



# SIERRA

THE SIERRA CLUB BULLETIN

April 1978

\$1.00

California's Peripheral Canal

Mining Law Reform

Panama Canal

# Clear and Clean.



Photograph © 1978 by John Blaustein

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## Sierra Club

To explore, enjoy and preserve the nation's forests, waters, wildlife and wilderness



Founded in 1892, the Sierra Club works in the United States and other countries to restore the quality of the natural environment and to maintain the integrity of ecosystems. Educating the public to understand and support these objectives is a basic part of the Club's program. All are invited to participate in its activities, which include programs to "... study, explore, and enjoy wildlands."

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Cover: California poppy. Photograph by Peggy Wayburn.

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|--|---|--|
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| <input type="checkbox"/> Colombia          | <input type="checkbox"/> Indian (U.S.)          | <input type="checkbox"/> Lebanon             |
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|  |   | <input type="checkbox"/> Rural South (U.S.)  |
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**3. Would you like a picture of your sponsored child?**

Shortly after we select a child for you, we can send you a photograph and brief personal history, if you desire.

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**6. How do you wish to send your sponsorship contribution?**

Enclosed is my check for \$ \_\_\_\_\_

- |  |  |
|--|--|
| <input type="checkbox"/> Monthly, \$16   | <input type="checkbox"/> Semi-annually, \$96 |
| <input type="checkbox"/> Quarterly, \$48 | <input type="checkbox"/> Annually, \$192     |

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photo: Bentley Kassal

# An Important Sierra Club Vote

WILLIAM FUTRELL

*On February 2, the California State Senate defeated S.B. 346 for the second time in five months. The measure lost by a vote of 20 to 14, seven short of the two-thirds margin needed for passage. The issue, however, is not dead. The measure will be reconsidered by the state legislature. Most people agree that the Peripheral Canal will continue to be hotly debated for some time to come.*

—The Editor

**I**N accordance with a Sierra Club bylaw, the entire membership of the Club is being asked by a group of petitioning members to vote expressing an opinion on a key portion of a California state bill, S.B. 346, that would revise the California water plan. Few issues have caused as much excitement among California members of the Sierra Club as whether the Peripheral Canal should be built. The controversy has raged for years. In September 1977 the two California Regional Conservation Committees (RCCs) met jointly, held a four-hour hearing and then voted 22 to 7 to give a qualified endorsement of S.B. 346, which permits construction of the Peripheral Canal under performance of certain conditions. In November 1977 the Club's board of directors voted not to discuss the Club's support of S.B. 346, stating that this complex regional issue was properly the responsibility of the California branches of the Club. Since 1973 the board has delegated responsibility to the RCCs for determining regional conservation positions within the constraints of board-established policies.

In the following months petitions were circulated asking that the question of the Sierra Club's support for construction of the Peripheral Canal be submitted to the national member-

## Wording for Official Ballot

Shall the official Sierra Club support or opposition to the building of the Peripheral Canal be decided by a vote of the full Sierra Club?

Yes \_\_\_\_\_

No \_\_\_\_\_

Shall the Sierra Club oppose the building of the Peripheral Canal?

Yes \_\_\_\_\_

No \_\_\_\_\_

ship. Some 339 signatures were judged valid; 338 were required to qualify for the ballot (1% of the number of members voting in the last national election). Opponents of the Peripheral Canal argue that California Club officers are wrong and that S.B. 346 contravenes the Club's policy against interbasin water transfers. The California officers argue that this is a regional matter that has already been decided on by the two California RCCs.

How did the Sierra Club arrive at its position on S.B. 346? The policy is an outgrowth of the long involvement of

the Northern California RCC Water Committee in lobbying for changes in the California state water plan. Members of the committee developed a strategy involving legislation, litigation and negotiation. In the summer of 1977 a series of meetings resulted in the Club's position of support for S.B. 346, the compromise bill worked out at California Governor Brown's initiative. This compromise was approved by the Mother Lode Chapter and the two RCCs last fall, though some of the Club's regional groups remained opposed to it.

One key issue divides the two sides: how can we be sure the state will live up to its guarantees? The California RCCs' endorsement of S.B. 346 hinged on the fact that the proposed legislation ties construction of the canal to the fulfillment of important environmental conditions.

The two ballot measures demonstrate again the openness of the Sierra Club. Our entire national membership is now to vote on the correctness of the decision of its California officers.

The following summaries of arguments for and against S.B. 346 are written by Larry Moss and Tom Graff. □

## S.B. 346 and the Peripheral Canal

**T**HE PERIPHERAL CANAL is a major segment of the California Water Project. Water is now carried from Northern California dams to the beginning of the California aqueduct through the natural channels of the Sacramento/San Joaquin Delta. The quality of water shipped south is thus dependent on the quality of water in the Delta. The quantity of water that can be shipped south is also limited by the natural capacity of the Delta channels. The present levels of shipment substantially disturb the ecology of the Delta by reversing natural stream flows and disturbing fish and wildlife habitats.

The Peripheral Canal would be an artificial channel to carry water from dams upstream to the pumping stations at the beginning of the California aqueduct and would eliminate the need to use the Delta channels. Natural stream flows would not have to be reversed and in fact could be restored. However, the Peripheral Canal would also make it possible to let water qual-

ity in the Delta worsen without lowering the quality of the water shipped south. And much larger quantities of water could be shipped. Federal and state water projects now divert between five and six million acre-feet of Sacramento River water to the San Joaquin Valley and Southern California—water that would normally flow through the Delta and San Francisco Bay to the sea. The Peripheral Canal would increase the capacity of water exports to eight million acre-feet.

S.B. 346 is an attempted legislative compromise. It authorizes the Peripheral Canal and a number of other water projects but makes the authorization conditional on the maintenance of strict water-quality standards in the Delta by state agencies as they operate the Canal. S.B. 346 also requires, through a Congressional statute or a binding contract, that federal water agencies operate their facilities within California in conformance with strict water-quality standards. □

# The Peripheral Canal: A Debate

## For S.B. 346

LARRY E. MOSS

**H**ISTORICALLY, water development in California has been destructive to economic and environmental values. The State of California and federal dam-building agency plans continued this pattern until the late 1960s, when the governor of California opposed the massive Dos Rios dam on the Eel River in Northern California. Several years later California established a state Wild and Scenic River System that proscribed the construction of large reservoirs on the major unspoiled rivers draining the mountain ranges of northwestern California. Until the establishment of the state Wild and Scenic River System, the North Coast rivers had been longingly eyed as the future source of water for Southern California and the San Joaquin Valley. Now a new path is mandated in S.B. 346.

S.B. 346 is designed to meet California's water needs through the year 2000 by a program of water conservation

and waste-water reclamation, storage in groundwater basins during wet years for use in dry years and surface storage in offstream reservoirs in the Sacramento and San Joaquin valleys. This program protects all of the North Coast rivers because no water development is scheduled there.

S.B. 346 also provides a good solution to the other key water resource problem in California. The hub of California's water resources is the vast estuary made up of the Sacramento-San Joaquin Delta, the Suisun Marsh and San Francisco Bay. This is the largest and the most productive estuary in California, but the current operation of the State Water Project and the federal Central Valley Project has greatly degraded that productivity. The Delta is a network of channels in whose quiet waters fish and other marine life could once breed easily. However, pumps now located at Tracy in the south end of the Delta increase the turbulence of water flowing through the channels. In pumping more than five million acre-feet of water per year they also "export" eggs, larvae and even small fish from the Delta hatchery. Reverse current flows created by these sizable pumps also confuse migrating fish (salmon and striped bass). Furthermore, the Suisun Marsh doesn't receive enough water during some winters to sustain feed for the immense number of

## Against S.B. 346

THOMAS J. GRAFF

**T**HE PERIPHERAL CANAL would make it possible to increase exports of Northern California water to Southern California to more than eight million acre-feet. Though S.B. 346 does not authorize construction of dams on California's North Coast wild rivers as the source of additional exports, the Canal would increase the capacity of the systems to transfer water from the North Coast to Southern California.

