Society and the Sierra Club. "There are old gold-working areas all over the California Desert," he says. "If you take an aerial photograph of the

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Mesquite mine and superimpose that on any area where there are gold ore bodies, it gives you an idea of the potential impact."

How many new heap-leach mines will spring up in the next few years, and what toll they will exact from the desert, will depend largely on gold prices, new technologies, and the number of ore bodies discovered. Politics will also be a factor—at this point one working in the miners' favor. Most of the mines are on acreage cared for by the Bureau of Land Management, an agency that has shown itself to be a less-than-zealous environmental guardian when it comes to mining projects. For example, the BLM first attempted to approve the Viceroy Mining Company's Castle Mountain Mine without conducting the extensive studies required for an environmental impact statement. The proposed mine would disrupt more than a square mile of the East Mojave National Scenic Area. After some legal wrangling with environmental groups, the agency backtracked and now has a draft EIS in the works.

Dodson says the mine would be visible from much of the East Mojave: "In that kind of country, it doesn't take much to make an impact that other people have to share."

Filler, the Mesquite mine manager, insists that the BLM serves well as the lead agency on environmental issues. "We found it to be aggressive, in the sense that we had to cross all the *i*'s and dot all the *i*'s," he says.

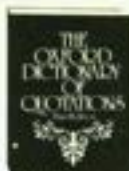
Dodson disagrees. "The BLM seems to be trying to excuse business as usual," he says. If the agency is indeed requiring everyone to dot all the *i*'s and cross all the *i*'s, he adds, "it's a mighty short word."

The BLM's policies on heap leaching are governed by the agency's own congressionally mandated 1980 Desert Plan and by the federal Mining Law of 1872. The Desert Plan places few restrictions on land managers, and in fact encourages off-road-vehicle use, mining, livestock grazing, and energy development, along with conservation. The BLM could amend the plan. But

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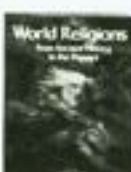
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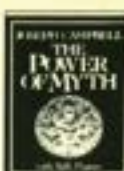
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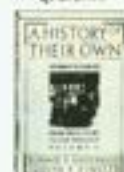
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with Cy Jamison—a one-time aide to former Interior Secretary James Watt—heading up the bureau, most observers doubt that changes unfavorable to the mining industry are likely.

The mining law also works to miners' advantage. Enacted to encourage exploration for much-needed minerals, the mining law is now being used by firms like British-owned Gold Fields and Canadian-owned Viceroy to plunder U.S. lands without paying the government a penny. Dodson says he considers repeal or modification of the law "one of the most pressing things on the environmental agenda." (See "What's Mined Is Theirs," September/October 1989.) A Senate Energy subcommittee held hearings last June on reform legislation (S.1126) introduced by Dale Bumpers (D-Ark.).

The proposed Desert Protection Act (S.11 and H.R.780) could affect gold miners, too, though much less dramatically than Bumpers' bill. The act would establish Mojave National Park and expand Death Valley and Joshua Tree national monuments, elevating them to national-park status. It would also designate 81 new wilderness areas, adding a total of 4.5 million acres to the National Wilderness Preservation System. Existing mining claims would be honored on all these lands. In fact, Viceroy's proposed Castle Mountain Mine would lie within Mojave National Park. The act would prohibit new claims in the protected areas, however.

The California Mining Association, working through an educational arm deceptively named the Desert Conservation Institute, is trying to turn public opinion against the Desert Protection Act. But even if the bill passes, much of the desert would still be open to exploration. And as long as gold prices remain high, the Mining Act of 1872 prevails, and the BLM stays on its present course, the large mining companies will continue to tear huge chunks out of the California Desert—leaving their messes behind them. ■

CRAIG McLAUGHLIN is the San Francisco Bay Guardian's projects editor.

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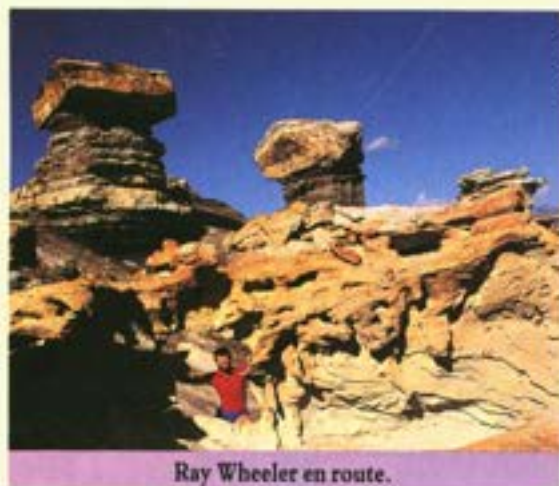
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Petrified dunes near the Escabute.

TWO WEEKS TO WANDER



Ray Wheeler en route.

Walking alone from desert badlands to frost-shattered summits, a hiker finds otherworldly rewards - and disturbing signs of change - in southern Utah.



BY RAY WHEELER

In early October a radiant stillness descends upon the high plateaus of southern Utah. Small breezes stir the air and then die. High clouds filter the sunlight; the world loses its edge in a glow. ■ On such a morning, I lay on the rim of Boulder Mountain, head pillowed comfortably on my pack, sighting down the length of my body as if aiming a rifle. My target, 11,000-foot Mt. Pennell, was framed in the space between my hiking boots. Even 30 miles away the mountain was impressive. From a base four miles in diameter, Pennell rises 5,000 feet above the mesas and badlands that surround it. On a clear day you can see it from a distance of more than 100 miles. ■ Not a difficult target, I reflected, but not an easy one either. I would not fly to Mt. Pennell on a straight-line

trajectory. Instead I would approach it on foot, and my route would be anything but direct.

This was, I reminded myself, a backpacking trip—not an Apollo space shot. Yet there were similarities to extra-terrestrial travel. My journey would carry me across an unpeopled void. In 14 days I would hike a distance of 150 miles, mostly without trails, following a pencil line that zigzagged across 13 topographic quadrangles. Scrambling up over mesas and down into canyons, I would climb and descend a total of 30,000 feet. I would pass through a variety of otherworldly landscapes, including alpine tundra, desert sand dunes, narrow canyons, vast expanses of rock, and badlands whose barren soil is the closest Earthly equivalent to the surface of the moon.

Like space travel, this trip would be dangerous. Climbing

up and down cliff walls with a 40-pound pack, it would be easy to fall. If I broke a leg or a foot—or even twisted an ankle—I would be in a world of trouble. Friends knew my route and my schedule, but where along those 150 miles would they begin searching for me? How long would I last while they searched?

Good questions. Just two hours earlier my shuttle driver, Mark Nelson, had been the last to ask them. "We may never even find your body out there," he offered as he watched me struggle into my pack. For one contemplating a friend's death, his tone was remarkably cheerful. "You'll disappear without a trace, just like Everett Ruess."

An obscure poet, Everett Ruess had made a name for himself by vanishing in this area in 1934. The search party found his pack mules, but they never found him. Soon he

FROM BOULDER MOUNTAIN TO MT. PENNELL

On an ambitious 150-mile hike, author Ray Wheeler crossed rivers, mountains, waterless plains, and—invariably—administrative boundaries. The BLM lands shown in gold below are those included in Representative Wayne Owens' Utah wilderness bill (H.R. 1500), passage of which conservationists consider vital to preservation of the wild Colorado Plateau.



LEGEND

- FOREST SERVICE LANDS
- FOREST SERVICE WILDERNESS
- PROPOSED BLM WILDERNESS
- NATIONAL PARK SERVICE LANDS
- RAY WHEELER'S ROUTE



TAMM WAGGELIN PHOTOS

was famous. By the simple device of getting terminally lost, he had achieved immortality at the age of 20.

"People are gonna ask me, so I'm asking you," Mark continued. "Why, Ray? Why are you doing this?"

I had my reasons, and posthumous fame was not among them. The canyon country of southern Utah is one of the largest blocks of undeveloped land in the lower 48 states. Certain people (like me, for example) believe that the 7 million acres that remain wild here should be protected as part of the National Wilderness Preservation System. They warn that to allow any further alterations—coal mines, oil and gas fields, dams, power plants, new roads—would be a mistake, a crime, a terrible loss.

A terrible loss—but of what? What is it about this country that such people find valuable? That was the question I hoped to answer by walking from Boulder Mountain to Mt. Pennell.

FILLED WITH RESOLVE, I set off into a dense forest of Engelmann spruce. In an act of hubris, I walked westward, away from Mt. Pennell. During the next two days I would traverse Boulder Mountain before circling south into the Escalante watershed. My reason for the detour was simple. Boulder Mountain fascinated me. While plotting my route, my pencil had been captured by the mountain's gravitational pull.

Boulder Mountain lies west of Capitol Reef and north-

A lake on the west side of Boulder Mountain. At right: the view from the top.



east of Bryce Canyon national parks. Square-shouldered and flat-topped, it is not really a mountain at all, but the eastern extension of the Aquarius Plateau. A sumo wrestler of landforms, it dominates its neighbors by sheer bulk. A walk around its base would be a journey of more than 100 miles. The summit is roughly 12 miles in diameter, with a surface area of 50,000 acres.

Sailing among the clouds at elevations between 10,000 and 11,000 feet, it catches moisture in hundreds of small lakes and ponds. Winter snowdrifts remain until early June; in summer the mountain is a green mosaic of grassy meadows, tundra-like turf, and forests of spruce and subalpine fir. It is a splendid anomaly—a piece of Alaska floating a mile above the dry Utah desert.

A hike across Boulder Mountain may well be excellent practice for life after death. All that is missing is harp music. The terrain is level. The walking is easy. The forests and meadows are lovely. Water is plentiful. One feels buoyant,



Aspens on Boulder Mountain.

energized by the brisk alpine air. The views are spectacular. But the best thing about Boulder Mountain is its lakes. They are everywhere—hidden in forests, clustered in meadows, perched on the rim of the plateau. Each is a different color—blue, green, gold, black, silver. Each is a small Walden Pond.

At sundown I made camp beside one of the lakes. The evening was breathless. Smoke rose from my fire in a vertical column, as if contained in a flue. Ducks quarreled, then fell silent. A spiral-shaped cloud, iridescent with alpenglow, floated in the center of the mirrorlike lake, accompanied by the planet Venus. While I stared into that mirror as if hypnotized, a full moon fell from the upside-down trees.

SOUTHERN UTAH is a land of horizontal and vertical planes. Every terrace is formed by a different layer of rock, each with its own color, texture, and soil. Every cliff is a boundary. Cross it, and you enter a different world.

Nowhere are these truths more self-evident than on the southern rim of the Aquarius Plateau. The rim is a 600-foot wall of dark-brown basalt. Above the wall lies the lake country of the Aquarius. Below it lies a gently sloping terrace, two to four miles wide, carpeted with dense stands

of aspen. In summer, as seen from above, the aspen canopy looks as thick and solidly green as that of the Amazon rainforest. For two weeks in September the green turns to gold. At a promontory called Trail Point, a foot trail plunges like a bobsled run from one world into another.

For two days I followed a network of trails through the aspen belt, climbing gently over wooded ridgetops, crossing small meadows, fording streams, skirting marshes and lakes. Most of the trees had lost their leaves, but some remained in full color. Occasional groves of fir and pine appeared. A gusting wind drove the aspens' white-bellied leaves through the forest like snow.

On the morning of the third day I entered World Number Three. I was descending steeply, bushwhacking into the thousand-foot-deep canyon at the head of Sand Creek, when I encountered the first of the giants—an old-growth ponderosa pine perhaps 90 feet tall and four feet thick at the base. At one time, a forest of virgin ponderosa ringed the upper slopes of the mountain, spilling down into the canyons of the Escalante. In 1980, however, Dixie National Forest officials suddenly jacked up their timber-sale volume from 5 million to 20 million board-feet per year, and Boulder Mountain's giants began riding down the mountain on logging trucks. In just one decade, at least 15,000 acres (or 23 square miles) of old-growth ponderosa on Boulder

Mountain's southern and eastern slopes were opened to logging.

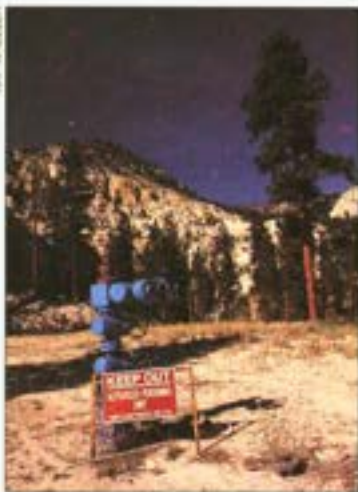
By the mid-1990s the loggers will have completed their march through the ponderosa belt, and the buzz saws, bulldozers, and logging trucks will move on to the Aquarius Plateau. Preliminary planning maps show timber sales blanketing more than half of Boulder Mountain's vast summit, suggesting that up to 35,000 acres of forest may be roaded and logged. The roads may ultimately cause even more environmental damage than the logging, because they will open the area to many new forms of development.

At the head of Sand Creek Canyon I found a sample of what is to come. The canyon is a miniature Yosemite Valley, its walls crowned with rock knobs and domes. Tiny Sand Creek winds among groves of aspen, ponderosa, and Douglas fir. Pristine wilderness? Not anymore. In 1961 Phillips Petroleum Company bladed a road up the canyon and pierced its floor with a wildcat oil well. In 1983 Mid-Continent Oil followed suit. The two wells sit 50 yards apart on a drill pad that looks like a bomb crater. A "Keep out" sign claims the canyon for Mid-Continent.

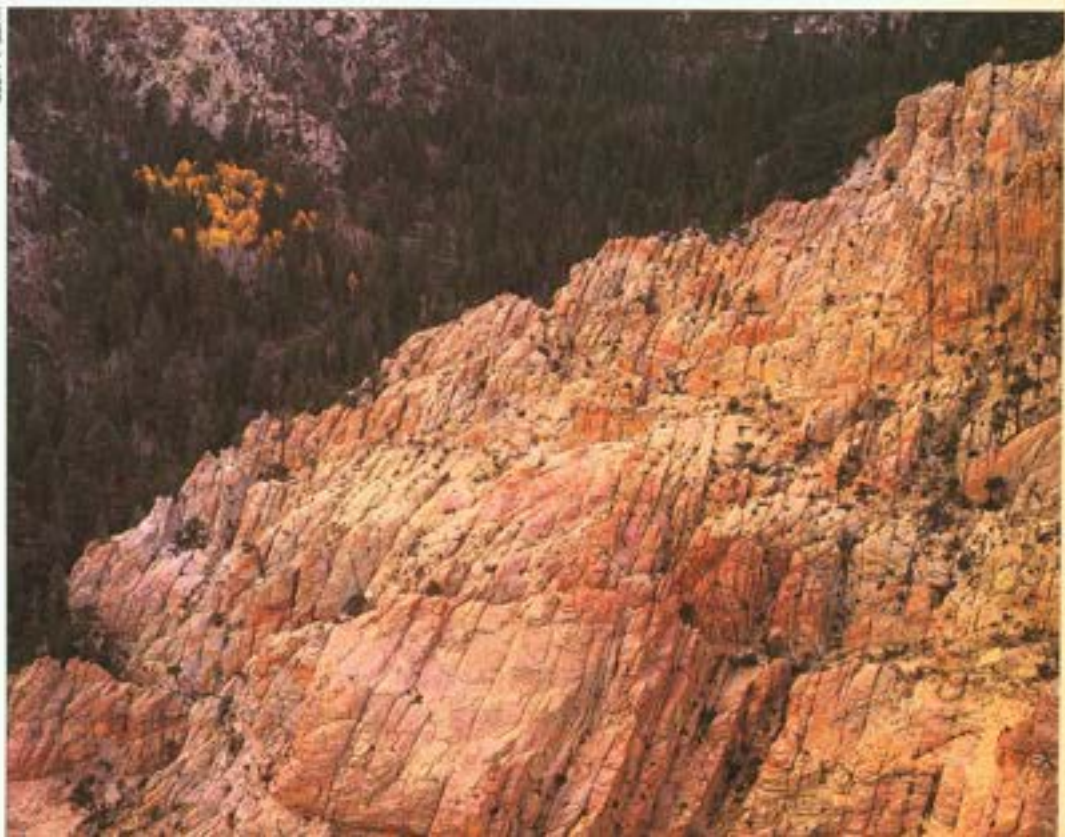
I found a second sign, with an identical warning, four miles south on Antone Bench. A land bridge 15 miles long, narrowing in places to less than 400 yards wide, the Bench connects the alpine world of the Aquarius with the valleys 1,000 feet below. The two sides of Antone Bench are cliff walls that plunge into canyons called The Box and Death Hollow. At its higher elevations the Bench is covered with virgin ponderosa pine. Lower down, clean, bare sandstone is sprinkled with juniper and piñon pine. Deer, elk, and cougar winter on the ridge, along with a small herd of pronghorn antelope.

The 1984 Utah Wilderness Act established a 26,000-acre Box-Death Hollow Wilderness Area in the upper canyons of the Escalante. Antone Bench runs like a spine through the center of the new wilderness area—yet, strange to say, the Bench is *outside* the wilderness. Under intense pressure from oil-industry lobbyists, Congress adjusted the area's boundaries, extracting Antone Bench like a tooth. Developers claim the area contains both oil and a large deposit of carbon dioxide, which could be transported by pipeline and used to force additional oil from depleted fields in Colorado, New Mexico, and California. Full field development—essential to generate sufficient gas to make the project viable—would reach northward from Antone Bench across upper Sand Creek Canyon to the Aquarius Plateau. It would require drilling nearly 100 wells and constructing 100 miles of new road. Oil prices are not high enough now to make extraction of carbon dioxide economically attractive here. But a price hike could launch a major development.

LATE AFTERNOON on the fourth day of the hike I stood on the eastern edge of Antone Bench, looking out over the petrified landscape of Death Hollow. A hot wind rose from the canyon, roaring in the crowns of the ponderosa. I stood at the brink of World Number Four, a labyrinth of canyons carved by the Escalante River and its tributaries. In its 125-mile journey to Glen Canyon, the Escalante River sweeps by its namesake—the town of Escalante—and then makes a sharp turn, vanishing through a crack in the 600-foot-high sandstone wall on the town's eastern border. For the remaining 84 miles of its passage to Lake Powell, the Escalante stays



A carbon dioxide well near upper Sand Creek. At right: Death Hollow.



hidden in a narrow, winding, sheer-walled canyon.

Soaring cliff walls, huge alcoves, natural arches, fins, domes, towers, cool grottoes shaded by cottonwoods—all these have made Escalante Canyon one of the wonders of the backpacking world. But even finer are the 35 major side canyons that branch north and south from the main stem. Each side canyon may have six to a dozen major forks. In all, the system comprises more than 1,000 miles of canyons sprawling over an area of roughly 1,200 square miles.

For obvious reasons, human travel through this labyrinth has traditionally followed the canyon bottoms. Most travelers enter the maze via one of the side canyons, follow the main canyon for a distance, and then exit via a second side canyon farther downstream.

My own journey, however, cheerfully violated all such convention. I had plotted a course roughly parallel to the Escalante River, cutting boldly across the grain of the northern tributaries. In 53 miles I would cross nine side canyons, climbing from one to the next over a series of 500-foot-high benches. The route would be challenging and strenuous. In total, I would climb up and down more than 12,000 feet.

The landscape above the rims of the canyons consists largely of bare rock. The land undulates gently, following the contours of the 150-million-year-old petrified dunes of Navajo sandstone. The Navajo is a pure, clean white—dazzling in the noonday sun. White rock domes float by like UFOs, some of them hundreds of feet high. In places the rock underfoot is rippled in fine, thin layers. Elsewhere it has a quilted texture, like the surface of the human brain.

Brainrock. Pockets of sandy soil in the rock nurture small, round gardens of cactus, bunchgrass, and yucca. There are also living dunes of bright-orange sand. Topping a rise, I found myself on the brink of a canyon. A stream roared 500 feet below. The land dropped away in a bewildering profusion of cliffs, domes, and slot canyons. Then I pulled out my topo map and hunted for a safe descent.

The climbs between the rims were easier than I had expected. Because no vegetation hides the land's contours, the topographic maps for this country are incredibly precise. Where contour lines widen on the topo there is usually a route up the canyon wall. Each morning I sketched my route plan with a pencil—then shouldered my pack and followed the pencil line with my feet. On the benchtops the hiking was easy. I flew over their wide, level expanses, making up lost time.

Considering how forbidding this landscape can be, it is not surprising that two side canyons are named Death Hollow. One served as my entrance to that maze, and the second, "Little" Death Hollow, was my escape route.

Little Death Hollow is one of the most spookily narrow of all of the Escalante side canyons. It is a serpentine hidden passageway 12 miles long—a tunnel leading from the heart of the Escalante canyon country out into the bright, open world of the Circle Cliffs Amphitheater. The salmon-colored walls are riddled with potholes, alcoves, and windows. For distances of 100 yards, the walls close to the width of an arm span. Flash floods have wedged sticks and logs 15 to 20 feet above the canyon floor.

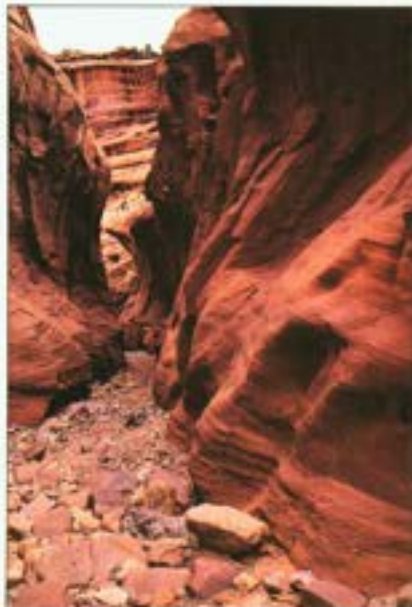
I hurried through Little Death Hollow. It was beautiful.



At left: Escalante canyon country. Below: Little Death Hollow.



RAY WHEELER PHOTOS





Circle Cliffs from Horse Canyon.

but it gave me the creeps. Perhaps I had been wandering among the canyons of the Escalante for too many days. Perhaps I was beginning to feel claustrophobic after descending from the high, open benchlands above. Perhaps, too, I was anxious to reach the cache that awaited me at the head of the canyon. That morning, I had eaten the last of my food.

By midafternoon storm clouds had darkened the sky. A lone raindrop—cold, heavy, ominous—struck my forehead. I imagined a 20-foot wall of floodwater rocketing through the narrow gorge—and quickened my pace.

When the storm finally broke, just before nightfall, I had reached my food cache at the head of Little Death Hollow. Before me, partly shrouded behind advancing curtains of rain, lay World Number Five—a huge open area ringed by 600- to 800-foot-high walls known as the Circle Cliffs.

BY CANYON-COUNTRY STANDARDS, the floor of the 200-square-mile Circle Cliffs Amphitheater is flat. Its canyons are a mere 200 feet deep and its buttes no more than 300 feet high. The exception to this rule is Wagon Box Mesa, a giant battleship three miles long and a thousand feet high.

I reached the southern tip of Wagon Box Mesa late in the afternoon on the tenth day of my hike. The sun was low, bracketed by two masses of storm clouds advancing from the west. In every direction the horizon was ringed by the

Circle Cliffs, their orange walls of Wingate sandstone glowing like molten steel in the red light of the sun.

From the head of Little Death Hollow I had walked about ten miles and gained nearly a thousand feet in elevation. Now I could see across the southern end of the amphitheater. Due south lay the 20,000-acre Colt Mesa roadless area—a small but important piece of the million-acre wilderness surrounding the Escalante River canyons. In 1980 the Bureau of Land Management rejected Colt Mesa as a candidate for official wilderness designation. “Vegetation is sparse,” the BLM report explained. “Views across the unit are possible from many locations.”

While I admired those views, a thundercloud swallowed the sun. A keen wind began drying my sweat, even as small droplets of rain were replacing it. The storm clouds on the western horizon were advancing with frightening speed. Soon it would be dark. My second water cache lay two miles distant and 1,200 feet below. I knew I should shoulder my pack and hurry to safety. Instead, I pulled on a rain jacket—and continued to stare at the view.

Along with Colt Mesa, the BLM omitted the Circle Cliffs Amphitheater from its inventory of lands qualifying for the National Wilderness Preservation System. The entire region was too flat to be wilderness, the BLM had concluded. With terrain so level and visibility so great, it would be impossible to find outstanding opportunities for primitive recreation or solitude.

WHITHER UTAH'S WILDLANDS?

IT HAS TAKEN more than a quarter of a century, but the process begun by passage of the Wilderness Act is finally nearing completion in Utah. Last March, Utah Representative Wayne Owens (D) introduced H.R.1500, a bill that would add 5.1 million acres of the state's BLM lands to the National Wilderness Preservation System. The bill would protect many of the largest roadless areas on the Colorado (River) Plateau, as well as in Utah's portion of the Great Basin. In the Escalante canyon country, it would safeguard more than 300,000 acres—including virtually the entire route between Antone Bench and the Waterpocket Fold

described in "Two Weeks to Wander." West of the Fold it would protect nearly 400,000 acres surrounding the Henry Mountains.

More than 30 local and national conservation groups have endorsed H.R.1500. But opposition is strong. Four of the five members of Utah's congressional delegation favor development over wilderness designation, and all four can be expected to do everything in their power to weaken the bill. In search of legislation that will designate wilderness only where the potential for development is minimal, they seem likely to wheel and deal, trading canyon systems and

mountain ranges like kids swapping baseball cards.

Such trading typifies our pluralistic political process. But it ignores the geography of southern Utah: The bill's proposed BLM wilderness areas surround and connect Utah's national parks and national forests. They are the mortar that holds the entire region together, ensuring the integrity of vistas, watersheds, and wildlife-migration routes that indifferently straddle agency boundaries. If wilderness legislation becomes—by omission—a masterplan for development, Utah's magnificent national parks could rapidly become mere islands of pro-

To anyone who has ever visited the Circle Cliffs Amphitheater, such explanations are absurd. To walk across it is to experience the epitome of solitude, the essence of primitive recreation. There had to be a better explanation for the BLM's decision—and there was. Wilderness designation would preclude mineral development in the Circle Cliffs region, and the amphitheater contains one of Utah's largest deposits of tar sands, a potential source of petroleum.

According to a 1984 BLM environmental impact statement, tar-sands development in the Circle Cliffs region would entail drilling some 27,000 wells on 49,000 acres of land. A processing plant, with a 200-foot-high stack, would be built at the head of Little Death Hollow. All the accoutrements of a major industrial park—oil-storage tanks, airstrips, reservoirs, power and sewage plants, living quarters for 500 on-site construction workers—would be needed, along with several hundred miles of new roads.

At current oil prices, tar-sands development is not economically viable. But the world's oil reserves are inexorably dwindling, and oil prices are on the rise. Only for the moment are the Circle Cliffs defiantly wild.

Just *how* wild I learned later that evening, as I lay shivering under a tarp. It had been raining for hours. Suddenly the downpour grew furious. Wind snapped the tarp like a whip. The rain turned briefly to hail. Thunderclaps bounced off the cliff wall above with a force I could feel in the base of my spine. At midnight a flash flood tore through a dry wash not ten yards away. Gradually the thunderclaps came nearer. I covered my ears with my hands, counting off the seconds between lightning and thunder, bracing myself for the impact. Finally, with a resounding crash, a lightning bolt struck the cliff wall directly overhead.



Clockwise from above: Mancos badlands below Swap Mesa; looking east to Mt. Pennell from the top of the Waterpocket Fold; marching over the Mancos.



tected land in a sea of civilization.

The campaign for H.R.1500 is therefore a battle for the future of the Colorado Plateau. The integrity of southern Utah's canyonlands will depend upon whether conservationists can persuade Congress, the media, and the American public to acknowledge that the entire region is one wilderness, and that something truly great will be lost if we allow that wilderness to be compromised.

Although the Owens bill is not expected to move forward in Congress anytime soon, conservationists are working hard to publicize it. "We're building our strength day by day," says Sierra Club Utah Representative Lawson LeGate.

The canyonlands at the heart of the

Colorado Plateau are, today, one of the few places in the coterminous United States where one can take a backpack or float trip of more than 100 miles without seeing a single paved road or power line. Do Ameri-

cans recognize the value of preserving such places, such opportunities? If they do not, in all probability the last great blocks of the American wilderness will vanish, during our lifetimes, while we watch. —*Ray Wheeler*

WHAT YOU CAN DO

■ **Write.** Urge your congressional representatives to endorse H.R.1500, or thank them if they have done so.

■ **Contribute.** The Sierra Club's Utah Chapter is helping to produce a 400-page book featuring detailed maps and hundreds of photographs of southern Utah's BLM wildlands. Donations to support publication of this volume may be sent to the Utah Chapter of the Sierra Club, 177 East

Ninth S., Suite 102, Salt Lake City, UT 84111. (For more information about the Club's Utah wildlands campaign write to Lawson LeGate at the above address or phone him at 801/355-0509.)

■ **Wander.** Spend a week or two exploring this spectacular country and become the most valuable asset of all—an articulate and informed advocate for the land.



GEORGE WILKINSON

I was still shell-shocked the next morning. The storm left a buzz in my left ear that would remain for days. The floor of the wash was still muddy, but the floodwater had mysteriously disappeared. Where had it gone? The wash ran due east—directly into the eastern wall of the Circle Cliffs. I put on my pack and followed. Within minutes I was deep inside World Number Six, the Waterpocket Fold.

A KNIFE-EDGE RIDGE, or "hogback," of sharply upturned sedimentary rock strata, the Waterpocket Fold forms the eastern wall of the Circle Cliffs Amphitheater. Spiny, reptilian, and huge—a thousand feet high and a hundred miles long—the Fold has two distinct faces: on the east, a steeply sloping ramp; on the west, a cliff. Its crest, capped with great white domes of Navajo sandstone, is known as Capitol Reef.

My Fold journey led through Muley Twist Canyon, then up a trail that climbs like a stairway over the top. From the Fold's crest, for the first time in ten days, I could see my almost-forgotten destination—Mt. Pennell. The top of the mountain was lost in a thunderhead, but what was visible looked enormous, and deceptively close.

Near the crest of the Fold I found snowbanks—piles of congealed hail 18 inches deep, left by the previous night's storm. Then more rain came, and I made an early camp. To the east I could see down into a trough-shaped valley running parallel to the Fold. A stiff wind began to cover it with massive, flat-bellied clouds. Then roving shafts of sunlight poked through the cloud cover, pouring honey-colored light across the valley floor. A fine, cold rain sifted out of the clouds. Rainbows came, vanished, reappeared. I lay in my

Continued on page 150

CAMPING WITH THE

As drought threatens Sahelian Africa, scientists and royalty bearing answers – only to discover an entirely different



By Thomas Bass

We crest a sandy ridge, and there below us, unfurling like a golden sash laid over the brown land, lies the Niger. A mile wide, the river fills the horizon. Birds flock over the sluggish current. Pirogues pull inverted Vs in their wake. It will ultimately get banked against the Sahara and spun from north to south, but here in the delta the Niger runs like a great highway straight to Timbuktu.

The Niger River possesses not one but two deltas: a mangrove swamp on the Atlantic coast rich in fish and hydrocarbons, and an inland delta blessed in its own fashion. Rising in the Guinean highlands of the Fouta Djallon mountains, almost within sight of the ocean it later rejoins, the Niger passes through a dusty stretch of Sahelian forest

Under sail on the Niger River.

PRINCE

*descend upon the scene
set of questions.*



before coming to the clay plain of the inland delta. Here the river, swollen with summer rains from the mountains, transforms itself into a moving lake sixty miles wide and two hundred miles long.

Because of the Niger flood, what would otherwise be a semiarid steppe surviving on ten inches of rain a year is converted annually into a mosaic of lakes and streams. Green islands rise out of the water, their shores fringed with the mat houses of Bozo fishermen, who ply the river in canoes made of dom palms stitched together with hibiscus twine. Rimaïbé farmers plant rice at the river's edge. A long-stemmed floating grass known as *bourgou* sprouts in the flooded meadows, and then as the waters recede in the southern delta, Fulani and Twareg nomads lead their herds northward through the newly revitalized pasture. For a thousand years these wetlands supported the black empires of West Africa and anchored the southern edge of the

Saharan trade routes. They nurtured the medieval fortunes of Timbuktu, and today they assure the livelihood of a million fishermen, farmers, pastoralists, and nomads.