S.B. 346 also authorizes construction of both the Mid-Valley Canal—which would divert an additional 650,000 acre-feet annually to the valley (where farmers have been "overdrafting" or mining groundwater at twice that rate)—as well as several offstream and underground storage reservoirs to store run-off that would otherwise flow out through the Delta.

S.B. 346 includes provisions designed to obtain federal financing of more than half the projects' cost and to convince environmentalists that the projects will help the fragile Delta environment. These provisions require that before construction may start, a Congressional Act must be passed that will assure the maintenance of water-quality standards and fish and wildlife protection measures in the Delta.

Senate Bill 346 (and the Peripheral Canal) have four fundamental defects:

(1) The Peripheral Canal would threaten what is left of the Delta and impair the integrity of San Francisco Bay. Water exports have decimated San Joaquin River fisheries and substantially depleted the fisheries of the Sacramento River, as well as the Suisun Marsh's waterfowl feeding areas. Arguably a properly designed and managed Peripheral Canal could mitigate some of these atrocities, but whatever paper guarantees of Bay and Delta protection are written into law, the likely result of the Canal's construction would be increased exports south and less water for the Delta's environmental needs.

(2) Building the Canal would point a loaded gun at the

waterfowl that winter there. The Bureau of Reclamation, which operates the Central Valley Project, has compounded this problem by refusing to release stored water into the Delta to meet water quality standards for agriculture and other beneficial uses. The only legal responsibility the Bureau acknowledges is to provide adequate water quality at the pumps that export water from the Delta.

S.B. 346 mandates that facilities to supply adequate fresh water for the Suisun Marsh be built posthaste. The bill also clarifies the State Water Project's responsibility to release stored water for fish and wildlife and other beneficial uses in the Delta, Suisun Marsh and San Francisco Bay and forbids the export of water from the Delta unless an adequate supply remains to serve all beneficial uses there.

Finally, S.B. 346 conditionally authorizes the construction of the Peripheral Canal but only under conditions that assure the Canal will benefit fish and wildlife populations in the Delta. By drawing water from above the Delta and channeling it along the Delta's eastern edge, the Canal will alleviate the problems caused by the pumps at Tracy and help restore the Delta's fishery and wildlife habitat. Isolating the water transfer from the Delta proper should mitigate the environmental and fisheries problems that now exist.

wild rivers of the North Coast because it would substantially increase the capacity of the federal and state projects to export Northern California water to the south. Legal guarantees of wild-river protection can be rescinded, and developers are not likely to let a billion-dollar ditch—once installed—be used at less than full capacity.

(3) S.B. 346 would cost \$7.2 billion by the developers' estimate (which assumes 6% annual inflation). Federal taxpayer contributions to this cost would be immense, since the plan's principal beneficiaries, Central Valley farmers, cannot afford anything near the water's full price, estimated at \$100 to \$300 per acre-foot. The current federal price for Delta water is \$3.50 per acre-foot.

(4) S.B. 346 inadequately addresses the only possible resolution of the tug-of-war between the North Coast/Delta and water-hungry, semi-arid Southern California—*water conservation*. Progressive legislators inserted a \$50-million revolving water conservation loan fund into S.B. 346. But the loan fund, intended to encourage the adoption of efficient irrigation technology by California farms, is only a drop in the bucket. In order to eliminate the Central Valley's overdraft and to satisfy Southern California's water needs, a sub-

State authorization of the Peripheral Canal is qualified by conditions to assure that the project will benefit the San Francisco Bay-Suisun Marsh-Delta estuary, and *no Peripheral Canal can be built unless all the conditions are met*. The stipulations provide that the federal government, in conjunction with California, must release adequate water into the Delta, Suisun Marsh and San Francisco Bay to meet *all water quality standards* and to restore fish and wildlife populations to historic levels. The conditions protect agricultural and municipal as well as fish and wildlife interests in the Delta, Suisun Marsh and San Francisco Bay.

Passage of S.B. 346 will change the California Water Plan substantially. Water conservation and reclamation, more efficient use of existing water supplies and adequate protection for the Delta-Suisun Marsh-San Francisco Bay estuary will be the cornerstone of a new water plan. For this and the above reasons the Sierra Club now supports the bill and should continue to do so.

---

*Larry E. Moss is a former executive director of the Planning and Conservation League; he serves on the Mother Lode Chapter Executive Committee and was formerly the Club's associate conservation director.*

stantial conservation program is needed. It is not included in S.B. 346.

In sum, S.B. 346 threatens important environmental values, is extremely costly and is a regressive water management measure. In 1970 the Sierra Club Board of Directors called for a halt to further design or construction of any major addition to the California Water Plan. Nothing significant has changed since that time.

The center of the stage for water resource policy is shifting to Washington, where President Carter again seems ready to assault the venerable Congressional pork barrel. Environmentalists helped elect Carter partly because of his water resource record in Georgia and his promise to take the Army Corps of Engineers out of the dam-building business.

A vote in opposition to S.B. 346 and the Peripheral Canal indicates support for his reforms. A vote in favor of S.B. 346 and the Canal, on the other hand, would support a massive interbasin water transfer, an example of just the kind of pork-barrel legislation the President has opposed.

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*Thomas J. Graff is west coast regional counsel of the Environmental Defense Fund and serves on the Water Subcommittee of the Northern California Regional Conservation Committee.*

*Two Hundred Years After Captain Cook*  
**Otter Crest**

BYRON H. DUDLEY



Photographs by Byron Dudley

**O**N A LATE WINTER'S DAY IN 1778, Captain James Cook first sighted North America. Sailing the *Resolution* off Oregon's north-central coast ten miles north of what is now Newport, Cook viewed the 500-foot-high headlands. Coming closer, he saw the cliffs, the isolated coves and rocky, sandy beaches, and he recorded it all in his journal:

"At daybreak, the long-looked-for coast of New Albion [so named by Sir Frances Drake in 1579] was seen. . . . At the northern extreme, the land formed a point which I called Cape Foul Weather from the very bad weather we soon met with. . . . Our difficulties now began to increase. In the evening, the wind came to the northwest, blowing in squalls and with hail and sleet and the weather being so thick and hazy I stood out to sea. Two days later [March 9, 1778] I ventured in. . . . The land is of moderate height, but in some places, it rises higher within, and many of the hills are covered with tall, straight trees. The whole, though it might make an agreeable summer prospect, now had an uncomfortable appearance. . . . Latitude, 44°33' north, Longitude, 124°40' west."