Arranged into carefully synchronized patterns of land use that have survived for millennia, these desert wetlands produce eight times as much plant matter per acre as the average wheat field. A half-dozen Malian tribes have worked out elaborate protocols for sharing this common ground as it cycles from flood plain to pasture for a million cattle and three million sheep and goats—the highest density of herds in all of Africa. Now that the Nile, Senegal, Volta, and Zambezi rivers have been dammed and channeled, the Niger delta preserves the last of the continent's great flood plains.

A safe harbor for nomads throughout the Sahel, the delta is also a refuge for millions of birds. Three hundred and fifty species either breed or winter here. As snow settles over the

northern hemisphere, most of the herons, egrets, ibises, and terns empty out of Europe and Asia north of the Himalayas. To reach their wintering grounds in Africa, birds coming from the Arctic Circle will fly up to ten thousand miles in a month-long journey across Siberia, the Caucasian steppes, the Black Sea, and a desert as large as the United States.

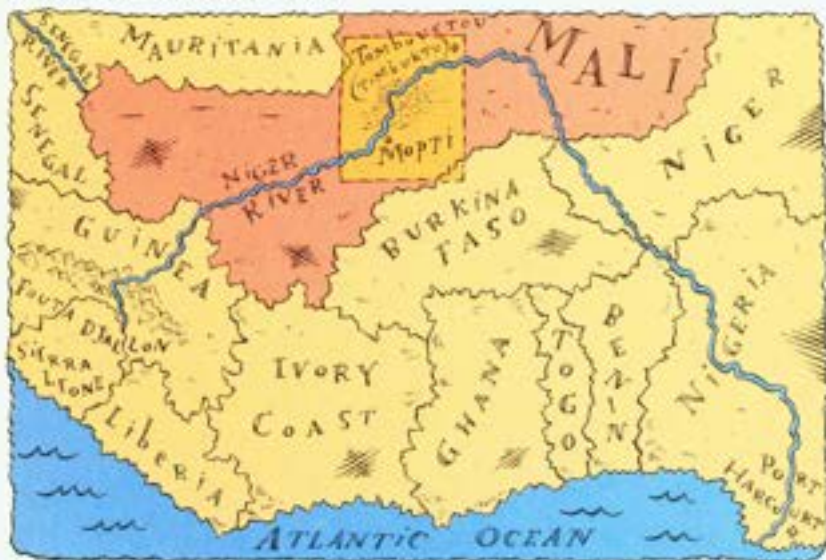
Like most other visitors to the Niger delta, I have come in the spring, after the flood and before the rains. This is the one season when passable roads exist. I have also come a couple of years after the worst Sahelian drought in recorded history. Following a string of bad years beginning in the late 1960s, the flood failed completely in 1984. The delta that year received less than a third of its usual volume of water. By the summer of 1985, three fourths of the stock in the area had died for lack of pasture. How many people died is unknown.

Stephen Cobb has been given a tough nut to crack, a scientific puzzle with too many pieces and no obvious solutions. Employed by the Swiss-based International Union for the Conservation of Nature and Natural Resources (IUCN) as director of a \$730,000 project financed by the German government and the World

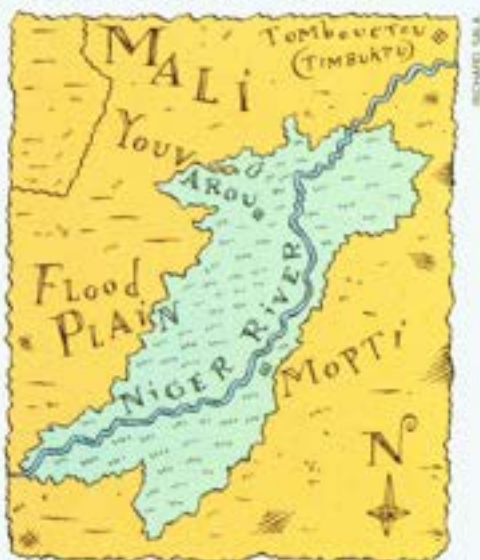
JOHN C. CHASSON / GAMMA LIAISON



THE NIGER RIVER



THE INLAND DELTA





Living with the Niger: Children master the main form of transportation; hunters take pelicans for food; and nomadic fishing tribes make their temporary homes at the river's edge.



Wildlife Fund, he is charged with studying the Niger delta and thinking of ways to solve its drought-exacerbated problems. He will design a mix of small-scale development schemes, wildlife reserves, and buffer zones regulated for multiple use by all the competing forces in the region. After drawing up a management plan for the delta in its entirety, he is supposed to mount an experiment that will demonstrate the effectiveness of his plan.

The stakes in this venture are high for everybody involved. Cobb's project is IUCN's largest, and it marks a revolutionary departure for the organization. Since its founding in 1948, this consortium of five hundred government and environmental groups has

employed a variety of traditional measures for protecting plants and animals. But there is growing concern in the organization, as its Red Data Books record the demise of one species after another, that these standard procedures—such as the establishment of parks and international controls on the traffic in wildlife—are no longer working. When it was founded, IUCN thought about conservation in terms of individual species. Then, after launching a campaign to save tropical rain forests and plants, it began to think in terms of environments. But a crucial element was still missing from the equation. Only belatedly and with great trepidation has IUCN begun to think about people.

Plants, animals, and environments have to be put back in a social matrix—which they never left in the first place—to see what people do with nature and how they benefit from conserving it. Ducks in the Niger delta will not be saved while nomads die, and the two causes are really part of the same struggle anyway. Desert wetlands preserved as working resources are good for both ducks and people. The new theme at IUCN headquarters is "development based on a healthy environment," and Project 9016, with Stephen Cobb at the helm, was launched in 1984 as the flagship for reaching this goal.

The stakes are also high for the Malian government, which has been watching the country's major assets die

on the hoof and wither under a killing sun. International experts bearing multimillion-dollar contracts have been advising the government to dam the Niger and channel it into agricultural projects. Do the conservationists really have something better to offer? They think so, which is why Prince Philip is coming to town. Wearing his twin hats as vice president of IUCN and president of the World Wildlife Fund—which will later change its name, along with its perspective, to the World Wide Fund for Nature—the prince is going to talk with the president of Mali about Cobb's project and ask him to support it at the highest level. For a wildlife ecologist who spent the happiest years of his life living alone studying elephants in Tsavo National Park, Stephen is about to get a strong dose of politics mixed into his science.

In Youvarou, Stephen and Alison Cobb are busy preparing for the royal visit, so they send me next door to stay with their sociologist, Richard Moorehead, and their ornithologist, Jamie Skinner. Jamie, at twenty-seven, is younger than Richard and less experienced in the field, but he is politically savvy about things that Richard prefers not to think about, like the protocol of royal visits. They make a good team. While Stephen is preoccupied with the logistics of running the project, Jamie and Richard carry on its scientific work.

"Birds get massacred in the slide to monoculture," is Jamie's succinct way of characterizing one problem with developing the Niger flood plain. As precious as they are, these waters are bound to be developed. But developed for whom?

The engineers have already largely succeeded in channeling West Africa's wetlands into polders, rice paddies, and other irrigation schemes. They are launching a spate of new projects supposedly designed to counter desertification in the Sahel. Overlooked or ignored in these schemes is the fact that every technological fix attempted

in the Sahelian wetlands over the past fifty years has failed. Either the technology was wrong for the culture, or the technology itself was faulty.

The land itself has also resisted the imposition of western technology. The soils have proved too fragile to support the irrigation projects already built in the Sahel. Most of these have been plagued by waterlogging and salinization before finally being abandoned. A telling example comes from the agricultural schemes on the Senegal River, which, along with Lake Chad and the Niger, used to be the third great wetlands in the Sahel. Two new dams at the headwaters and mouth of the river will put an end to its existence as a seasonal flood plain. But they will do nothing to alter the fact that other irrigation projects already built along the Senegal have greatly impoverished the lives of its riverine citizens: every newly created acre of paddy field has resulted in four acres of flood plain reverting to desert.

The figures are no more encouraging for the Niger delta. Over the past fifteen years more than one hundred million dollars have been invested here in cattle-ranching and rice-growing schemes. During the drought of 1984, this Sahelian herd totaled a million well-watered cattle, but two thirds of them died for lack of pasture. Their plight was worsened by the conversion of twenty percent of the delta from grazing land to rice polders that produced no rice that year. Undaunted by its previous failures, the World Bank is investing another fifty million dollars in the delta for irrigated agriculture. A further threat to the area comes from twenty dams planned for the river all the way back to its headwaters in the Fouta Djallon in Guinea.

In the face of this onslaught, Jamie's original assignment was little more than a holding action. He was supposed to survey the delta and find a watery ark to be set aside as a national reserve for the ducks and water birds that winter here. Many of Africa's parks have been established under similar conditions. They represent an

amelioration of doubtful policies, an itch in the conscience of northerners as they work their will on the south. Cynics might say that establishing a bird reserve in Mali is of particular interest to European duck hunters worried about their supply of fowl. Whatever the motive behind it, Jamie abandoned the project when he realized there was no way the delta could be turned into a park.

"You can't tell someone not to eat a pelican when they're hungry," he says. "And pelican-eating itself is less of a threat to the bird populations than other factors."

In a locale that shifts from dusty plain to watery world in a matter of days, where mud, marsh, and flood make transportation impossible for six months of the year, it is impossible to establish and police a European-style park. "Most of what you do in conservation is untenable here. When the flood arrives you're surrounded by a sea of water. So forget about driving your car. Then when the flood recedes you're surrounded by mud. So you can't travel by boat either."

Late in 1984 Jamie sent a report to Switzerland explaining why he wanted to drop the idea of bird reserves in the delta. The birds are threatened locally by four trends: the extension and intensification of agriculture, the use of contact poisons on cropland, the destruction of *bourgon* pasture through overgrazing, and the hunting of ducks and other waterfowl by the Bozo. But in Jamie's opinion, none of these trends is alarming, and all are relatively benign compared with other threats lying upstream.

"In fact the desired reserve system exists already—it is the thousands of square kilometers of seasonally flooded pastures managed traditionally for fishing and grazing activities, neither of which excludes healthy bird populations," his report concluded. "While current land use practices continue, the role of the conservationist will be to fine-tune improvements at the local level of re-

Continued on page 115

Continued from page 46

source use, which will probably have few dramatic effects. The single most long-reaching contribution to be made is in ensuring the water supply, and let the vast surface area and tradition do the rest."

Prince Philip is traveling to Mali in his private capacity as head of the World Wildlife Fund, or so Stephen Cobb has been told. He wants a quiet tour of the delta with time out for bird watching.

Stephen is alarmed by the list of journalists observing the event. It includes reporters from the *Guardian* and *Observer* in England, Agence France Presse in France, and a Swiss TV crew.

The prince will be traveling light, with a couple of WWF advisers, a bodyguard, and the royal physician. The Europeans will spend the night with the Cobbs. The Malians will stay next door with Richard and Jamie, and the journalists will be lodged somewhere else. The logistics of preparing for this onslaught has become the Cobbs' major obsession.

The day the prince is supposed to arrive, I wake to a white sun filtered through clouds. This is an improvement over a red sun filtered through dust, but the harmattan is still blowing strongly off the desert. Green bee eaters flit through the acacias. In front of me the river bustles with stilts and terns and bands of crocodile birds scooting along the shore. Next door the chortling sounds of guinea hens rise from Stephen and Alison's courtyard.

The prince is already several hours late as day fades into evening. I am standing on Richard and Jamie's roof, scanning the river with a pair of binoculars, when the cry goes up around me. "Ils arrivent! They're coming!" Across the plain I make out a caravan of six Land Rovers eating each other's dust. The red one in the lead is driven by Stephen, and next to him sits the prince. The cars roar up to the house. Out tumble HRH (as Alison calls His Royal Highness) in khaki safari clothes

and a top slice of the Malian government, including the ministers of state planning and natural resources, the head of the national political party, and the governor of the Fifth Region. The Malians are wearing resplendent, three-piece *boubous* in powder blue and egg-shell white. According to the protocol outlined by Alison earlier in the day, this is a crucial moment. The Muslim Malians, who refrain from alcohol, have to be segregated from the prince as soon as possible.

The Malians are steered in my direction. HRH is ushered into the Cobbs', and the two houses are surrounded by armed guards. Suddenly the prince emerges on the neighboring roof within a stone's throw of me. His schedule calls for a shower and tea, but he seems to have moved straight to the cocktail hour. Looking rather glum, with his jaw set in a hard-mouthed frown, he walks to the edge of the roof and trains his binoculars on the river. The day is fast sinking into crepuscular gloom. The Niger is the color of rusted iron except where a kingfisher, diving for his dinner, has poked a gray hole in the water. HRH drops his binoculars onto his chest and settles into a deck chair across from mine. Alison plants a Union Jack in a pot of sand, thereby alerting the staff to his royal presence.

Later in the evening I walk a half mile inland from the river to find the journalists lodged in a concrete shed. They had not been invited to dinner. Scraps from the lamb roast were delivered to their door, but they have run out of water. The man from the *Guardian* says he has never been treated so badly in all his years as a journalist. The scrappy Yorkshireman from the *Observer* frets about there being no story here. The Swiss TV crew is embroiled in the animosity of a lovers quarrel between the producer and her cameraman. Everyone is thirsty.

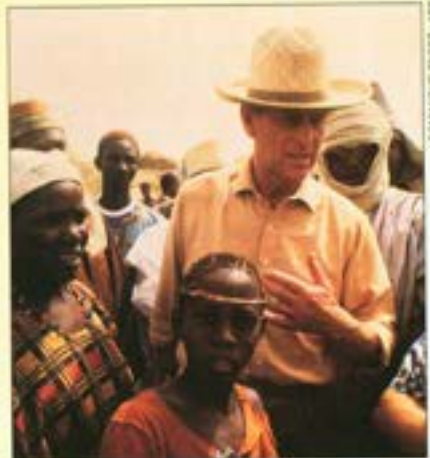
I learn from the journalists that the prince's trip is already littered with social mishaps. HRH found python skins for sale in the lobby of the Hotel Kanaga in Mopti. At the official reception

in the Hotel dining room he chided his host, the governor, for his laxity in protecting endangered species. The governor, in turn, spoke about the need to sedentarize nomads. Stephen followed with a disquisition on the theory and practice of aerial surveys. The journalists voted thumbs down on all three presentations.

I have already heard of another faux pas marring the prince's tour. The caravan of Land Rovers was late in reaching Youvarou because Stephen, more familiar with flying than driving across the delta, got lost on the way. Richard had warned him that the route was tricky, especially on the dry bed of Lake Walado, where tracks veer off in every direction. Only belatedly, with an entourage of Malian officials turning in his wake, did Stephen discover that his compass had jammed and he was driving in circles. This ticked the prince into a rage. What kind of project are they running with a director who gets lost going home? The prince's physician was also in a dither, as the snake bite serum in his medical kit was supposed to be refrigerated.

If very little goes right the first day of the prince's visit, nothing goes right the second. He rises early. Accompanied by his bodyguard, he is driven to the river for a sail on the Niger. Kassoum the boatman, for reasons that remain obscure, fails to arrive with the newly outfitted pirogue. The prince peers through the dust at several species visible from shore and then returns to breakfast.

His official day begins with a speech delivered in the *forêt morte*, a stand of dead trees near Youvarou. To get there, we drive in a caravan of Malian functionaries, soldiers, and journalists down a sandy track into what was formerly a forest of *Acacia scorpioides*. This once-green world used to stretch for ten miles in every direction. During the flood, men in pirogues would float in here to cut wood. But not since the drought of 1973 has the water level been high enough to reach the forest, and without their yearly inundation,



In his role as president of the World Wildlife Fund, Prince Philip gives counsel to the Malians (left). Like many buildings in Africa, the mosques of Mali are made of mud (below).

the trees have died. All the large mammals that used to live here—gazelles, panthers, oryx, and antelopes—have disappeared.

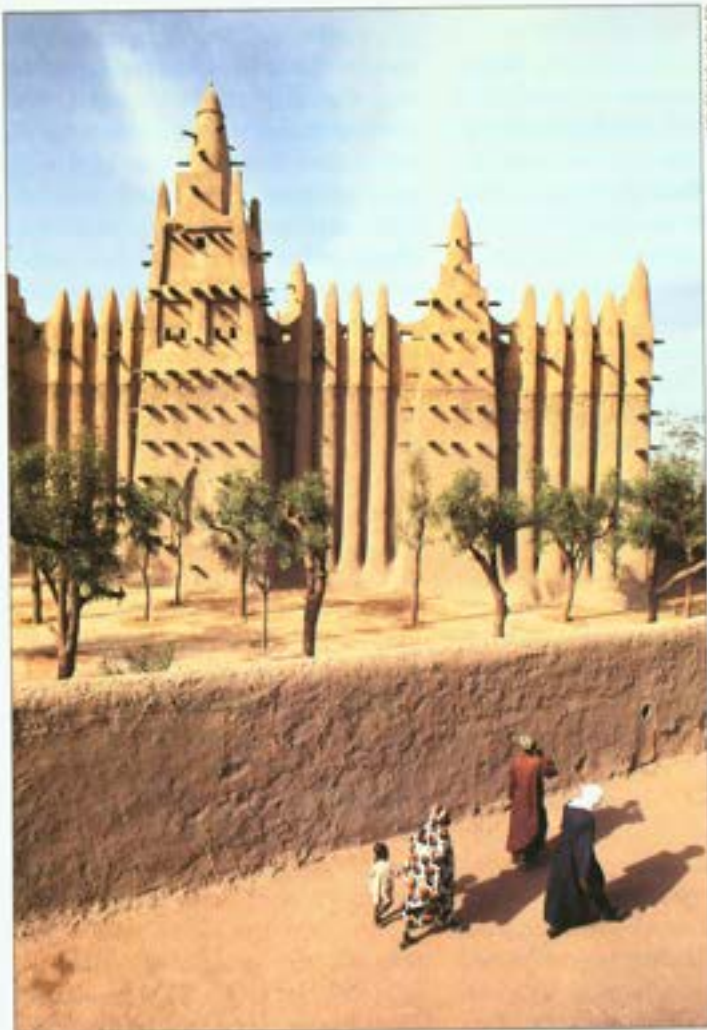
As we pull up in a sandy cloud, I look out to see the prince stationed before a backdrop of leafless trees bleached stone gray in the desert sun. We pile out of our cars and face him at a respectful distance. As we have seen no other human beings for many miles, we are his only audience. A hawk-faced man with a beaked nose and blue eyes, the prince is dressed in beltless slacks fasted with Velcro, a salmon-colored shirt, and a straw hat. "He doesn't look like a prince," I hear a *houboué* Malian say to his companion.

The TV camera rolls. HRH begins speaking about the Sahelian drought, how there is really very little that can be done about it, save for building a kind of Noah's Ark, a reserve for protecting the indigenous flora and fauna from the people who would otherwise use them up. If the rains ever return, people can draw on this ark to revitalize their world. If the rains do not return, they will have to practice birth control and expect less out of life.

"Do you know how much the population of India increases every year?" asks the prince.

"Oh, no," mutters the man from the *Guardian*. "He gives the same bloody speech wherever he goes."

"... It increases by twenty million people. That's more than the population of London, and the country sim-



ply doesn't have the infrastructure to handle that big an increase."

Alison and her staff have worked all morning making cucumber sandwiches and other goodies for a royal picnic. Stephen thinks he has found a nice place to stop under a tamarind tree halfway between Youvarou and Mopti, but once again his timing is off. The prince and his entourage fail to reach the tree until midafternoon. HRH is not pleased with the site. He leans against the fender and wolfs down a cucumber sandwich before commanding Stephen to drive on. The governor

has no time to protest that he, too, has laid on a royal picnic farther down the road, complete with sheep roasts and tribal dancing. When HRH's group zooms by without stopping, the governor is furious at the insult of having his party spurned.

"God, it's depressing," says the prince in his last words to Stephen.

As for the enormous quantities of sandwiches left over from the royal picnic, they eventually make their way into the begging bowls of the *Mopti garibous*, who praise God for showering them with such munificence.



T. A. BAIRD

The river's harvest: a garden on a former Niger flood plain; collective fishing in Youvarou. Below, anthropologist Richard Moorehead learns the old ways from village elders.



T. A. BAIRD



T. A. BAIRD

Like his father, Alan Moorehead, who wrote about the continent in his books on explorers and natural history, Richard is an Africanist. He had already spent a year and a half in the delta, studying family economies in a Bozo village, and had gone back to England to write up his work for a master's degree at the University of Sussex, when Stephen Cobb tapped him for a return engagement.

Glad for the chance to return to Mali, Richard bought a Land Rover and spent three weeks driving from England to Africa in the fall of 1984.

His assignment was to figure out how the old systems of land use in the delta could be integrated into a plan for conserving it. "Tradition is a powerful force here," he says. "I try to work inside these societies, to take all their productive lines and see them as a whole. These are sophisticated, practical people who have known about conservation and multiple-use reserves for a long time."

One evening, with the moon rising over us as we sit in the courtyard of his house talking, I ask Richard about the future of the delta. "If you want to

conserve resources and raise the standard of living," he says, "you have to be hard-nosed about who's in this game for what. The idea of walling off the delta into a park is ostrich behavior. The Malian government is broke. They have to get revenue out of here.

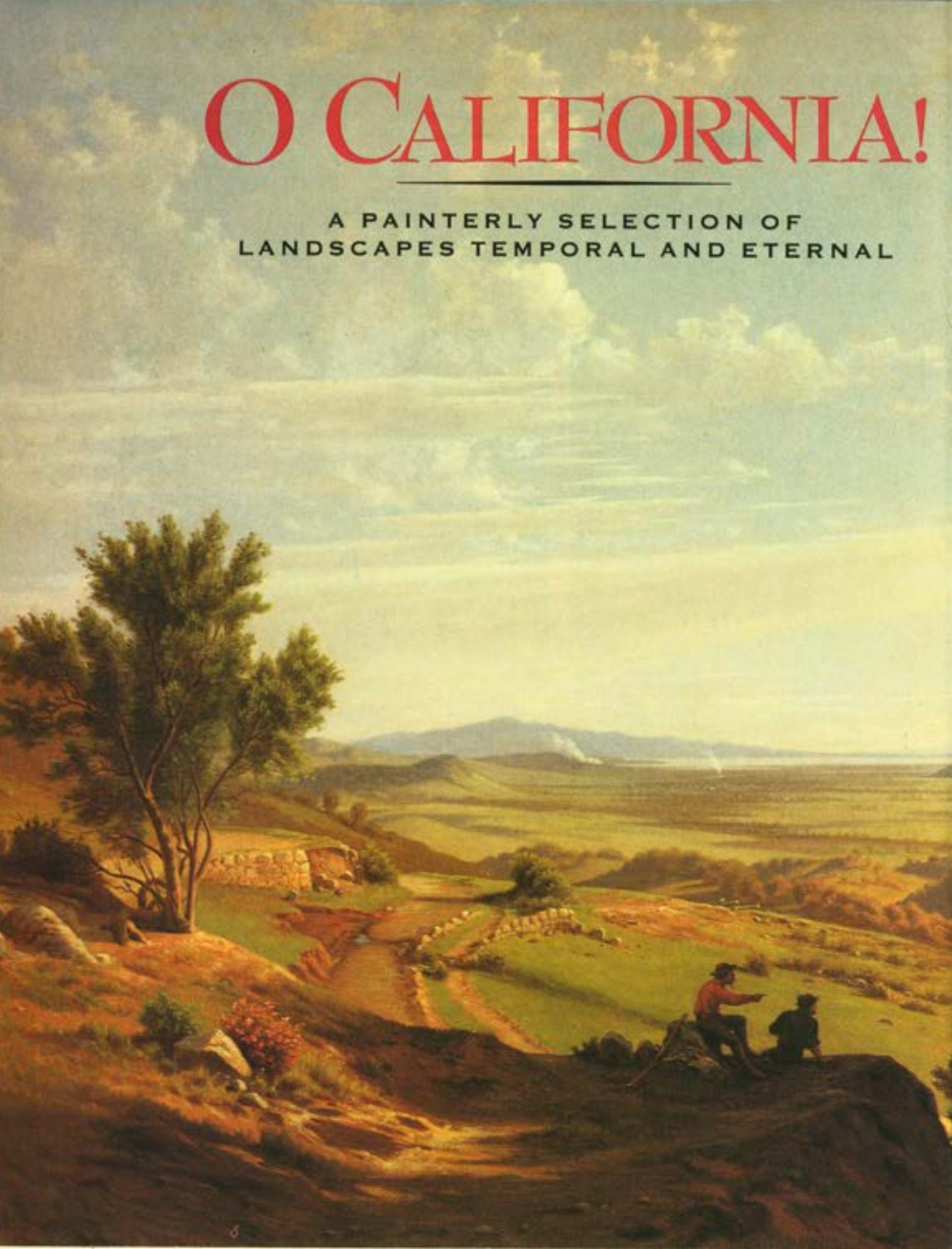
"From their perspective, they have two choices. They could build a dam across the top of the Niger near Timbuktu and turn the delta into a rice plantation. Rice growing, when it works, is more productive than nomadic economies. You have seden-

Continued on page 145



O CALIFORNIA!

A PAINTERLY SELECTION OF
LANDSCAPES TEMPORAL AND ETERNAL



T

ime spent with *O California!*, a carefully assembled collection of 19th- and early 20th-century landscape paintings and period texts, engenders strong and conflicting emotions in those who know and love the Golden State.

At first one empathizes with the wonder that permeates so many of the first-person accounts set down by early explorers: those Spaniards in the Portola expedition of 1769 who crested a rise to "discover" San Francisco Bay, or the Anglo-Saxons who, half a century later, approached a Sierran cliff edge to find the awesome valleys of Yosemite or Hetch Hetchy lying nearly a mile beneath their feet.

Yet next one mourns all that is now irre-

trievably gone from this land. The view from the Sonoma Hills seen here is today marred by freeways, suburbs, and commercial development. Much the same can be said for all too many of the vistas reproduced in this book—though, thankfully, some magnificent areas have been saved in something approaching their natural state by a century of dedicated conservationist action.

In the following pages we share a few of our favorite paintings and contemporary text selections from *O California!*, in hope of whetting your appetite for the full banquet the book affords. From Mt. Shasta to San Diego Bay, from the Pacific to the edge of the Great Basin, a fabulous new world is depicted as some of its earliest observers saw it.

Virgil Williams *View South From Sonoma Hills Toward San Pablo Bay and Mount Tamalpais*, 1864





John Ross Key
Mt. Diablo, 1871

T
 he Californians tell us that once in olden time they had a battle with the Indians here; it was going hard with the Spaniards, when the Devil came out of the mountain, helped the Spaniards, and the Indians were vanquished. I cannot vouch for the truth of their story, but the story gave the name to the mountain, and the rocks certainly do look as if the devil had been about at some time. There is a breaking up and roasting of strata on a grand scale.

—William Henry Brewer
Up and Down California, 1861



The two halves of [the] view, both in sight at once, express the highest, the most acute, aspects of desolation.

... From the desert have been dried up and blown away its seas. Their shores and white, salt-strewn bottoms lie there in the eloquence of death. Sharp white light glances from all the mountain-walls, where in marks and polishings has been written the epitaph of glaciers now melted and vanished into air. Vacant cañons lie open to the sun, bare, treeless, half shrouded with snow, cumbered with loads of broken debris, still as graves, except when flights of rocks rush down some chasm's throat, startling the mountains with harsh, dry rattle, their fainter echoes from below followed too quickly by dense silence.

—Clarence King, "The Range"
Mountaineering in the Sierra Nevada, 1871

■
Edwin Deakin
Owens Valley, 1884



COLLECTION OF THE CALIFORNIA HISTORICAL SOCIETY

Albert Bierstadt
Sunrise, Yosemite Valley
no date

■

Yosemite has yet to be painted; painters' visits of a month or so have not done it. Time is required to take it in, and digest it, or else the inevitable result will be artistic dyspepsia (in the shape of the conventional yellow and red rocks), which, perhaps is the reason for the average Californian's disgust for Yosemite pictures. The cliffs are neither red nor yellow, but an indescribable shifting gray, changing and shifting even as you look.

—William Keith, letter, 1875





COLLECTION OF THE AMON CARTER MUSEUM, FORT WORTH



Albert Bierstadt
The Hetch-Hetchy Valley, California
circa 1874–80

■

After supper I took a stroll along the backbone of the ridge and looked down into the little Hetch Hetchy Valley, looked plumb down one mile. . . . The summits, in the clear higher air, looked like a company of angels with their lofty heads tipped with the sun's last rays in a flush of glory; patches of snow rose-colored, patches of pine and chaparral, dashes of purple and blue and gold, and over it all the silence of eternity—inexpressible things.

—William Keith, letter, 1875



H

ere, in the mountains, the labor of excavation is extremely difficult, on account of the immense rocks which form a large portion of the soil. Of course, no man can 'work out' a 'claim' alone. For that reason, and also for the same that makes partnerships desirable, they congregate in companies of four or six. . . .

—Louise Clapp
"The Shirley Letters," 1852

■
Charles Christian Nahl
and Frederick Wenderoth
Miners in the Sierras
circa 1851–52



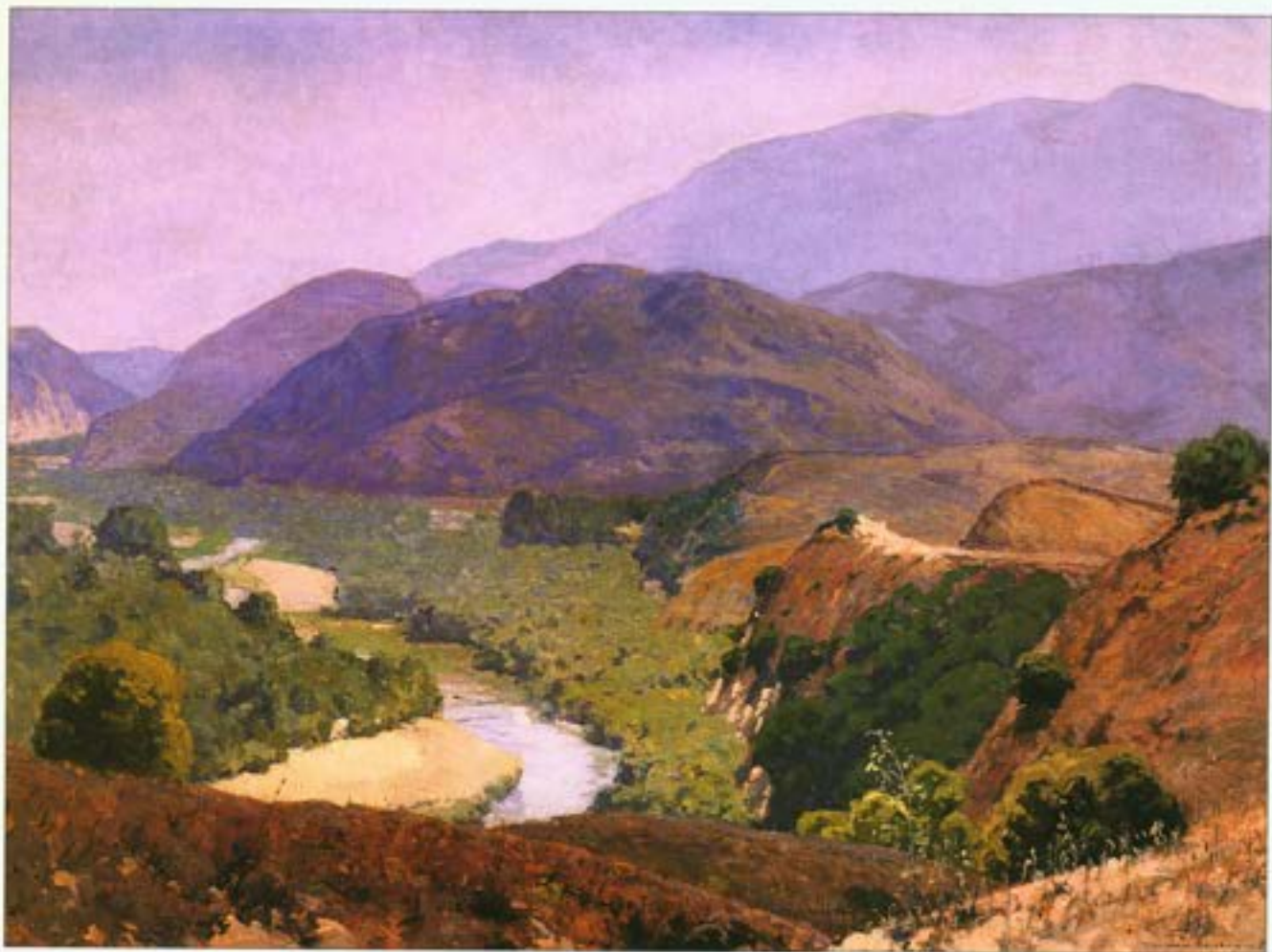
COLLECTION OF THE NATIONAL MUSEUM OF AMERICAN ART, SMITHSONIAN INSTITUTION, GIFT OF THE FRED HEUBRON COLLECTION

If beauty consists, as theorists, I understand, declare, in the true expression of spirit, then certainly this landscape complied with the terms. It was a very summary of the native and original California del Sur, California of the South, as Nature designed it. And even the sophisticated mind, trained to weigh tone values and balance of line, found the composition ideal in its magnificent Western simplicity.