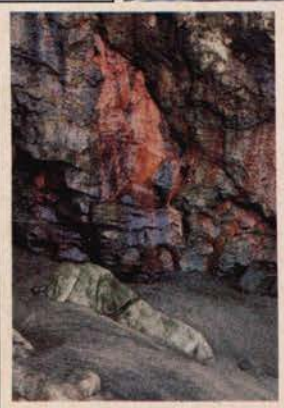
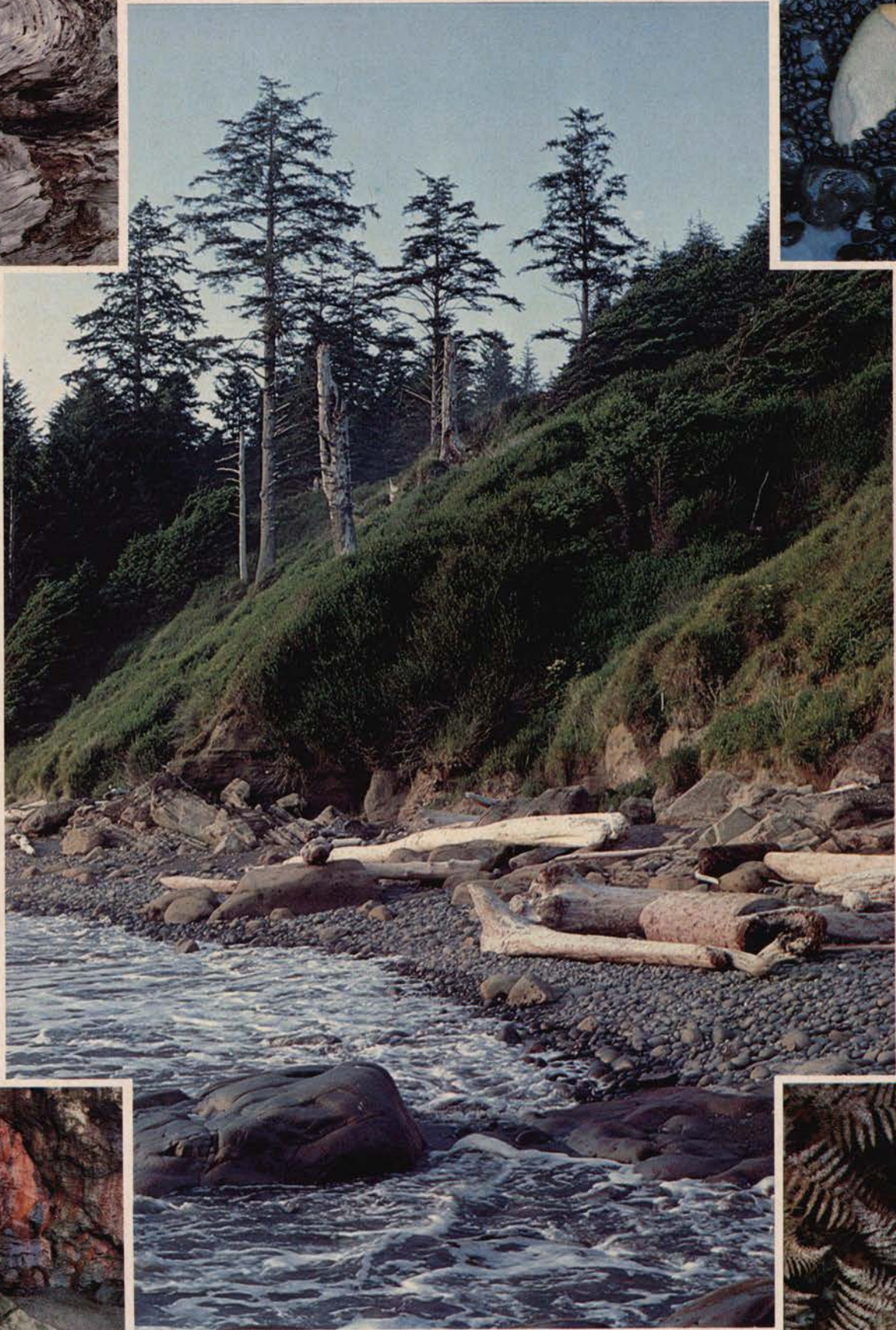
The journals of Dr. David Samwell, surgeon of the ship *Discovery* (companion and sister ship of the *Resolution*),

offer a bit more detail concerning the coming of Captain Cook to the coast of North America. Dr. Samwell wrote: "At ½ past seven this Morning [Saturday, March 7, 1778] we saw the Coast of America bearing NW, the extremes of it from NNE to ESE, off shore about 8 leagues. This Land is high and craggy and mostly covered with snow. We saw prodigious large flocks of birds flying about. Squally with fogs and frequent Showers of Snow, Hail, and Sleet, which made it dangerous to approach this unknown Coast too near. . . ."

Times have changed, but the coast has not. The cape, still called Foulweather, remains a barren, rugged headland often cloaked in clouds and fog. Yet also here are weathered driftwood, sculptured sea walls, sea-carved arches and caves, the open expanse of the sea and concave cover of the sky. Otter Crest seems a gentler place since we have come to expect more than danger from it. It seems, in its calmer moods, lush and verdant, both dramatic and introspective. Otter Crest remains an unspoiled place of real beauty. In many ways, it is the very spirit of the Northwest Coast. □

*Byron H. Dudley is a photographer living in Eugene, Oregon and working for the preservation of Otter Crest.*





# Mining the Public Wealth

DAVID SHERIDAN

**A**BOUT ONE-THIRD of the total U.S. land mass is owned by the public. Lying west of the Mississippi River for the most part, these public lands are used for a variety of purposes: fishing and hunting, grazing livestock, lumbering, archaeological digs, hiking and camping, wildlife sanctuaries, testing nuclear weapons, collecting firewood, motorcycle racing. Among those who exploit the publicly owned resources for profit, the hardrock mineral explorer and miner possess unique privileges.

Under the terms of the Mining Law of 1872, the hardrock explorer and miner can go onto any public land that has not been specifically withdrawn from mining activity—about 68% of the almost 800 million acres of public land are open to mineral development—and look for mineral deposits, claim them, dig them out of the ground and process the ore—all on public land. No permit or license is necessary. No fee is paid for the use of the land or its surface resources; no royalty is paid to the U.S. Treasury for the extraction of valuable minerals. If the mining activity conflicts with some other use of the land, whether it be trout fishing or grazing Herefords or any other pursuit, that is too bad. Mining has first priority under the law. Furthermore, the hardrock miner has the option of buying the land that contains a marketable mineral deposit from the government for a mere pittance—\$2.50 to \$5.00 per acre, surely one of today's great real-estate bargains. Of course, miners enjoy no such privileges on private lands. There, they must obtain permission before beginning operations, and they must reimburse the owner for the use of the surface resources and for the extraction of mineral wealth.

All commercial users of public land once had the same privileges that miners still enjoy. Indeed, it was the explicit policy of the federal government in the nineteenth century to dispose of public land and resources as quickly as possible. Public land was the bait used to lure railroads, lumber companies, ranchers and homesteaders westward; the conquest of the whole continent was our manifest destiny. The Mining Law of 1872 was written and passed in this spirit.

Moreover, it was a supremely practical measure. Prospectors and miners had already swarmed onto public land in the West. Their presence on the land was a fact and there was little a distant and ineffectual federal government could do about it. As one historian has noted, the mining law legalized "what would otherwise have been a trespass."

By the end of the century, however, it began to dawn on some Americans that our natural resources were not limitless. In 1897 Congress passed the Organic Administration Act, which ended the lumber companies' free and unlimited access to national forests. Congress brought the operation of oil, natural gas, coal and phosphate companies on public land under federal control by passing the Mineral Leasing Act of 1920. In 1934 the Taylor Grazing Act ended ranchers' free and unlimited access to public

rangelands. Homesteading had already been curtailed. But somehow the privilege of hardrock miners survived. The Mining Law of 1872, a relic of another age and philosophy, withstood all efforts to reform it.

Many officials, agencies and commissions have recommended reform—among them the Hoover Commission (1949), the Paley Commission (1952), the Secretary of the Interior (1969), the Public Land Law Review Commission (1970), the former director of the Bureau of Land Management (1970) and the General Accounting Office (1974). In every session of Congress since 1969 someone has proposed legislation to reform the mining law.