—J. Smeaton Chase
California Coast Trails, 1913



William Alexander Griffith
Santa Ana Canyon, 1928





William Lees Judson
Laguna Coast, no date

■
Here, warm ochres, creams, and drabs alternate on the broken cliff faces with olive-greens, grays, and masses of ashy rose; and the herbage of the tops carries out the same general class of tone. Cactus growing to the cliff edges gives a touch wholly characteristic of the region. But the long, wing-like reaches of the land line, where ten miles of coasts will contain twice that number of little emerald bays barred one from the other by white arms of spray, brought constantly to my mind the rocky shores of Guernsey and Jersey.

—J. Smeaton Chase
California Coast Trails, 1913

O California!
Nineteenth and Early Twentieth Century
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Amory Lovins: Walking the Soft Path

James R. Udall

SITTING IN THE BACK of an auditorium, waiting to address a global-warming conference at the University of Colorado, Amory Lovins glances toward the ceiling and frowns. The man *Newsweek* once called "one of the Western world's most influential energy thinkers" has detected yet another wasteful indoor-lighting system.

Lovins pulls a calculator from his breast pocket and begins punching numbers. Soon he has computed how many kilowatts are being squandered, how many pounds of greenhouse gases are being spewed into the atmosphere to produce that power, how many thousands of dollars a lighting retrofit could save.

At the lectern, Lovins extracts an efficient light bulb from his briefcase and plugs it in. Like a modern Prometheus, he raises the bulb and launches into his speech.

He tells his audience that the United States could run its economy on a third to a fourth as much energy as it does today, saving \$300 billion annually while reducing urban smog, acid rain, and global warming. By making cost-effective efficiency investments, he says, the country could eliminate oil imports and save trillions of dollars by the year 2000—enough to pay off the national debt.

This is easily the conference's most uplifting message yet, and the crowd—nearly pickled by doom and gloom—perks up as Lovins, his mustache and thick eyeglasses giving him a vague resemblance to Charlie Chaplin, continues his speech.

"Together, renewable energy and energy efficiency—in the form of light bulbs like these, high-mileage cars, superinsulated homes, smart electric-

motor systems, advanced aircraft, high-efficiency appliances, and a host of other such technologies—make it possible to meet all our energy needs without harming the climate."

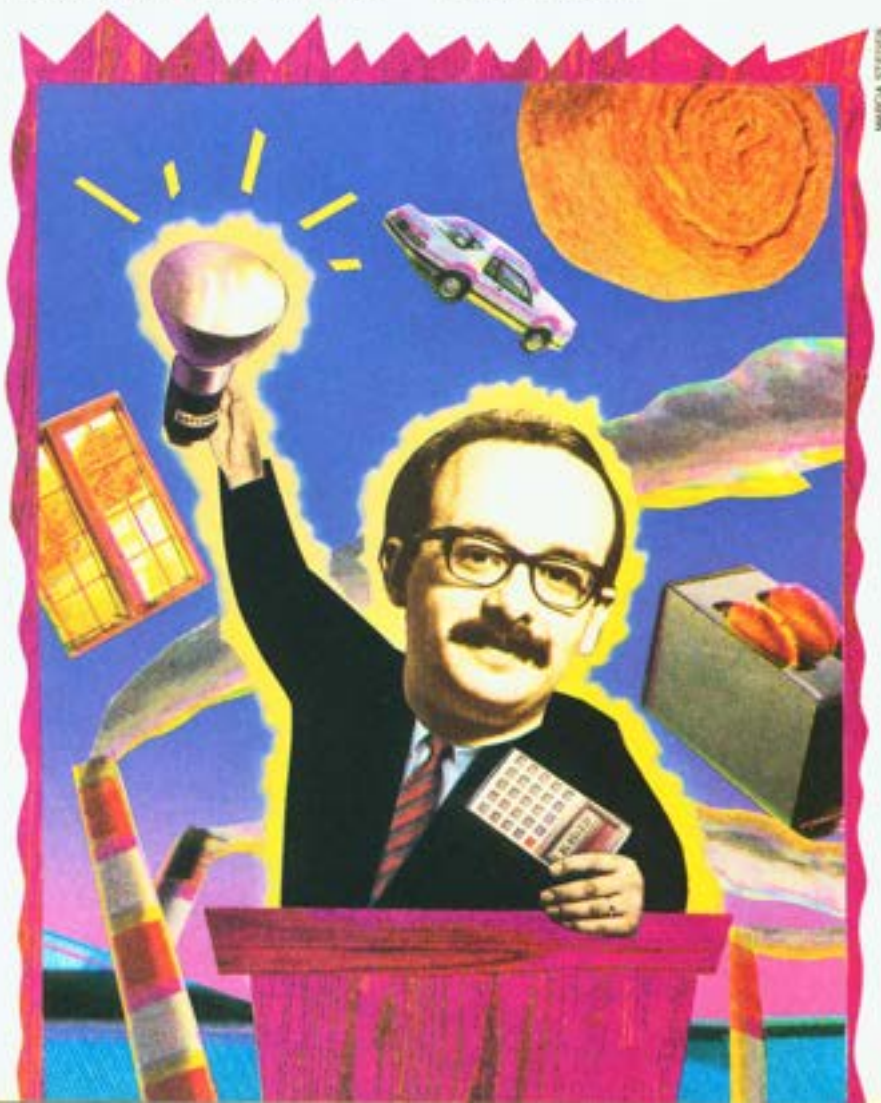
Reeling off facts, figures, and asides ("In some cases efficiency is better than a free lunch; it's a lunch you're paid to eat"), Lovins keeps the audience hanging on his every word. He concludes by gently chiding the university: "It's

theoretically possible to save 92 percent of all the electricity used for lighting—and this auditorium would be a good place to start."

Applause, laughter. As Lovins leaves the room, small clusters of people form to discuss his speech. Two questions hang in the air: Who is this guy? And, is his good news too good to be true?

Environmental patriarch David

"I'm not interested in doing with less, but in doing more with less. We don't have to become vegetarians and ride bicycles to save the Earth." —Amory Lovins



MARCA STEIGER

Brower first met Amory Lovins in 1970, after Lovins mailed him a manuscript he had written about Snowdonia National Park, Britain's second largest. Brower found the manuscript riveting, both as an ode to Snowdonia and as a jeremiad against its exploitation. "Imagining it to be the work of someone middle-aged, I was astonished to discover that Amory was only 21," he recalls.

Growing up in Washington, D.C., the grandson of Ukrainian immigrants, Lovins was early recognized as a child prodigy. He was composing complex music by age 11. He took math courses at Amherst College while still in high school.

Donella Meadows, a longtime Lovins associate who is now a professor at Dartmouth, remembers the day "this pip-squeak freshman with a slide rule on his belt" sauntered into a lab at Harvard and volunteered to tune the nuclear magnetic resonance spectrometer. "Everybody was in awe of his intellect," Meadows says. "He was the quintessential brain."

The self-described "techno-twit with defective knees" was pursuing a graduate degree at Oxford when a friend took him hiking in North Wales. Climbing peaks and communing with the clouds, Lovins fell in love with Snowdonia.

British parks lack the safeguards that American parks enjoy, and Lovins soon discovered that Snowdonia was under siege, hemmed in by two nuclear power plants, an aluminum smelter, and other government-sponsored industrial projects. The largest single threat was a copper mine proposed by Rio Tinto Zinc, a powerful British mining firm.

As Lovins' Snowdonia manuscript, *Eryri: The Mountains of Longing*, went to press, Rio Tinto sued (unsuccessfully) to stop the book's publication. After the British Broadcasting Corporation aired a documentary on Snowdonia that Lovins helped prepare, the fate of the park became a front-page issue. Within months, public outcry forced the company to abandon its mining plans.

"Amory had stopped one of the largest mining companies in the world," recalls David Brower. "Afterward he looked around and asked, 'What else can I do?'"

Dropping out of school to take a job with Brower's organization Friends of the Earth, Lovins expanded his studies of the energy problem. Trained as a scientist, he was comfortable, as few environmentalists are, with the topic's arcane jargon; perhaps more important, he had both the courage to question the conventional wisdom and Brower goading him on.

"My experiences in Snowdonia taught me that minerals and fossil fuels must be wrested from the earth with great violence; that their extraction, transportation, and usage all entail environmental costs," says Lovins. "But having been trained as a physicist, my initial assumption was that the best replacements for oil and gas would be the nuclear technologies."

Reading voraciously, attending seminars, playing what-if on his slide rule, Lovins discovered that nuclear power "made much less sense than I had presumed." Turning his back on such "hard" technologies, he began developing the case for an alternative energy future he called the "soft path." Soon Lovins was giving the seminars himself.

"Where most of us use 10 percent of our brainpower, Amory uses 90," Brower says. "He is extraordinarily dedicated. He's insightful, intuitive, great with numbers. He sees the linkages better than almost anybody. He's an absolute genius."

In the early seventies it was universally believed that a nation's energy consumption was the yardstick of its economic performance—hence U.S. consumption was expected to double every 20 or 30 years. Then came the 1973 oil shock. The energy crisis was born.

It was against this backdrop that Lovins published the book that brought him to prominence, *Soft Energy Paths*. "According to conventional wisdom," he wrote, "the energy problem is how to increase energy supplies

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to meet projected demands. The [proposed] solution to this problem is familiar: Ever more remote and fragile places are to be ransacked, at ever greater risk and cost."

Lovins argued that a better answer was to wing more work from our energy. "We understand too little the wise use of power," he wrote. "We're like somebody who can't keep the bathtub full because the water keeps running out. Before we buy a bigger water heater, we ought to get a plug."

By outlining a scenario in which the nuclear-power genie is rebottled, and oil, gas, and coal are replaced by hydropower, biomass, solar, and other sustainable-energy supplies, Lovins forever changed the context of the energy debate. Because of its seminal impact, *Soft Energy Paths*, which has been translated into eight languages, has been compared to *Silent Spring*.

The book touched off a firestorm of debate. Energy insiders vilified Lovins as a gadfly, a pie-in-the-sky dreamer, a dangerous eco-freak, a purveyor of naked nonsense, and Public Enemy Number One. Supremely, even arrogantly confident, Lovins did not mind being cast as the energy priesthood's Martin Luther. "All knowledge starts as heresy," he told his critics.

With "energy independence" as its slogan during the late 1970s, the U.S. government was striding down the hard path. Billions were lavished on experimental technologies—syn-fuels, the breeder reactor, coal gasification. But as energy prices rose, Americans began buying gas-sipping cars, insulating attics, caulking windows. As consumers opted for the soft path, energy shortages were transformed into gluts, and hard-path initiatives succumbed to market forces. From 1973 to 1986, U.S. energy usage leveled off even as the gross national product grew by 35 percent—a historic accomplishment. Lovins' energy-efficiency revolution, once derided as visionary, was coming to pass. Events were proving the heretic right.

In 1982, Amory and his wife, Hunter Lovins, a lawyer and political scientist who helped start the urban-for-

estry group TreePeople, established Rocky Mountain Institute. A non-profit research and educational foundation, RMI works to "foster the efficient and sustainable use of resources as a path to global security." Half the institute's \$1-million annual budget comes from providing state-of-the-art information on efficiency to energy companies, utilities, and government agencies in more than 20 countries.

The institute is housed in a building the Lovinses designed to be a model of resource efficiency. Curvilinear stone walls, reminiscent of an Anasazi cliff dwelling, flank a greenhouse (complete with iguana and banana tree) that supplies virtually all of the building's heat. Everywhere is evidence of Amory's fondness for ingenious gadgetry. Flushing the Swedish toilets requires a mere gallon of water, the shower uses water-saving technology first developed for submarines, and the refrigerator is six times as efficient as the best commercial model. Floor-to-ceiling bookcases overflow with one of the world's most comprehensive energy libraries, a note on the photocopier says that operating it doubles the building's electrical use, and the table around which the RMI staff (earnest, bluejeaned, thirtyish) gather for lunch is covered with publications ranging from the *Wall Street Journal* to the *Utne Reader*.

Lovins is the key synapse in a global network of energy experts, and he maintains a frenetic schedule, traveling hundreds of thousands of miles a year. In truth Lovins is a driven man. He does not vacation. "He's been known to take a book to a talent show—and read it," says one former aide. Though his circle of acquaintances is broad (encompassing actor Robert Redford, Colorado Senator Tim Wirth (D), and everybody who is anybody in energy), he has few intimate friends. Still, it's not unusual to see him give a bear hug to a collaborator arriving for a visit.

According to RMI staffers, Lovins is motivated by the intellectual's quest for truth, the ecologist's reverence for linkages, and the economist's affection for efficiency. What irks him most is

the careless, unthinking way so much energy is squandered.

And yet he is no puritan. "I'm not interested in doing with less," he says. "But in doing more with less. We don't have to become vegetarians and ride bicycles to save the Earth."

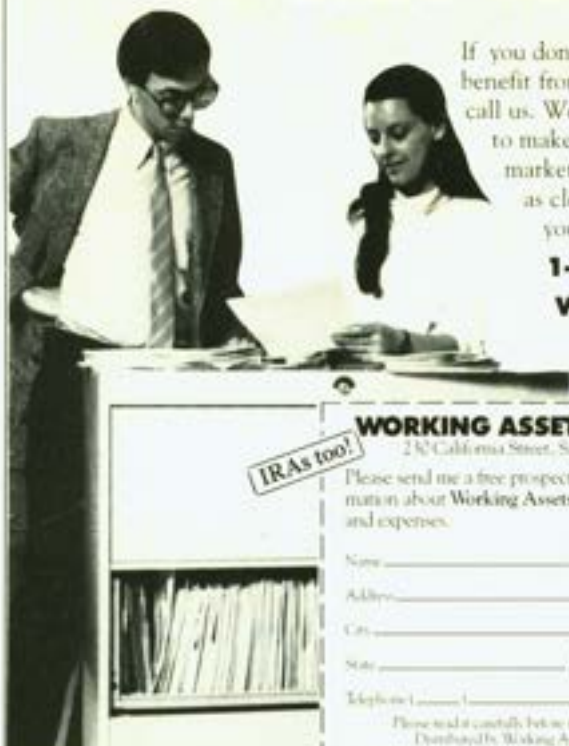
Together the Lovinses have coauthored numerous thought-provoking books and articles. One major focus has been the relationship between energy and national security. "Today's concept of security based on military threats is making humankind poorer and less secure," says Hunter. "A truly secure society, in contrast, is one that is free from fear of privation or attack."

In a book entitled *Brittle Power: Energy Strategy for National Security*, based on a study commissioned by the Pentagon, the Lovinses conclude that our dependence on centralized sources of fossil fuels makes us insecure: "A handful of people could cut off three fourths of the East's oil and gas in one evening's work without leaving Louisiana." Moreover, by destroying a single pumping station a saboteur could stop the flow of oil in the Alaska pipeline, turning it into "the world's largest Chapstick." A third of the U.S. military budget is spent on getting or keeping access to foreign oil and minerals, RMI estimates.

Though they care deeply about the environment, the Lovinses are careful not to bill themselves as environmentalists: "It's an ambiguous term that means different things to different people," says Amory. "We generally find it more effective to frame our arguments in economic terms."

Nonetheless, RMI routinely intercedes in environmental disputes involving energy. For example, in 1985 Lovins was asked by the Conservation Law Foundation of New England to analyze the energy needs of a paper company that wanted to build a controversial hydroelectric dam on Maine's Penobscot River. Lovins discovered that improving electric-motor systems at the company's pulp mills would free up more energy than the dam could produce, at one-eighth the

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cost. By demonstrating that a cost-effective, practical, and environmentally benign alternative was available, Lovins played an important role in the eventual cancellation of the dam.

Two years later, Lovins critiqued a Department of the Interior report recommending that the Arctic National Wildlife Refuge be leased for oil drilling. Never one to mince words, he concluded that the department, which had failed even to mention efficiency and the role it might play in meeting the nation's energy needs, "should not shame its traditions, and expose its honest analysts to ridicule, by proceeding with this mendacious draft. It needs to be done over." Although Interior's report was never rewritten, the Sierra Club and other environmental groups have used Lovins' arguments as ammunition in their so-far-successful fight to prevent development of the refuge.

More recently, Lovins funded and helped direct an exhaustive study by RMI associates Bill Keepin and Grego-

ry Kats that refutes the contention, fashionable among some editorial-page writers, that increasing our use of nuclear power is the best way to abate global warming. In fact, they found, improving electrical efficiency is nearly seven times more cost-effective than nuclear power for reducing carbon dioxide emissions.

Efficiency and national security are the Lovinses' bread and butter, but RMI is also active in water, agriculture, and economic-renewal issues. Last March an RMI report concluded that an efficiency program could save Denver residents as much water as the proposed Two Forks Dam could provide, at one-fifth the cost. Two weeks later, Environmental Protection Agency chief William Reilly announced that he would scuttle Two Forks. Although Lovins does not claim credit for single-handedly nixing the dam, he does believe that the RMI report had some bearing on Reilly's decision. The Denver Water Board subsequently adopted an aggressive water-conservation pro-

gram along the lines suggested by Lovins and his environmentalist allies.

Lovins now commands \$6,000 a day as a consultant and recently won a \$100,000 prize from the Onassis Foundation, but he was something of a prophet without honor during the Reagan years. ("No nation ever conserved itself to greatness," said that president.) The irony is that Lovins' ideas have found a very receptive audience among many foreign leaders, including Soviet President Mikhail Gorbachev, several of whose top advisers maintain a relationship with Rocky Mountain Institute. One, Yevgeni Velikhov, was instrumental in the production of a 45-minute television film, *The Energy Efficiency Revolution—A Key to Perestroika*, which has been aired in the Soviet Union four times. Lovins and Velikhov are now collaborating on a book and have plans to build an international youth camp in Soviet Georgia that will be solar-heated and energy-efficient.

Meanwhile, a number of recent de-

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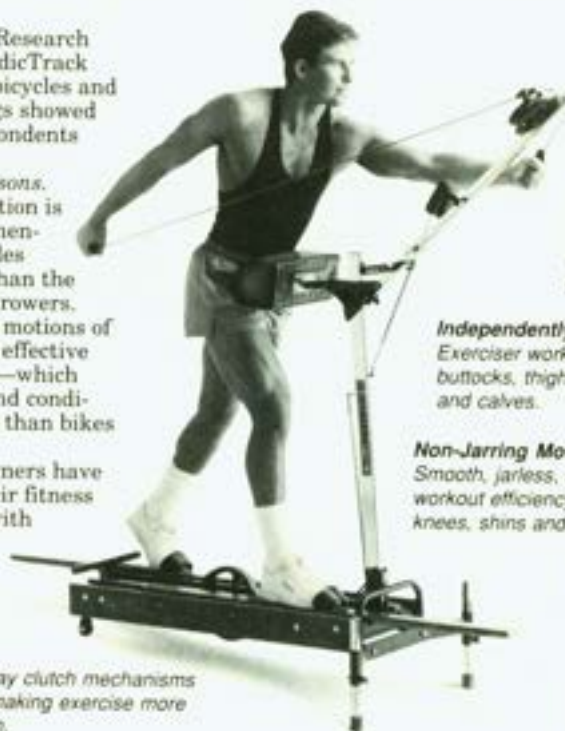
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velopments have given Lovins' message new currency here at home. By 1988 the U.S. energy bill grew to \$500 billion, with domestic oil extraction dropping and oil imports soaring. As OPEC regains its ability to put the screws to the West, some experts predict another oil crisis. At 17 million barrels a day, Americans are now burning as much oil as the Exxon Valdez spilled—every 20 minutes.

For years the public has confused efficiency with conservation, with Jimmy Carter in a sweater, with "freezing in the dark." But efficiency does not mean curtailment or sacrifice. "Drilling for oil in our inefficient cars and buildings isn't instant or free," Lovins says. "But it's faster and much cheaper than drilling anywhere else."

It's also much better for the environment. Efficiency improvements not only reduce acid rain and urban smog, they are essential in the effort to stabilize Earth's climate—a goal that climatologist Stephen Schneider of the National Center for Atmospheric Re-

search believes will require cutting fossil-fuel consumption by half. "The conventional wisdom says that achieving such reductions will require draconian sacrifice," says Lovins, ever the heretic. "However, cutting carbon dioxide emissions through energy efficiency will *save* money and *improve* the quality of life here and abroad." To this end, RMI has recently begun an international outreach program to use less electricity in China, India, and the Soviet Union.

As more politicians begin to understand that a sound energy policy would cause many other issues to fall into place, efficiency has gained powerful new allies. Lovins' intellectual fingerprints are all over the global-warming bills introduced by Senator Wirth and Representative Claudine Schneider (R-R.I.). Even President Bush's otherwise-flawed clean-air proposal acknowledges that energy efficiency can help control acid rain.

Yet despite efficiency's abundant promise, it may take another crisis be-

fore the federal government adopts it as a national goal. "History teaches us that men and nations behave wisely once they have exhausted all other alternatives," Lovins says, quoting Israeli politician Abba Eban. "We've worked our way well down the list, but we may not be at the bottom yet."

Regardless of what happens, Amory Lovins will continue as a torchbearer for efficiency. A man with a mission, he has a consuming desire to discover elegant solutions to vexing problems, large and small.

"Somewhere in my basement," says David Brower, "I have drawings that Amory once did showing 11 improvements that could be made to the Sierra cup. He won't go down in history for that, but as the man who changed the way the world thinks about energy—and not a moment too soon." ■

JAMES R. UDALL, a freelance writer in Carbondale, Colorado, wrote "Climate Shock," a look at global warming, in the July/August 1989 issue of *Sierra*.

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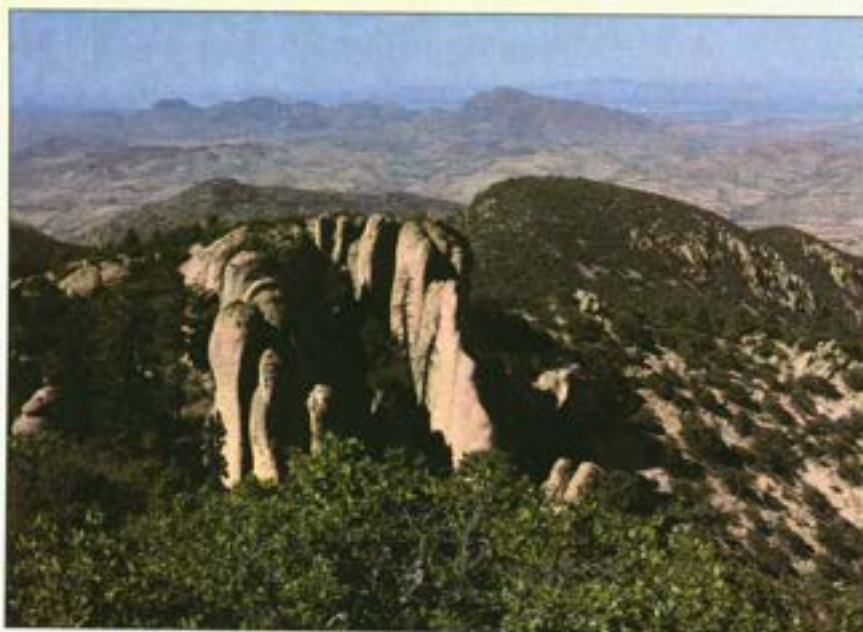
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ANIMAS RANGE, NEW MEXICO

BACK IN 1924, legendary bear hunter Ben Lilly killed the Animas Mountains' last grizzly after chasing it south into Mexico. Forty years later, a U.S. Fish and Wildlife Service (FWS) trapper killed the last Mexican gray wolf in the United States on a rocky flank of the New Mexico range five miles north of the international boundary.

Although the grizzly and the wolf may be gone from the Southwest, the Gray Ranch—a 500-square-mile expanse crossing the Animas and the native grasslands that surround it—still contains desert wildlife in astounding variety.

Now the Interior Department is waffling on an FWS plan to buy the ranch and turn it into the Animas National Wildlife Refuge. Originally, The Nature Conservancy hoped to buy the property and hold it in trust until the FWS could come up with the money. But after listening to New Mexico ranchers who oppose the deal, Interior Secretary Manuel Lujan and New Mexico

Governor Garrey E. Carruthers (R) last fall blocked a request by Senator Jeff Bingaman (D-N.M.) that Congress appropriate \$1 million from the federal Land and Water Conservation Fund as a down payment for the FWS purchase.

The ranch, once the property of California mining magnate George Hearst, father of publisher William Randolph Hearst, is currently owned by a Mexico City family. It contains an ecosystem, still largely intact, where wildlife moves freely through habitats that change in subtle gradations. Cottonwoods and willows line wetland *ciénagas*, while buffalo and grama grasses grow thick and tall on gently sloping prairies. High above, Douglas fir stand where the Continental Divide follows the 8,500-foot crest of the Animas range. "The first time I hiked out here I felt like Audubon and the other early naturalists must have felt when they first came west," recalls Charles J. Ault, an FWS biologist who surveyed the ranch for the agency.

The Gray Ranch hosts 51 percent of the mammal species and 43 percent of



the bird varieties found in New Mexico. In all, Ault counts 75 mammal species—more than are found in Yellowstone, Yosemite, or any other national park or wildlife refuge. The ranch provides habitat for 22 endangered species, among them the bald eagle, peregrine falcon, ridgenose rattlesnake, and Arizona shrew.

While other southwestern ranches have been broken up into small units and overgrazed by sheep and cattle, the Gray Ranch has remained intact. "The grassland communities at the lower elevations are in better shape than anything else we have seen in the Southwest," says Thomas Wolf of The Nature Conservancy's New Mexico chapter. Both the Conservancy and the FWS want to lease the ranch for grazing in order to study how it has remained in such good shape after a century of hosting livestock.

With the ranch appraised at a hefty \$16.5 million, conservationists fear that any profit-motivated purchaser would subdivide the property to build resorts or retirement homes. But Governor Carruthers objects to the federal government acquiring more land in New Mexico, and the state land commissioner fears that refuge status would prohibit mining. If the federal government were to buy the ranch, state officials would favor turning it over to the Bureau of Land Management, a federal agency more amenable to the desires of the mineral and livestock industries.

Nonetheless, Senator Bingaman remains committed to creating a wildlife refuge, and has been exploring legislative avenues for obtaining the go-ahead. He, like William C. Reffault, director of The Wilderness Society's wildlife-refuge program, sees protecting the Gray Ranch as a rare opportunity to save a landscape where wildlife can roam between rugged mountains and grassland valleys, unhampered by fencing, roads, or urban development. "You don't often get a chance to preserve a chunk of land like this," Reffault said while surveying Gray Ranch from the air. "Maybe once in a century." — *Tom Arrandale*



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Once a jewel of the Northeast, fouled Onondaga Lake awaits Superfund cleanup.

Where Muck Needs Raking

ONONDAGA LAKE, NEW YORK

Grand resorts and hotels drew thousands to New York state's Onondaga Lake in the late 1880s to swim, fish, and dance along its shores. Nearby, a multimillion-dollar salt-mining business added to the area's prosperity. But the 4.6-square-mile lake, adjacent to the city of Syracuse, was also the site of several chemical plants. While visitors vacationed, the industries dumped wastes into the lake, eventually making it, in the opinion of Senator Daniel Patrick Moynihan (D-N.Y.), "the most polluted body of water in the world."

Today the bottom of the 73-foot-deep lake is covered with a layer of gooey black muck some 15 feet thick, according to Julia Portmore, conservation co-chair of the Sierra Club Atlantic Chapter's Iroquois Group. Waste has also accumulated along the shoreline, so that walking around the lake is like "walking on a pile of slippery toothpaste," she says.

Allied Chemical Company was the biggest polluter until it shut down its Syracuse operations four years ago, Portmore claims, but other companies are also responsible for the damage.

And the city of Syracuse still contributes its share: On rainy days, when the city's antiquated sewer-overflow system is unable to handle the load, raw sewage floats into the lake. Even Onondaga County has contributed foul effluent; its government has allowed illegally connected sewers and drains to add to the burden of an already overworked wastewater-treatment plant. The combined result is that parts of Onondaga Lake are now turbid and unsuitable for swimming.

In 1986 the state's Department of Environmental Conservation (DEC) formed the Onondaga Lake Advisory Committee, a community group of environmental, recreational, business, and government representatives. The committee is working with Onondaga County to upgrade its pump station and to eliminate the sewage overflows from Syracuse, and with the DEC to get industries to clean up their wastes. Says Portmore, who represents the Sierra Club on the committee, "We feel that Allied is responsible for a lot of the problems and that it should pay its share to clean up the lake."

Of particular concern is the effect the pollution has on Onondaga's wild-



life. The lake's whitefish industry has virtually disappeared, and many other species that once thrived there are no longer to be found. Those fish still present are undersized, underweight, and often covered with lesions caused by stress and a lack of oxygen, says Cliff Creech, a fisheries manager for the DEC.

According to the agency, mercury is the principal contaminant; some of the fish sampled showed such high concentrations of the poisonous element that they were declared unsafe for human consumption. For these reasons, Onondaga Lake has been placed on state and federal Superfund lists for mercury cleanup, and the state health department has posted strict advisories against eating any fish caught there.

Last fall, Senator Moynihan proposed the Onondaga Lake Restoration Act, pledging \$100 million to clean up the water and shoreline. With nearly \$19 million in state and federal grants already earmarked to help correct the county's sewage-overflow problem,

Moynihan's proposal would get the cleanup off to a good start.

Portmore and the Iroquois Group hope that by the end of the century Atlantic salmon will once again migrate into the lake and spawn in the creek that feeds it. But success, Portmore stresses, will require that every-

one in the community share in the effort.

"People are becoming very much aware of the pollution, and of the need to clean it up," she says. "We all have the same goal. We could conceivably reach it by 2000 if we all work together." —Molly Keene

New Life for the River of Grass

EVERGLADES, FLORIDA

Out in the Shark River Valley, in the brilliant Florida light, the Everglades possess a singular and tranquil beauty. Islands of hardwoods stretch across the freshwater marsh. Tricornered sawgrass bends gracefully in the wind as stunning white herons and curve-billed ibis keep company with anhingas and alligators.

Yet peace is an illusion here. The biologically fragile wilderness has been altered and battered by a system

of canals and by encroaching urbanization in a region of nearly 3 million people.

Everglades National Park, established in 1947, is one of the ten most endangered parks in the United States, according to The Wilderness Society. The flow of water that is its lifeblood, beginning several hundred miles north of the park's boundaries, has been so altered over the years that many now fear the park could be left high and dry.