Now the Carter Administration has sent a bill to Capitol Hill that would totally revamp the mining law—ending the hardrock miners' special privileges. At stake here are several key issues:

- Will the public retain ownership of land that contains mineral deposits?
- Will the public receive a fair market return for the exploitation of these minerals?
- Will the government agencies that manage this land for the public have the clear-cut legal authority to prevent mining in areas of special scientific, cultural, recreational or ecological value?
- Will the government be able to minimize the permanent environmental damage caused by mining?

Without a change of the Mining Law of 1872 along the lines proposed by President Carter, the answer is "no" to the second and third questions, and "not necessarily" to the first and last.

Although this is the first time such efforts have had the full-fledged support of the White House, the prospects for the legislation still look very uncertain. In recent years, small miners more than anyone else have thwarted attempts to reform the mining law. The big mining companies such as Anaconda, Kennecott, AMAX and Asarco have, for the most part, supported limited reforms—such as paying royalties and recording mining claims with the federal government. The small miners, on the other hand, have resisted changing even a comma in the Mining Law of 1872.

The reasons for the small miners' intransigence are partly economic. Some of them operate on a very small margin. They rightly fear that the extra costs of complying with government regulations—those requiring reclamation of the mined land—would drive them out of business. But the psychological reasons are probably more profound. In small towns throughout the West are people who call themselves miners. They may, indeed, have small mines that they work by themselves or with friends. The income may be meager, but they enjoy the freedom of being their own bosses. Independence is highly prized for its own sake in these communities. But it would be more accurate to recognize many of these miners as speculators. That is, they make their livings pumping gas or driving trucks, but in their

*The present system holds out hope  
to thousands of people who wait to someday hit the jackpot.  
The odds, of course, are awful—  
something like 2000 to 1 that their claims  
will never be purchased or mined.*

spare time, they prospect for mineral deposits on public land. (All they are required to do to stake a claim is fill out a simple form at the county courthouse and another at the local Bureau of Land Management office.) The small miners or prospectors then sit on the claim hoping that a large mining company will come along, do some professional mineral exploration and assessment and buy the claims from them. The present system holds out hope to thousands of people who wait to someday hit the jackpot. The odds, of course, are awful—something like 2000 to 1 that their claims will never be purchased or mined. But the appeal of such a system is strong, almost as strong as gambling.

In his study of mineral development in Nevada, Anthony Payne, a professor of geology at the University of Nevada and a practicing geologist, found: "No important mineral discovery has been made in Nevada by an amateur prospector in the post World War II period." He also found that the total yield from the operations of small miners accounts for less than 1% of the state's annual mineral production. The same apparently holds true for other mining states such as Arizona, Utah, Colorado, Idaho, California and New Mexico. In other words, the greatly romanticized small prospector-miner, who has traded in his burro for a four-wheel drive pickup, is playing a very insignificant role in the mineral development of the modern West. As Payne noted: "The exploration and development of a modern mine requires a very substantial amount of money." Knowledge and sophisticated exploration techniques are required too. Most of the easy-to-find, big mineral deposits have already been found, it seems.

But the small miner-pro prospector is still a political force to be reckoned with. In fact, the Administration's bill contains a special section for the small miner (defined as an individual or a partnership of no more than three persons, not a corporation). Small miners are allowed to submit "abbreviated" exploration and mining plans before commencing work, and the federal government is required to provide them with direct technical assistance in doing the necessary paperwork and "carrying out operations." These plums will undoubtedly do little to assuage small miners' opposition to the legislation, however. And the record shows that small miners and prospectors and their various associations lobby hard and effectively—deluging western congressmen and senators with letters and calls.

In addition, the reforms being proposed by the Administration are thorough enough that some will also be opposed by the big mining interests who, for instance, would no longer have the option under the new legislation of obtaining full ownership of a public mining property. Overall, stiff political opposition can be expected.

Under the terms of the Administration's bill, hardrock mineral exploration that would cause more than "minimal disturbance" to the environment would require a license and the submission of a reclamation plan. The license would be good for

five years and would cost not less than \$5 per acre. If a mineral deposit were found, the license-holder would seek to lease the property. The standard lease would run for twenty years (with an option to renew) and cost not less than \$25 an acre. The miner would also pay royalties to the U.S. Treasury equal to 2% of the gross value of the mine's output. Reclamation plans and the ongoing reclamation itself would be required of the mining company. In all cases, the public, however, would retain ownership of the land.

If passed, this legislation would give the agencies that manage the public's land—the Forest Service and the Bureau of Land Management (BLM)—clear authority, for the first time, to integrate mining into their multiple-use management of the land and to mitigate the environmental damage done by hardrock mining and exploration.

Multiple-use management of national forests was mandated by Congress in the Multiple Use-Sustained Yield Act of 1960 and for BLM lands in the Federal Land Management and Policy Act of 1976, known as the BLM Organic Act. Under current mining law, land may have incalculable recreational, ecological or aesthetic value, but if it is open to mineral development (and even Wilderness Areas will remain open until the end of 1983), then neither the Forest Service nor the BLM has the legal authority to say to the person with a valid mining claim to that land, "No, you cannot mine here." Federal land management agencies can lay down certain regulations to mitigate the environmental effects of mining. Even here, though, great uncertainty exists among Forest Service and BLM managers regarding how far they can push mining companies under the current laws when it comes to such matters as reclamation. As one forest supervisor noted: "What do I do if the mining company tells me to go to hell when I demand more reclamation than they are willing to provide?"

The primary tool the land-management agencies now have to implement the multiple-use mandate is land-use planning. Through this elaborate but necessary process, the resources of the land are assessed, and plans are made to manage them in a way consistent with their most appropriate uses—recreation, wildlife, grazing, timber, watershed protection and so on. Heretofore, mining has not been part of this planning process because the 1872 law gives mining unconditional priority over all other uses, regardless of planning.

Under the Administration's legislation, comprehensive multiple-use decision-making would be possible. The question of whether to mine a given piece of public land should be essentially no different than whether to graze a piece of land, or whether to cut timber on it. In all such cases, the question must be asked: are the values (qualitative as well as quantitative) of the uses that are to be sacrificed greater than the value of the resource that will be exploited? It is not an easy question to answer, but it lies at the very heart of land-use decisions, and

*Individual hardrock mines can,  
upon occasion, have a tremendous  
impact on the environment.*

comprehensive land-use planning should provide a rational context in which to seek an answer when all the uses (including mining) are considered.

The environmental damage done by hardrock mining is usually not as striking as the devastation often caused by strip-mining; hence, it has not attracted the national attention of environmentalists. This is unfortunate. Individual hardrock mines can, upon occasion, have a tremendous impact on the environment. For example, Homestake Mining Company seeks to mine a uranium deposit in the Gunnison National Forest in Colorado. They plan to gouge out a pit 4000 feet long, 400 feet wide and about 700 feet deep and to build a mill there to process about 600 tons of rock a day. An operation of this scale will have an enormous impact on the landscape. The mine will leave behind a huge crater and small mountains of waste rock from which ore has been removed, as well as the sterile beds of dried tailing ponds.

The cumulative effects of many smaller mining operations can be just as serious. Recall, for example, that the abundant marine flora and fauna of San Francisco Bay were smothered in the nineteenth century by silt-laden waters flushed from the gold mines by hydraulic mining. They never recovered.