The Everglades' wading-bird popu-



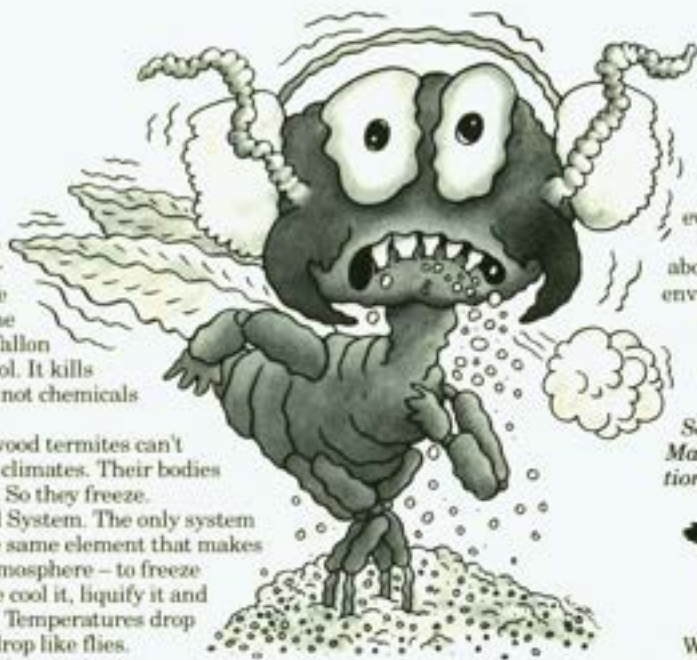
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ART MOULTE

*The expansion of Everglades park will
give the wood stork a new lease on life.*

lation has followed what Mike Finley, park superintendent from 1986 to 1988, calls "a death spiral," declining by 93 percent since the 1930s. Roseate spoonbills have shrunk in number by 50 percent since 1980; endangered wood storks have not nested here for the last two years. Half of the alligator hatchlings in 1988 were killed by prematurely elevated water levels, and only six Florida panthers remain in the area.

As critical as its condition is, though, the park may now be resuscitated. In the final hours before adjourning last November, the Senate approved a bill (S. 724)—a version of which was approved a month earlier by the House of Representatives—that if signed into law will add 107,600 acres to the Everglades, in the process reclaiming 55 percent of the natural water flow to the Northeast Shark River Slough, the heart of the park. That flow was reduced by 90 percent in the 1960s, when the U.S. Army Corps of Engineers attempted to control flooding by siphoning water into public-works projects.

The additional lands—excluding 35,000 acres to be donated by the state—will cost \$35 million to \$40 million. Modifying the canals and water-flow

structures and providing flood control on the edge of the protected area will require another \$29 million.

But the potential benefits are immense: More than 75,000 acres of wetlands will be restored, Finley says, including 25 percent of the wood stork's original feeding ground. The addition will also protect the habitat of the only male Florida panther known to roam these watery sawgrass sloughs, as well as that of the endangered snail kite.

"There's a real need to reunite the Northeast Shark River Slough with the park," says Sierra Club Associate Southeast Representative Theresa Woody. "The expanded park will more nearly reflect the natural ecosystem and help move us toward our goal of restoring the Everglades by the year 2000."

The bill also provides for modification of previous water-diversion projects in order to restore much of the park's original hydrologic conditions and ecosystems. While conservationists are delighted with this provision, they are troubled by other aspects of the bill. According to Woody, the legislation allows motorized air-boats to continue operating in the expansion area. That is unfortunate, she says, because the noise and turbulence generated by those boats cause "fright and flight" responses in wildlife.

The Sierra Club and other environmental groups are also concerned about amendments that provide for new flood-control measures in agricultural areas adjacent to the new parklands. Those projects, to be carried out by the Corps of Engineers, are designed to offset potential damage to farmlands as a consequence of the restoration program.

Despite these problems, the legislation is a resounding success for those who have been fighting to save what 99-year-old author and environmental activist Marjory Stoneman Douglas has aptly called a "river of grass." Former Park Superintendent Finley believes that this expansion legislation is "the most important public-policy decision to be made about the Everglades in 25 years." —*Georgia B. Tasker*

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SIERRA NOTES

The 1990 Public Interest Law Conference, a gathering of environmental activists from around the world, will be held March 1-4 at the University of Oregon School of Law. This year's theme is "grassroots strategies for our global future." Scheduled speakers at the event include Petra Kelly, a leader of West Germany's Green Party; Denis Hayes, chair of Earth Day 1990; Jay Hair, president of the National Wildlife Federation; Vandana Shiva, an environmental activist from India; and David Brower, chair of Earth Island Institute. Representatives of the Sierra Club Legal Defense Fund will serve on panels discussing northwestern old-growth forests, the Prince William Sound oil spill, endangered species, and international conservation. For more information, contact the 1990 Public Interest Law Conference, c/o Land Air Water, University of Oregon School of Law, Eugene, OR 97403; phone (503) 686-3823.

A group of Republican environmentalists has formed in California to explore ways of making the party more responsive to environmental concerns in the state and nationwide. According to long-time Sierra Club member Richard Sybert, the traditional Republican philosophy, with its emphasis on the free market rather than on government regulation, could make a real contribution to cleaning up the environment. For example, price mechanisms could make polluting expensive, and natural resources could be priced at full value.

For more information about Republican Environmentalists, write to Richard Sybert, 333 South Hope St., 48th Floor, Los Angeles, CA 90071; phone (213) 617-4170.

The Earthwise Consumer is a newsletter "for people who want the choices they make to be personally healthful as well as environmentally beneficial." Written by Debra Lynn

Dadd, author of numerous books and magazine articles about natural alternatives to household toxics, the newsletter offers in-depth information about how our actions as consumers affect not only ourselves, but other people and the planet as a whole. A one-year subscription (8 issues) is \$20 from *The Earthwise Consumer*, P.O. Box 1506, Mill Valley, CA 94942; phone (415) 383-5892.

Global Walk for a Livable World invites anyone concerned about Earth's well-being to join like-minded people in negotiating all or part of a trek around the globe. The event is designed to heighten people's awareness about threats to the environment and to suggest lifestyles that will foster a healthier planet.

Phase I of Global Walk will begin January 15 in Los Angeles and conclude October 24 in New York City. As many as 500 people are expected to participate along the way. Phase II begins in London in the spring of 1991. On that leg of the journey, 20 to 30 people will cross Western and Eastern Europe to Greece, then continue through Egypt, Israel, India, and China, concluding in Hiroshima, Japan, in August 1993.

For information about the event, contact Global Walk for a Livable World, 1431 Ocean Ave., Santa Monica, CA 90401; phone (213) 458-3911.

The Public Broadcasting System is airing several films in January that are likely to be of interest to Sierra Club members.

The Wilderness Idea: John Muir, Gifford Pinchot, and the First Great Battle for Wilderness, a film by Lawrence Hott and Diane Garey, airs January 9 as part of the *American Experience* series. Produced by Florentine Films of Haydenville, Massachusetts, the film combines scenic shots with archival footage to document the historic battle

over Hetch Hetchy Valley in Yosemite National Park. That controversy pitted Sierra Club founder John Muir against U.S. Forest Service chief Gifford Pinchot in one of the key struggles in North America's fledgling conservation movement.

Also airing January 9 is *Poison in the Rockies*, a film by Christopher McLeod and Robert Lewis, produced by WGBH/Boston as part of its *NOVA* series. The program reports on a century-old legacy of abandoned mines in the Rocky Mountains: the ongoing pollution of that region's once-pristine waters. McLeod's previous film, *The Four Corners: A National Sacrifice Area?* earned him an Academy Award.

Amazon: Land of the Flooded Forest, a

National Geographic-WQED/Pittsburgh special, airs January 10. The program examines a 38,000-square-mile region of the Brazilian Amazon that is submerged under as much as 50 feet of water for six months of the year or more. In the past 16 years, American scientist Michael Goulding has discovered more than 500 new species of fish in the region.

The first installment of *The Miracle Planet*, a six-part series focusing on natural history and global environmental issues, premieres January 15. The program, co-produced by KCTS/Seattle and NHK/Japan, was filmed on location throughout the world. It concludes with a sobering look at humanity's impact on Earth's ecosystems. ■

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Duck, Duck, Goose

Frogs are peculiar enough. You would think that one group of squat creatures with weird-feeling skin would be plenty for one planet. So why do we need toads, a similar amphibian? And what about other close animal pairs: ducks and geese, butterflies and moths, falcons and hawks, wolves and coyotes?

In every case, each animal fills a different niche in the environment. Frogs and ducks are mainly aquatic creatures, while toads and geese live much of their lives on land. Butterflies exploit the daylight, while moths inhabit the night.

These animal groups have common ancestors. Over time, the pressures of finding habitat, obtaining food, and avoiding predators have caused them to develop in slightly different ways. The variations in their shapes or features are clues to the specific adaptations they've made.

Look at butterflies and moths, for example. Moths usually are drab and have large, fuzzy antennae, while butterflies are brightly colored and have thin antennae. Because moths generally are active at night, they don't depend on colors to find a mate. Instead they rely on chemicals released by one moth and picked up by the antennae of another. Butterflies, which are active in daylight, use visual clues to select their mates.

Knowing how similar animals look and behave differently will help you identify them. But telling animal cousins apart isn't always easy; often they must be studied in a lab or watched as they change from season to season. ■

KEVIN BREEN is a freelance writer in Grand Rapids, Michigan.

PRAIRIE
FALCON

TIM FITZTHUMS / ALLSTOCK

Falcons and hawks, both birds of prey, can be easily confused. They differ most notably in their wings. Falcon wings are long, narrow, pointed, and bent back at the "wrist." In flight, they beat their wings rapidly and do not soar.

Hawks can be divided into two groups.

The accipiters, such as the northern goshawk, inhabit woodlands. To enable them to fly through dense forests, their wings are relatively short and rounded, and their tails are long. When flying, they alternate rapid wing-beats with short glides. Buteos, such as the red-tailed hawk, are heavy-bodied birds with long, wide, deeply notched wings for soaring over fields, and often have fan-shaped tails.

RED-TAILED HAWK

TOM BLEDSOE / OAK PHOTO



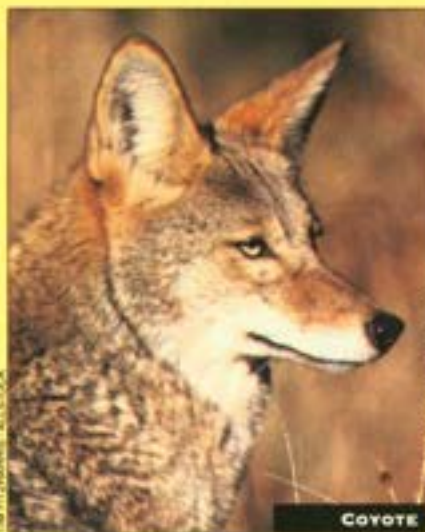
CHINESE GESE

Geese are generally larger and plumper and have longer necks than ducks, but the differences don't end there. Because geese are mostly land grazers, their legs are positioned centrally under their bodies so they can walk easily. Duck legs are positioned farther back to facilitate swimming. Geese, which usually have plain white plumage, molt (shed their feathers) just once a year. Ducks, which have colorful, often iridescent feathers, molt twice a year. Male and female ducks of the same species have different plumage, which helps them select their mates, while male and female geese of the same species have identical coats.



NORTHERN MALLARDS

Wolves are nearly twice as large as their relatives in the dog family, the coyotes. A male timber wolf typically weighs 75 to 100 pounds, measures five to six feet long from nose to tail, and stands three feet high at the shoulder. A male coyote usually weighs under 40 pounds, and measures less than four feet long and two feet tall. Wolves have wider snouts and shorter ears. They run with their tails held high, while coyotes hold theirs low. One final difference: Wolves inhabit North America and Asia, and their range is mostly shrinking; coyotes are restricted to North and Central America, and their range is expanding.



COYOTE



GRAY WOLF

There are more than 3,400 types of frogs and toads in the world. In general, the different species are so diverse that it's difficult to clearly separate the frogs from the toads. But two families of these amphibians make it possible. The *Bufo* family, known as the true toads, have a hopping or walking gait and dry, dark, warty skin that helps the animals resist dehydration.

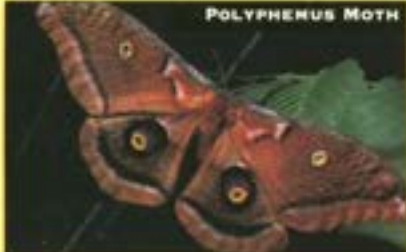
EDIBLE FROG



TIGER SWALLOWTAIL



POLYPHEMUS MOTH



AMERICAN TOAD



In addition to differences in coloring and antennae, moths have plumper bodies than butterflies. When at rest moths hold their wings open, while butterflies fold their wings vertically over their bodies, unless they're gathering heat. If a butterfly held its wings open all the time, it would be an easy target for birds. By folding them, the bright butterfly exposes only the wings' dull undersides. The drab moths display their wings at night without too much worry of detection.

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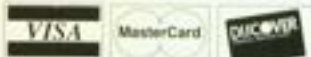
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Peter Wild

WE GO TO NATURE for any number of reasons: to stretch our legs under vast skies, to paint and photograph, to get away from it all, and, as John Muir observed, to muse on the "inexhaustible pages" of the outdoors. Yet most of us have deeper, less-often expressed reasons. We need to visit places that in their wildness reconnect us to the indescribable forces that are larger and more powerful than we are. In turn, they reconnect us, perhaps, to the sanguine wildness in ourselves.

Bill McKibben argues that we might as well forget about future forays into our favorite haunts. Mankind has so domesticated the world, so twisted its processes to human ends, that we can hardly speak of wild nature anymore. We may thrill at the sight of a brown bear gazing out at us from alder thickets, but the bear exists at the pleasure of a fish-and-game department carefully managing the "wildlife" under its suzerainty for the purposes of the state.

"Bears hold more or less the same place now as golden retrievers" in our manipulated world, McKibben decries. And this awareness colors our traditional view of nature as a place apart from civilization. We may flee to the mountains to breathe the pure air, but, as McKibben reminds us, the very atmosphere of the globe is polluted from pole to pole. The "something larger" that once took us to the edge of mystery and beyond has been conquered and now is purely theoretical. We live in a world of our own making.

Worse, the artificial realm we've created around us is fast slipping out of control. Nature, like some long-suffering, abused horse, is about to kick back and do us in for our past follies. McKibben's is a heavy message for those of us yearning for the solace of nature's bosom.

Still, environmentalists have become used to books pointing to a bleak present and an even bleaker future. It seems that overpopulation, nuclear winter, desertification, or some similar calamity lurks apocalyptically just around the corner. You'd think that, under such pressure, we'd have long ago joined the sackcloth-and-ashes set. What has kept us on a more even course has been the hope, admittedly slim at times, that with hard work and good sense ecological disaster can be averted. If *The End of Nature* is one more well-reasoned lamentation proposing yet one more burden to carry in the chancy business of healing the planet, well, we'll take up the book's issues and bear them with a sigh.

McKibben's, however, is a lamentation with a difference. Traditionally, most such alarms try to wean us from our muddled ways. If only we can realize the stupidity of nuclear warfare (or whatever), we can pull the teeth from the catastrophe leering on the horizon.

Not so with *The End of Nature*. From his hideaway in the Adirondacks, McKibben muses on the coming changes in climate brought on by the greenhouse effect, and envisions the forest outside his window soon turning brown, the nearby stream drying up—the whole idyllic scene he's hiked in and grown to love contaminated, as if visited by one of the plagues of Egypt.

The real problem, though, as McKibben sees it, lies not with the rising seas, withering forests, and

other fearsome possibilities much touted in the press recently. Rather, it is that it's already too late. We've polluted the atmosphere with so many chloro-fluorocarbons and so much carbon dioxide and other aerial garbage that climate change is inevitable.

Readers wont to pooh-pooh such gloomy predictions as the frothings of yet another tattered and wild-eyed prophet raving down from his mountain might consider the evidence McKibben assembles in his book. Scientists in the field may disagree about whether the greenhouse effect has begun and how severe it will prove to be, but generally they've arrived at a consensus that we're in for some stunning shifts in weather patterns. McKibben quotes the University of California's Sherwood F. Rowland on his research into destruction of the ozone layer: "I just came home one night and told my

wife, 'The work is going very well, but it looks like the end of the world.'"