Or consider what has happened in more recent times to BLM land north of Jeffrey City in central Wyoming. About 56 square miles of pronghorn antelope range in the so-called Gas Hill Uranium District have been devastated by numerous open pits, other excavations, mills and roads. Much could have been done to mitigate this damage—but wasn't. And today, south of Jef-

frey City, another uranium boom is underway along the upper rim of the Great Divide Basin—an area that serves as habitat for antelope, elk, raptorial birds and numerous other animals. Sheep Mountain is being mined both underground and on the surface. Eventually, most of the mountain will be hauled away to a nearby uranium millsite. The south slope of Green Mountain is pocked with drill holes and platforms and laced with switchbacking mining roads. Exploration is beginning in the Whiskey Peak area. Ferris Mountain has suffered not only the impact of earthmoving machinery, driven by parties unknown, but because of the earthmoving this *de facto* wilderness has been opened to off-road recreational vehicles. This whole Green Mountain area was once considered for management as a Primitive Area, but mining took precedence.

The point is not that mining on the public land must always give way when other important values (environmental, esthetic, etc.) are threatened. Rather, before mining ever begins, its benefits should be carefully weighed against its costs through a rational land-use decision-making process. Such a process is not now possible under the Mining Law of 1872.

Hardrock mining disturbs surface resources—wildlife and vegetation. It also alters water resources by disrupting water-carrying underground aquifers and by polluting streams and rivers with toxic chemicals such as sulfuric acid and mercury or carcinogenic chemicals such as Radium-226. And in the arid West, water is an increasingly precious commodity.

Our affluent, industrialized society does need minerals. Certainly mining should be prohibited in particularly sensitive natu-

### LETTERS NEEDED FOR CURRENT LEGISLATIVE ACTION

The mineral industry is now seeking to tighten its grip on the nation's public lands. The Subcommittee on Mines and Mining of the House Interior and Insular Affairs Committee held four days of hearings in mid-October in Washington, D.C., on mining law reform. Two additional days of field hearings were held in Phoenix, Arizona, in December, and more field hearings are expected in the West. The focus of these hearings and of the mining industry campaign is a bill, H.R. 5831, drafted by the American Mining Congress, the industry's trade association, and sponsored by Representative Philip Ruppe (R-Michigan). Their strategy is clear: pass a bill favorable to the mining industry, call it "mining law reform," thereby blunting future efforts at actual reform, and do it quickly—before supporters of real reform can muster their forces.

H.R. 5831 fits neatly into this strategy. It has been called the "Mining Law of 1852" by critics. It does include a few concessions to present-day needs and equities—the payment of minuscule royalties and the preparation and filing of primitive development plans. But the bulk of the bill is aimed at making it easier for large corporations with ample financial resources to gain access and title to the minerals on public lands. The corporations would be able to do this, under the provisions of H.R. 5831, without demonstrating discovery of valuable mineral deposits—a requirement of the existing law.

Most of the House Interior Committee members who were

present at the hearings seem to favor the approach taken by H.R. 5831. The Carter Administration bill, H.R. 9292, sponsored by Representative Phillip Burton (D-California) was either openly opposed or ignored during the hearings by the committee members and by the hosts of mining industry witnesses. Environmental groups have not made a good showing at these hearings so far.

As of this writing the House Subcommittee on Mines and Mining has scheduled an additional field hearing in Grand Junction, Colorado, in February and is expected to hold similar hearings in Washington (state) and Nevada. Shortly thereafter the "markup" of the bill will begin.

The situation in the Senate is much less clear, especially since the death in January of Senator Lee Metcalf, a long-time supporter of mining law reform who also chaired the Subcommittee on Public Lands and Resources of the Senate Energy and Natural Resources Committee, which has jurisdiction over this issue.

Now is the time to let your representative and senators know that you are opposed to the approach taken by the American Mining Congress bill, H.R. 5831, and that this bill, even heavily amended, is simply not an appropriate vehicle for reforming our antiquated mining laws. Express support for the Administration bill; it could be improved, but it comes much closer to providing the kind of true reform long overdue.

—Brant Calkin and John McComb

*Hardrock mineral production accounts for only 1%  
of the nation's GNP, so the impact of  
rising hardrock mineral prices is simply not that great.*

ral areas, but the majority of public land should continue to remain open to mining. The federal government can go a long way toward reducing the effects of hardrock mining on water, vegetation and wildlife on public land by enforcing environmental safeguards, monitoring mining activity and requiring reclamation. To date, the efforts of the Forest Service toward this end have been very uneven, and the BLM's efforts have been virtually nonexistent.

In the coming months, as debate over the Administration's mining law proposal mounts, the specter of mineral shortages will no doubt be evoked. Those who oppose reform argue that the U.S. is growing dangerously dependent on foreign sources of minerals and that changes in the law will only inhibit expansion of our domestic production and cause prices to skyrocket. These views, though grossly misleading, do contain at least a grain of truth. Under the Mining Law of 1872, the development of hardrock mineral resources is, in effect, subsidized because the miners do not pay for the resources they use or destroy. If the reform law is passed, the companies will have to pay these costs, and they, in turn, will build them into the price of the minerals. Moreover, the increased costs certainly will put some marginal mining operations out of business.

Some resource economists, such as John Schanz of Resources For The Future, take a much less apocalyptic view of the U.S. mineral supply situation. Schanz has observed that there is a small group of minerals for which the U.S. must rely heavily upon imports, or will have to in the future, and for most of these minerals this has nearly always been the case. Among these are chromium, cobalt, manganese, phosphates and tin. At the other extreme, there is another group of minerals that occur abundantly in the U.S. These include lime, magnesium, molybdenum, nitrogen and sulfur. Schanz concludes: "Measured in dollars, the United States became a net importer of minerals in the late twenties. By 1950, we were a net importer of approximately 8% of our needs. This reached 15% in 1970. Except for the recent acceleration to approximately 25% due to petroleum, our national shift toward mineral importation can be characterized as a gradual process. Perhaps this trend could be halted, but it is unrealistic to expect that it could be reversed. Nor is it really necessary for the U.S. ever again to be totally self-sufficient."

The threat of mineral cartels forming is also evoked by those opposed to mining law reform. We must maximize domestic production, they argue, because cartels may gain control of international mineral markets, as the Organization of Petroleum Exporting Countries did with oil, and drive up the price or perhaps embargo exports to the United States for political reasons. The prospects, however, of a small group of countries exerting cartel control over any of the hardrock commodity markets in which the United States is a buyer are very remote—except perhaps in bauxite. The hardrock mineral situation, it turns out, is *not* generally analogous to oil. For one thing, the demand for hardrock mineral commodities is more elastic than is the demand for oil; when the price of oil quadruples you cannot switch from gasoline to coal in your automobile, but if the price of copper should quadruple, for example, we can substitute aluminum or some other metal in many applications. There are, moreover, very few instances in the international hardrock minerals market when a handful of

like-minded nations have controlled a large share of the world's reserves, as is the case with oil.

Reform of the mining law along the lines proposed by the Carter Administration should have only a marginal long-term effect on the nation's hardrock mineral supply. Shortages in supply do not appear likely, and if they do occur, it will be for reasons other than reform of the mining law. The reform is an evolutionary step, not a radical one. A hardrock mineral leasing system similar to the one being proposed has, in fact, been in effect for years on the 56.3 million acres of land the federal government acquired from private owners. "Public domain" lands were obtained from other nations. So-called "acquired lands" constitute about 8% of the total public holdings and are, for the most part, managed by the Forest Service. The point is that it has already been demonstrated that private companies will explore for and mine hardrock minerals under a leasing system. Large quantities of lead, zinc and copper have been mined from leased mineral deposits on acquired lands; furthermore, royalties have been paid to the U.S. Treasury for those minerals.

Mining law reform should have a minimal impact on consumer prices. In most manufactured goods, the cost of the raw material is only a small fraction of the total cost; most of the cost stems from transportation, manufacturing and marketing. Bauxite, the raw material for aluminum, is a good example. A recent doubling of the price of bauxite actually translated into an increase of only two to three cents per pound for aluminum ingots in the U.S.—less than 10% of the prevailing price. And the ingot price, though hard to calculate, is probably not more than 1% or 2% of the cost of the finished product. Thus the economic importance of hardrock minerals is not similar to that of oil or natural gas. Hardrock mineral production accounts for only 1% of the nation's gross national product, so the impact of rising hardrock mineral prices is simply not that great.

From the standpoint of energy conservation, some increase in hardrock mineral prices would be beneficial. The mining and processing of hardrock minerals, especially primary metals, is highly energy consumptive. Indeed, primary metals account for about 9% of the total U.S. energy demand. The Environmental Protection Agency estimates the nation could reduce its total energy consumption by 1.5% to 2% (roughly the equivalent of 700,000 barrels of oil per day) if the maximum feasible metal and other resource recycling were undertaken. It takes 86% more energy to mine and process one ton of virgin ore for ferrous metal than it does to mine the city dump for the same resource and then reprocess it. Such recovery is also technically feasible. The prime reason for neglect of this energy conservation opportunity is that the economics of metal producing are stacked in favor of the mining and processing of virgin ores by government tax and other policies. If we stopped subsidizing hardrock mineral development on public land, it would be an important step toward making more efficient use of the nation's scarce energy resources.

The public land is in some ways like a huge commons, and if it is to survive we must agree to "mutual coercion, mutually agreed upon," as Garrett Hardin so aptly put it. □

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*David Sheridan is author of Hardrock Mining on the Public Land, recently published by the Council on Environmental Quality.*



*These palms in Beverly Hills, California are more than decorative: they provide wildlife habitat and help protect clean air.*

Bruce Coleman, Inc.

# Nature and Cities

MICHAEL McCLOSKEY

**T**HE URBAN ENVIRONMENT does not seem to be a rare or disappearing "species," but tender, loving care for it does. From the health, abundance and diversity of other living things in a city, we can tell a great deal about how good a habitat the city is for human beings. People are the most significant natural element in the urban environment. Our buildings and other artifacts may not exactly be natural, but we are. And certain natural conditions are necessary for our health—particularly clean air and water.

The Clean Air Act of 1970 was designed to bring about air quality adequate for the health of humans and other creatures and plants. Since its passage, sulfur dioxide levels have declined by more than 30% in many cities, and particulate levels are down too. In some places, though, nitrogen oxide levels are up. And health standards have been established for only six pollutants; standards have not yet been set for heavy metals and other toxic substances. Lead poisoning among youngsters is common in inner cities because too many cars still use gasoline with lead additives. While great battles rage over putting scrubbers on new sources of pollution such as power plants, too little attention is given to making progress in

cleaning up the air in metropolitan areas that have not yet attained compliance with primary health standards—the so-called nonattainment areas. However, installing scrubbers—or whatever is the best available technology—on new plants does provide a hedge against the lack of standards for heavy metals and other toxic substances. A few years ago, a study estimated that failure to meet the goals of the Clean Air Act would result in 12,000 premature deaths, aggravate the illnesses of 40,000 people and hundreds of thousands of cases of minor ailments.

Federal water pollution control laws have resulted in the removal of most coliform bacteria from water that is in frequent contact with humans. But not all bodies of water are in decent shape yet, nor is drinking water free of toxic substances.

In fact, a surprising number of municipalities have still not installed the best practical technology for treating sewage effluent, though almost 90% of industry has met this standard. It is necessary to hold on to the requirement that both industry and utilities install the best available control technology as soon as possible so that toxic substances such as heavy metals will be removed from drinking water. Many of these substances can induce

cancer. When this country achieves its goal of fishable and swimmable waters—originally targeted for 1983—it will also have waters truly safe to drink.

Not all refuse goes into rivers or the air. Some goes into dumps—in fact, most still does; only 8% of our refuse is incinerated. And some of the dumps are still open dumps, not sanitary landfills. These open dumps breed flies and rats that can spread disease, and they are usually sources of nauseating odors. Even sanitary landfills have their problems. More than half of these dumps allow noxious chemicals to leach into groundwater, showing up in wells a mile or more away, nor is it clear that better engineering can prevent leaching from occurring. Some 46 billion gallons of chemicals leach out of dumps each year. And if the fills are on floodplains and close enough to high-water marks, the leached chemicals can be carried considerable distances. In this way arsenic has contaminated wells in Minnesota, and pesticides have found their way into creeks in Tennessee.

There is growing doubt that reclaiming such landfills is feasible. They are mechanically unstable. Methane, which forms in dumps, can filter out through the surface for years, killing grass and other vegeta-

tion. Hopes of turning such old landfills into building sites are turning sour, and even their use as parks is doubtful.

In any event, there do not seem to be enough such sites to meet the need. Cities, whose residents generate 20% more solid waste per capita than do rural residents, need more disposal sites, but close-in sites are being engulfed by urban sprawl. The 50 largest cities in this country report they will run out of sufficient sites by the end of this decade. Rail hauling can take waste hundreds of miles away (it may be economical to haul it as far as 700 miles), but few rural areas appear to be anxious to become regional dumping grounds. Old quarries and stripmines are not usually suitable sites because of the dangers of contaminating groundwater.

Some very hazardous substances show up in city dumps, many of them in residues left in discarded paint buckets. Such buckets carry 32,700 pounds of mercury each year, 4.4 million pounds of lead, 2600 pounds of selenium, 1 million pounds of chromium and 310,000 pounds of cyanide. Some of these same hazardous substances also show up in discarded pesticide containers; 35,000 pounds of arsenic are discarded in dumps each year in this way. There has been a 50% increase, too, in the number of spent pesticide containers discarded in recent years.

Cities alter more than native vegetation patterns: they also change the normal climate. Temperature extremes can be greater in cities because hard building surfaces gain and lose heat more readily. The buffering action of vegetation is reduced as the number of living plants is reduced. In the summer, hot air pumped outside by air conditioners elevates ambient temperatures. Water drainage patterns are drastically altered by cities' large, impenetrable surface areas, which interfere with precipitation filtering naturally into the earth—the process by which aquifers are replenished. Night lighting can change the behavior of plants that are affected by the length of daylight. Changes in the maximum and minimum temperatures in cities can determine whether certain plant species, such as white oaks and sugar maples, can live there at all. Long-term climatic changes may be caused by the amount of carbon dioxide released into the atmosphere by combustion processes that occur principally in cities.

The impact of cities on their own micro-climates can be tempered by ample reserves of open space and parklands. Through transpiration, forests are a cooling influence in the summer, and parklands also break up heat concentration in devel-

oped areas. Shade trees on streets and around houses provide a windbreak and insulation, thus reducing both heating and cooling costs. Marshes and wetlands provide a tempering influence, too.

However, federal funding for open-space acquisitions under Housing and Urban Development grants ended in 1973 after some \$605 million was distributed over a twelve-year period. Most of these grants, which were terminated under President Nixon, went to suburban areas and did little for the urban environment. Many city parks have deteriorated. Some money has been available through the Interior Department's Land and Water Conservation Fund, but once again the suburbs have gotten the lion's share of what funds did filter down through state agencies—from five to ten times more than urban core areas.

### *Sprawl and Open Space*

Some newer HUD block grants have gone to the core cities for recreation, but little of these funds is likely to be spent for land acquisition. Cities with pinched budgets find it difficult to maintain existing parks, much less buy new ones. And, in too many instances, parkland is threatened by proposed freeways, as with Baltimore's Leakin Park. We hope that Memphis' Overton Park will be safe now that Transportation Secretary Brock Adams has decided to spare it.