By "the end," we should note, is not meant a cinematic firestorm crisping us all into oblivion, or a dramatic tidal wave sweeping the planet and accomplishing much the same thing. Rather, changes will be more gradual, taking place over the next few decades. According to this scenario, humans scramble to counter slowly invading seas, massive droughts, and the increased effects of acid rain. Apparently, as T. S. Eliot told us decades ago, our demise will come not with a bang but a whimper.

Where do McKibben's doleful predictions leave us? First of all, if the future is as hopeless as the author paints it, it's a little puzzling that McKibben would waste his time writing the book. But that lies in the province of psychology, not environmen-

talism. We can do little more with this information than nod our heads stoically and agree that, yes, the planet is in sorry shape. That's a burden those of us who care about it have always had to bear while translating our concerns into activism. But no matter what shape this globe is in, a measure of our own spiritual health lies not in despairing on the sidelines but in exercising our hope for the place we love. Perhaps we should be mindful of Margaret Murie's words about her husband, Olaus, a wildlife biologist: "He believed that even with the very worst forecast possible for the future, it was more fun to take part in the battle for what you believed in than just to stand on the sidelines wringing your hands." ■

PETER WILD is a writer and English professor in Tucson, Arizona.

THE PRINCE

Continued from page 117

tary rather than mobile forms of production, and the government likes these schemes. But damming the river is politically a very hairy issue. It would probably result in war with Nigeria. Even without a dam at Timbuktu, the government plans to build a million hectares of irrigated rice fields. The environmental consequences could be disastrous, and it will make the area more vulnerable to drought. Instead of three lines of production, from fishing, farming, and pastoralism, you'll have only one.

"An entirely different approach to development would encourage rational use of the delta by the people who live here. They've been practicing a risk economy for years. You plan for drought. You assume minimum natural resources and use this as your base. And then you tackle the thorny question of controlling the number of strangers let into the area."

I ask Richard if he has learned anything new about the delta since his return, and he gives me a grim report. The social arrangements that once

governed the area are collapsing. Farmers are cutting *bourgou* and selling it to herders who traditionally grazed it for free. Civil servants are staking off garden plots along the river on what used to be common ground. The fishing communities are breaking up under the pressure of too many people and too few fish.

At our last meeting I find Stephen Cobb sitting in his office. The wind is rattling the shutters and blowing papers across his desk. A sandstorm has cut visibility to a hundred feet. The sun glows with the eerie orange light of a holocaust fireball. "God, this is nasty," he says, stooping to pick up some Malian bank notes that have blown onto the floor. "I'm not particularly good at keeping track of these things anyway, and this doesn't help."

I look out the window to see a turbaned figure plowing into the wind. "There's no way you can really describe to people what it's like to have sand up your nose and in your teeth," says Stephen, following my gaze.

As he sits on the banks of the Niger watching the world around him dissolve into a cloud of dust, Stephen

thinks he is seeing "the inescapable evidence of climatic change." He could be wrong, but that's what it feels like. There is little solace to be found in reviewing weather data for the past two thousand years, but the historical record does contain one item of interest: Roman Africa, the Sahelian empires of the Middle Ages, and the Dina of Cheikou Ahmadou all managed to nurse agricultural plenty out of resources nearly as meager as those available today. The key seemed to lie in political organization, control of grazing and fishing rights, small-scale irrigation projects, and seasonal use of land that was replenished through reserves and various cycles of cropping and grazing. Stephen is no emperor or sheik capable of imposing his will on people, but these old techniques look to him like the only hope for preserving what remains of West Africa's greatest wetlands. ■

THOMAS BASS, a writer living in upstate New York, traveled in Africa from 1985 to 1987. This article is adapted from the first chapter of his book *Camping With the Prince and Other Tales of Science in Africa*, to be published by Houghton-Mifflin in February.

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EVEN WITH ALL the guidebooks and travel agents in the world, travel tips are accurate for only as long as it takes to pass them on.

This uncertainty makes preparing for an overseas trip adventurous; long before you set foot on foreign soil, you'll be swimming in thoughts of the unexpected. It also makes planning a challenge: Unless you sign up for a package tour, there's no single source of information about your destination that you can rely on.

Comprehensive planning takes in the fun stuff—those Walter Mitty dreams of strange lands that convince us to leave the comfort of our Barcaloungers in the first place; and the necessities—the preparations we need to make to avoid (or at least survive) the mishaps and misadventures that seem to await us when we're far from home.

To start, read everything you can get your hands on about your destination, corner everyone you know who's been there, and hang on your wall the largest map you can find of the place and stare at it during every idle moment.

Comb guidebooks carefully for general information and rules of thumb, and compare their specific recommendations, but always with a grain of salt. For example, most guidebooks point out that the cheapest (albeit noisiest) lodgings are near bus and train stations. Their detailed suggestions often disagree, however, and they may also be out of date even before publication. Some of the best

guides for independent travelers are offered by Lonely Planet Publications and Moon Publications.

Trust word-of-mouth advice as long as you trust the mouth it comes from. Recent returnees are a good source of current information, but make sure you share similar tastes. And be wary of too much word of mouth: If nine out of ten of your friends have just returned from Yelapa or Bali and they all rave about how undiscovered those places are, think twice.

Learn a bit of the language before you head out. Admittedly, hand signals and a smile work as well for some travelers as a phrase book or a brief language course. But try to learn several expressions, covering the basics of logistics ("Where is?" and "How much?"), politeness ("Please" and

"Thank you"), and protection ("No" and "Leave me alone"). Read up on your destination's culture and history. Cultural (and natural) appreciation is what separates travelers from mere tourists, and the nominal effort tells your hosts that you're grateful for the chance to visit their stomping grounds.

While you're beguiled by the romance of travel, don't overlook the paperwork, health matters, and other possible difficulties of being on the road. Applying for passports and visas is easy, as long as you apply early. A State Department hot line offers information about crises and travel restrictions throughout the world (202/647-5225). Health precautions are almost as easy to take care of, although immunization programs should be begun well in advance of a trip.

While few medical-insurance plans cover immunizations, many U.S. cities have public health clinics where you can get immunizations at a fraction of the cost charged by a private physician. The Centers for Disease Control provides recorded information about worldwide health conditions (404/639-1610).

Away from home, be prepared to handle disorders that range from dysentery to the minor discomforts caused by stress or change of diet. Most guidebooks have extensive sections on staying healthy.

A traveler's medical kit should include malaria pills, as well as treatment for nuisances: pain relievers, insect repellent, sun protection, and remedies for motion sickness, mild diarrhea, and constipation. Also pack supplies for



Before you head out, get the lowdown on Lombok.

infections, bites, cuts, scrapes, and allergies (few phrase books will help you find the local word for adhesive tape). Travelers to mountain regions should know how to treat altitude sickness and hypothermia. Clean and treat injuries carefully, especially in the tropics, where wounds heal slowly. If you have special health problems, consult a physician before setting out.

If you do need a doctor, anticipate difficulty if you don't speak the local language. Carry documentation describing any medical conditions you have, and plan to be bold with hand signals. English-speaking consulates or embassies may offer medical referrals. And don't leave home without insurance that covers medical evacuation in case your situation is severe. (In extreme cases, such as when a trip is canceled because of a typhoon or war, travel insurance may cover airfare and other trip costs.)

Stress and fatigue can cast a constant shadow over foreign trips. Harsh climates, bureaucratic hassles, and unfamiliar cultures take their toll if you don't stay well-rested and happily fed. To help keep a positive attitude, choose your travel partner carefully. Find someone who will remain sane if your train never arrives and who will chuck an itinerary if circumstances change. Relationships can be lost, as well as found, on the road.

Travel stress begins with a flight that crosses many time zones in a single bound. To avoid jet lag, try to arrive at night so that you can go directly to bed, avoid drinking alcohol in-flight, and sleep according to the time zone of your destination. Ease yourself into your trip by prearranging a hotel room for your first night and scheduling few activities for your first day.

Seasoned travelers know that a trek really begins the moment they nestle into a favorite chair with a good guidebook. Even tending to the essentials becomes part of the grand tour, enabling you to keep your head in the clouds without missing a step. ■

REED McMANUS is Sierra's associate editor.

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WEEKS TO WANDER

Continued from page 41

sleeping bag under the wing of the tarp, watching the storm like a movie.

THE NEXT MORNING I climbed down off the Fold, picked up some cached supplies, and set out across the valley into World Number Seven—the barren and waterless Mancos Shale badlands. I moved slowly, laboring under a full pack and two gallons of water. With each stride my boots sank two or three inches into the soil. To the north, 800-foot-high Swap Mesa formed a continuous golden wall, with sharp-nosed promontories and deep bays. To the south, an endless series of low hills undulated to the horizon, wave upon wave.

The Mancos badlands are all that the Escalante canyons are not. While the canyons are narrow, crooked, and intimate, World Number Seven is as expansive as the sea. Late in the afternoon I spotted a pinnacle off to the south, a 20-foot-high tower capped with a square block of stone that must have weighed several tons. Below the tower I found a delicate natural arch. These odd embellishments stood alone, a tiny sculpture garden lost in all the space.

Night came, moonless and still. I would have no campfire. There was no firewood—not a tree, not a bush—for miles. When I shut off my backpacking stove, the silence was instant and absolute. The tiniest sound—the gurgle of hot water pouring into my cup, the scraping of a spoon on the bottom of my aluminum pot—seemed wildly incongruous. I felt naked, conspicuous, alien.

If silence were a commodity, the Mancos badlands would be some of the most valuable real estate in the country. At present, however, they are valued more highly for coal. They lie within the Henry Mountains Coal Field, where a BLM study has earmarked some 25,000 acres as suitable for stripmining. They are also in the

heart of the 74,000-acre Mt. Pennell BLM Wilderness Study Area, but not one acre was recommended for designation in the BLM's 1986 draft wilderness environmental impact statement.

By 9 p.m. I was tucked in my sleeping bag, staring up into the black void of the universe. A delicate breeze flowed over me like water over a log. I played with my headlamp switch, answering the starlight, sending cryptic



Mission accomplished.

messages into the cosmos. Then, on an impulse, I howled.

My cry traveled across the badlands, evaporating swiftly in the dry air, gobbled by silence. Then, like a boomerang, it returned. Close behind it came a second howl, mingling with the first. Far away to the east, a pair of coyotes was answering my call.

Which was more chilling, their answer or my question? What was that strange, new sound in my voice? After wandering for 12 days through a succession of otherworldly landscapes, I had begun a kind of transformation.

How to describe it? Loneliness. Awe. The cold objectivity of the stars. The sudden diminution of my ego—of my sense of importance—against the scale of the landscape, the planet, the cosmos. A taste of the unknown and unknowable. A taste of fear.

THERE CAN BE no better way to measure the size of a mountain than to carry a heavy backpack from its base to its summit. On the final afternoon of my journey, I climbed 5,000 feet to the top of Mt. Pennell. A race with the sun, the climb took seven hours.

Like its neighbors in the Henry Mountains, Mt. Pennell is a frustrated volcano—the remains of a huge dome of sedimentary rock, uplifted by molten rock from below. Yet one need not know the range's geologic history to sense immediately that these mountains do not quite belong where they are. Mantled with forest and watered by streams, they are islands of green whose frost-shattered summits tower above the desert badlands below.

At 6:20 p.m. I arrived at a saddle just 600 feet below the top. My legs were shaky, my clothing stiff with sweat. I had reached a beachhead of civilization—the road that would lead down the east face of the mountain to my waiting jeep. My journey was very close to its end. All that remained was to scale the summit.

Minutes before the sun touched the horizon, I was on top. Below was a jumble of cliffs, buttes, mesas, pinnacles, canyons, reefs, and domes. Thirty miles distant, Boulder Mountain was a shadow on the western horizon. To have walked from Boulder to Pennell seemed as miraculous as to have been transported by flying carpet. There was little, in fact, that did not seem miraculous. As the sun set, the shadow of Mt. Pennell grew into an enormous pyramid, swelling eastward across the Burr Desert, the Dirty Devil River canyons, and the rim of the Canyonlands Basin. It was time for a summit shot. I planted my camera on a tripod and cocked the automatic shutter release. The sun flattened on the horizon; I grinned.

Looking back, I can see in that grin the unmistakable evidence of a mission accomplished. I had discovered what will be lost if we transform the plateaus and canyons of southern Utah into tree farms, oil fields, and strip mines. I had found what I came to experience—one of the last great remnants of American wilderness. ■

RAY WHEELER is a freelance writer and photographer based in Salt Lake City. He is coauthor of a book about Utah wildlands to be published by the Utah Wilderness Coalition early this year.

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
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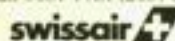
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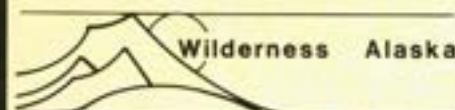
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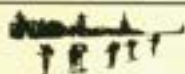
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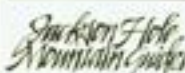
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QUESTIONS & ANSWERS

Has the tuna boycott had any effect on the tuna industry? (Richard G. Kritzer, Columbus, Ohio)

Earth Island Institute, the environmental organization that initiated the boycott in 1986, claims that the recent sale of two major tuna companies to foreign corporations is proof of the boycott's effectiveness. But according to the *Food Institute Report*, a trade publication of the food industry, sales of canned tuna have actually increased from 3.2 pounds to 3.6 pounds per capita since the boycott began.

Earth Island launched its boycott to protest the killing of dolphins by tuna-fishing fleets in the eastern tropical Pacific. Every year some 100,000 dolphins die when they become trapped in mile-long purse-seine nets used to capture the yellowfin tuna that swim with them in this region.

The boycott applies to all canned tuna. Although 95 percent of tuna—including all albacore ("white") tuna—is caught without the use of purse-seine nets, none of the major companies has been willing to sell *only* tuna captured by alternative methods.

To heighten consumer awareness of the dolphin-killing, U.S. Representative Barbara Boxer (D-Calif.) has introduced legislation requiring canneries to disclose the fishing methods used by their suppliers. Under H.R. 2926, tuna cans would be labeled "dolphin safe" or carry the



message: "The tuna in this product has been captured with technologies that are known to kill dolphins."

What is the risk of dioxin contamination from food packaging? (Laura M. Appelbaum, Rye Brook, New York)

Dioxin, the most toxic synthetic chemical known, has been shown to cause cancer and birth defects in laboratory animals, but the effects on humans are still being debated.

Trace amounts of dioxin have been found in milk and foods that come in contact with chlorine-bleached paper products, such as milk cartons, coffee filters, microwave-dinner containers, and paper plates and towels. Although the

Food and Drug Administration insists that the levels are safe, it has ordered milk-carton manufacturers to change the bleaching process to reduce dioxin leaching.

In paper manufacturing, dioxin forms when chlorine and heat are added to wood pulp. Because of fears about the toxin's possible health and environmental effects, some pulp mills in Europe are using oxygen and hydrogen peroxide as bleaching agents. And, as unbleached products are becoming increasingly available in England, Germany, and Scandinavia, consumers there have the option of going gray.

Is there a harmless alternative to salt for de-icing

roads and bridges? (James Newton, Grand Rapids, Michigan)

A corn-based acetic acid being developed by the U.S. Department of Agriculture may soon pave the way for winter travelers—for little more than the price of salt and at no cost to the environment.

In addition to causing an estimated \$5 billion a year in damage to physical structures, salt destroys roadside vegetation by burning or drying out leaves and by interfering with plants' ability to receive nutrients. In drought-stricken areas, salt damage accelerates erosion and increases the threat of wildfires.

Manufacturers of calcium magnesium acetate (CMA), a compound of acetic acid (the principal component of vinegar) and limestone, claim that the substance melts ice as effectively as salt does, and doesn't harm vegetation, pollute drinking-water supplies, or corrode bridges, vehicles, and underground utilities.

The CMA currently in use is petroleum-based and therefore expensive—\$650 a ton compared with \$45 to \$50 per ton for salt. But because the petroleum accounts for 85 percent of the cost, the Agriculture Department's corn alternative would make widespread use affordable. And because CMA has a residual effect, it—and you—will stay on the road a lot longer. ■

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