Cities have suffered as the suburbs have expanded. Six million acres of open space were turned into housing tracts in the United States between 1960 and 1970. This sprawl has destroyed prime farmland, increased the price of food, encouraged the flight of jobs from the central city and undermined the tax base for social services in urban core areas.

There is no federal program to combat sprawl. Funding to acquire open space has been terminated. Land-use planning legislation has been stymied. At one time, Walter Hickel identified a need for \$25 billion to be spent on national recreation areas in some 44 metropolitan regions. In 1970 he proposed that the federal government spend \$6.3 billion for this purpose. His report was suppressed, and its complete text has yet to see the light of day. Now the Land and Water Fund has been increased to provide more than \$6 billion to states over the next decade. But will enough of it get to urban areas? Will it really help to block sprawl? Will it help inner cities establish new neighborhood parks? Or will this money only help suburbs develop amenities that encourage them to sprawl even more? A new study by the Bureau of Outdoor Recreation may soon give us the

answer. There is reason to fear that the study may primarily propose new construction in the inner city.

One federal program did help curb sprawl. HUD's floodplain insurance program blocked loans to floodplain developments that did not comply with flood protection plans. This program was recently repealed, though eligibility for federal flood insurance is still contingent on agreements to make housing flood-proof. But even this apparently beneficial requirement can have injurious effects. Houses that resist floods displace flood waters and raise flood crests, thus causing damage to higher houses.

It is important to understand that floodplains serve a critical natural purpose. Floodplains absorb the flood tide and reduce the downstream crests that can tear away bridges and inflict other damage. Floods add new soil, enriching floodplains, and they recharge groundwaters, replenish the water supply for back channels used by wildlife and clean out main channels. If rivers are tightly channelized between levees, though, the main channel may be deepened so much that nearby water tables will be drawn down and thus damaged. Despite the fact that many cities are built near rivers, floodplains should be protected from urban encroachment. They are excellent candidates for parks, wildlife refuges and open space reserves.

Some floods are caused by development; when stream channels are choked by silt from soil erosion they overflow more often, causing local flooding and damage. This silting is particularly a problem when subdivisions are poorly sited on highly erodible soils or on slopes that are too steep. In these cases, and in the absence of preventive techniques, as much as ten tons of soil per acre can be lost through erosion. Properly locating a subdivision minimizes the amount of grading required. Sound land development also involves fitting the construction to the terrain, building proper drainage structures, leaving buffer strips of native trees and shrubs, stockpiling topsoil for reuse and replanting with quick-growing cover as soon as possible.

If there is enough plant cover in suburbia and enough parks and open space areas, very active populations of wildlife can be found in and around urban areas. Some of the most abundant breeding populations of birds can be found in mature yard plantings in the suburbs. Especially attractive habitats in certain cities host a wide variety of birdlife. These are areas where varied, mature plantings are found in close proximity to bodies of water and where the birds are protected from hunting and van-

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dals. In the San Francisco Bay Area, we find such spots in Golden Gate Park and in regional parks.

Native mammals and birds will generally be found on surviving tracts of native vegetation—in such bypassed places as ravines, on steep slopes and in marshes. The types of new plantings in suburban yards will shape the pattern of wildlife use. In some cases, new plantings support a richer and more varied wildlife pattern than the native landscape would. Migratory birds can be particularly interesting as they move through a neighborhood looking for berries. Heavily built-up areas with little vegetation will support only a few species adapted to living with human beings, such as pigeons, English sparrows and yard rats.

We can, however, influence the numbers and variety of wildlife in cities by the design of buildings and by the choice of plants for yards and streets. Unboxed eaves on houses, for instance, will provide more nesting sites for birds. Conifers, such as white pine and red cedar, as well as fruit-bearing trees also tend to attract birds. Our habitat needs are not so different from those of other animals. Urban areas that are not attractive to humans are also likely to have little wildlife. Areas that we find inviting and pleasant will similarly appeal to wildlife.

Nothing contributes as much to a pleasant city as trees. Besides their beauty and the shade they provide, trees and woodlands absorb pollutants such as carbon dioxide and sulfur dioxide; they help catch and settle particulates; and they help reduce noise levels. Wetlands used by wildlife also absorb air and water-borne wastes and can neutralize many of them. At one time, the planting and protection of shade trees along city streets was an important theme in the conservation movement. This effort died out after World War II, but there has been a recent effort to revive it.

Many shade trees that are mature now were planted in the early years of this century when major streets were laid out. Some got a good start with liberal droppings from the horses then plying the streets. Many, however, have been lost through neglect and as a result of street widening programs. In St. Louis, for instance, more than 100,000 street trees have died or been cut down in recent years. Few have been replaced, although the city has now decided to replant 3000 each year.

Most recent federal interest in this subject has been directed toward providing technical aid to cities, particularly in protecting trees like elms against blight. In

1973, though, the Forest Service was authorized to provide technical assistance to encourage planting trees and shrubs in urban areas.

More federal monies have gone into planting trees and shrubs along interstate freeways, particularly in western urban areas, than into any other landscaping program. In the East, on land swallowed up by the Boston-to-Washington megalopolis, there are probably more woodlands today than 100 years ago; many old, abandoned farmsteads have reverted to woodland.

A promising development has begun to improve some major cities: community gardening. Community gardens are, of course, nothing new, but they are enjoying a distinct revival. Gardening provides city people with an opportunity to become involved with the natural world; it is a simple and productive form of therapy. It answers the need for more self-sufficiency and greater control over our lives. It allows people to participate actively in a community, to work together. And, of course, it allows people to indulge their interest in organic gardening. These community gardens are surprisingly extensive. San Francisco, for example, has 245 community gardens, New York has more than 100, St. Louis has 60, and new gardens are being developed in Cleveland and Boston. A few government grants have been obtained to help this effort, and Comprehensive Employment and Training Act (CETA) workers are involved in some cities.

The most basic problem besides funding is finding suitable locations for gardens. But problems of authorization may be easy to overcome compared to the problem of abused soil. Soil on many city lots contains high levels of lead and other toxic substances that will be taken up in vegetables. Such soil must be scraped away (down to twelve inches in some cases), along with debris, and replaced with good topsoil. Soil that has been under buildings for a long time may also be devoid of necessary micro-organisms and be virtually sterile. However, where good soil is found (or the deficiencies of poor soil are corrected) a fifteen-by-twenty foot plot can easily provide a family of four with vegetables for a full year.

We rarely think of the urban environment as a natural environment, but we should realize that we do not escape natural laws and phenomena by living there. The more we understand and work with natural processes, the more we shall benefit. Certainly, cities will be healthier and more satisfying for people if we take pains to make sure they are suitable for many other living things as well. □



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# TERTIARY HISTORY

OF THE

# GRAND CAÑON DISTRICT

By CLARENCE E. DUTTON

CAPTAIN OF ORDNANCE U. S. A.

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*The first edition of Tertiary History of the Grand Cañon District, published in 1882, has long been a rare and valuable book. Peregrine Smith, Inc. (Box 667, Layton, Utah 84041) has recently reprinted the work in two volumes: the text is accompanied by a folio-sized (16" by 20") atlas of 23 double-spread color plates. The current printing of 1500 copies sells for \$175. The publisher, Peregrine Smith, Inc., has graciously permitted us to reprint one of the color plates (reduced in size), part of the introduction by Wallace Stegner and a section of the text itself.*

Introduction by  
WALLACE STEGNER

FROM 1875 to 1881, Clarence Edward Dutton, by profession a Captain of Ordnance in the U.S. Army, spent the field season of each year on detached duty as a geologist in the plateau region of Utah and Arizona, first with the Geographical and Geological Survey of the Rocky Mountain Region, J.W. Powell in Charge (the so-called Powell Survey), and later with the U.S. Geological Survey, which in 1879 consolidated the Powell, King, Hayden and Wheeler Surveys into a single bureau.

The reports and monographs resulting from Dutton's studies, notably the *Report on the Geology of the High Plateaus of Utah* (1880), *The Physical Geology of the Grand Canyon District* (1882), *The Tertiary History of the Grand Canyon District* (1882), and *Mount Taylor and the Zuni Plateau* (1885), are basic documents for our understanding of the region and in the history of the developing science of physical geology. . . .

As science, these reports represent a collaboration. They incorporate many of the ideas of Dutton's friend and co-worker Grove Karl Gilbert, and many more derived from their mutual friend and superior John Wesley Powell. . . .

Major Powell, a glittering public hero after his exploration of the canyons of the Green and Colorado in 1869, reached a large public with his adventure-story account of that expedition; but his strictly scientific reports, such as that on the Uinta Mountains, are as dry as his exploration narrative is dramatic. He did not carry his literary manner into his scientific work. As for Gilbert, probably the greatest geologist of these three early giants, he wrote for scientific men only, in the flat monotone of explicative geological prose, and he is read now chiefly by the experts and by curious historians of science or the West. But Dutton's works, and most of all *The Tertiary History*, are astonishingly fresh after nearly a hundred years, and still command a general audience. They have survived their specialty and

their period, perhaps because art ages less swiftly than science, and an artist was at least as prominent in the writing of these monographs as the scientist who drew his pay from the surveys. *The Tertiary History* is a rare, sought-after and cherished book, and has been from the time of its publication. . . .

It is the peculiar charm of *The Tertiary History* that, while explaining with great lucidity the geological history of the Grand Canyon, the uplifts and subsidences, the stratigraphy, the unconformities, the plural erosion cycles, the recession of cliffs and the denudation of whole vast tablelands back from the canyon's rims to the overlooking cliff lines of the high plateaus, Dutton never forgets that what he is describing is sublime. Enthusiasm is as much a part of his approach as scientific observation.

A born speculator and hypothesizer, he is as interested in why this "great innovation in natural scenery" so appeals to the senses as he is in how it was created. He refuses to apologize for departing from the "severe ascetic style" of science, because "the stimulants which are demoralizing elsewhere are necessary here to exalt the mind sufficiently to comprehend the sublimity of the subjects." A scientist with sensibility, a tourist with an insatiable scientific curiosity, Dutton consistently exalts his reader's mind. His scientific explanations arise out of brilliant descriptions, and the descriptions themselves are often set within a narrative frame so that the reader "discovers," as it were, and having discovered, contemplates, and having contemplated, all but devises for himself the meanings of the geological book opened before him.

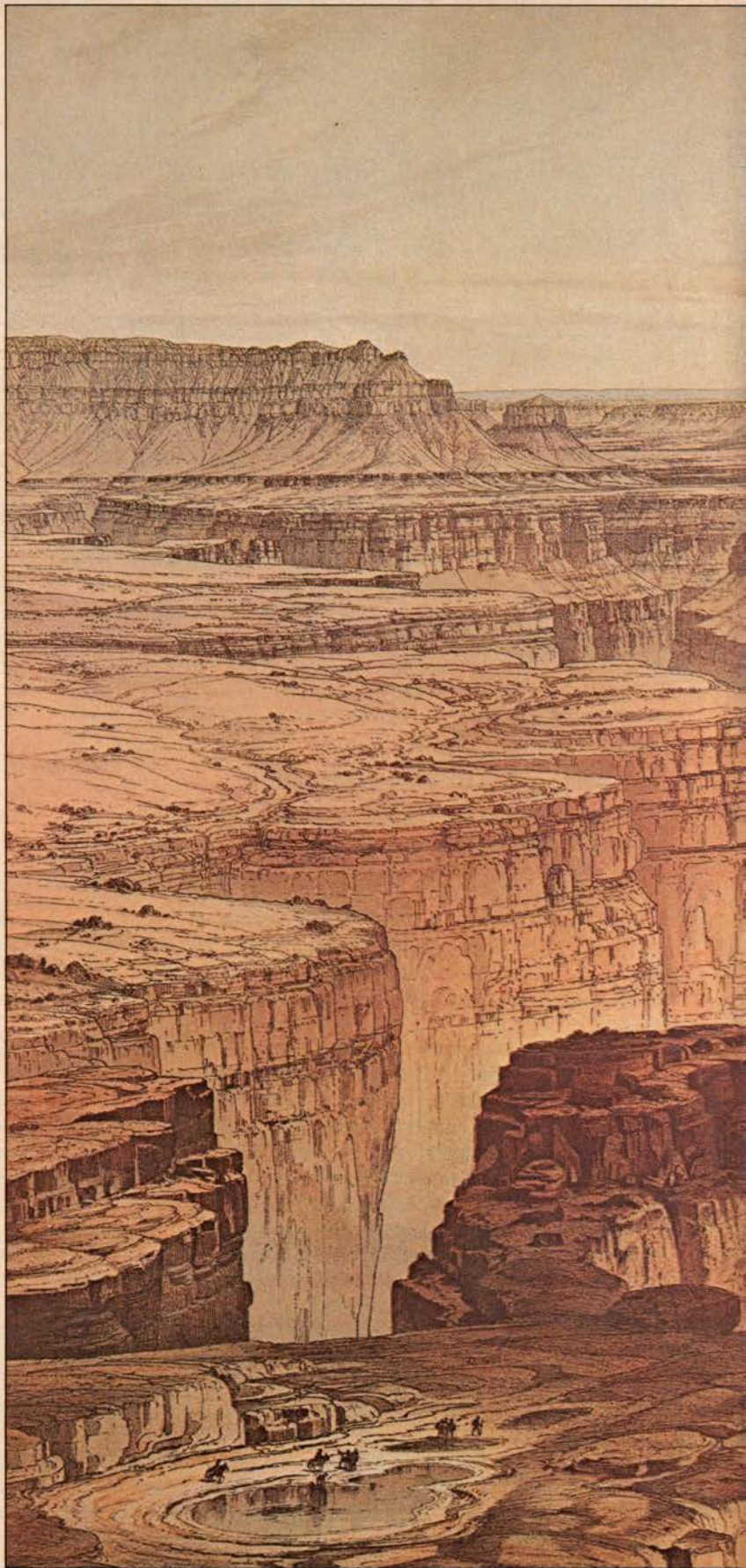
As if supernumeraries of a survey party, we ride from the outer terraces of the plateaus and across the platform of the Kanab Desert. We visit the Uinkaret and the Toroweap, we dawdle through the Kaibab delighting ourselves with the open glades and noble, spaced trees of that climax forest, we approach closer to our goal without paying too much attention to where we are going, until "the earth suddenly sinks at our feet to illimitable depths. In an instant, in the twinkling of an eye, the awful scene is before us."

The approach is as salutary as it is unique. Intellectual curiosity does not exclude, but derives from and feeds on, aesthetic sensibility. If scenery is geology, geology never gets over being scenery. In his descriptions of the terraces, the cliff lines, the platforms, the repetitive stratification and persistent profiles, the marvelous form and coloring and ornamentation of the buttes and canyon walls, Dutton not only taught geologists how to explain the chasm, but taught all sorts of visitors how to see it.

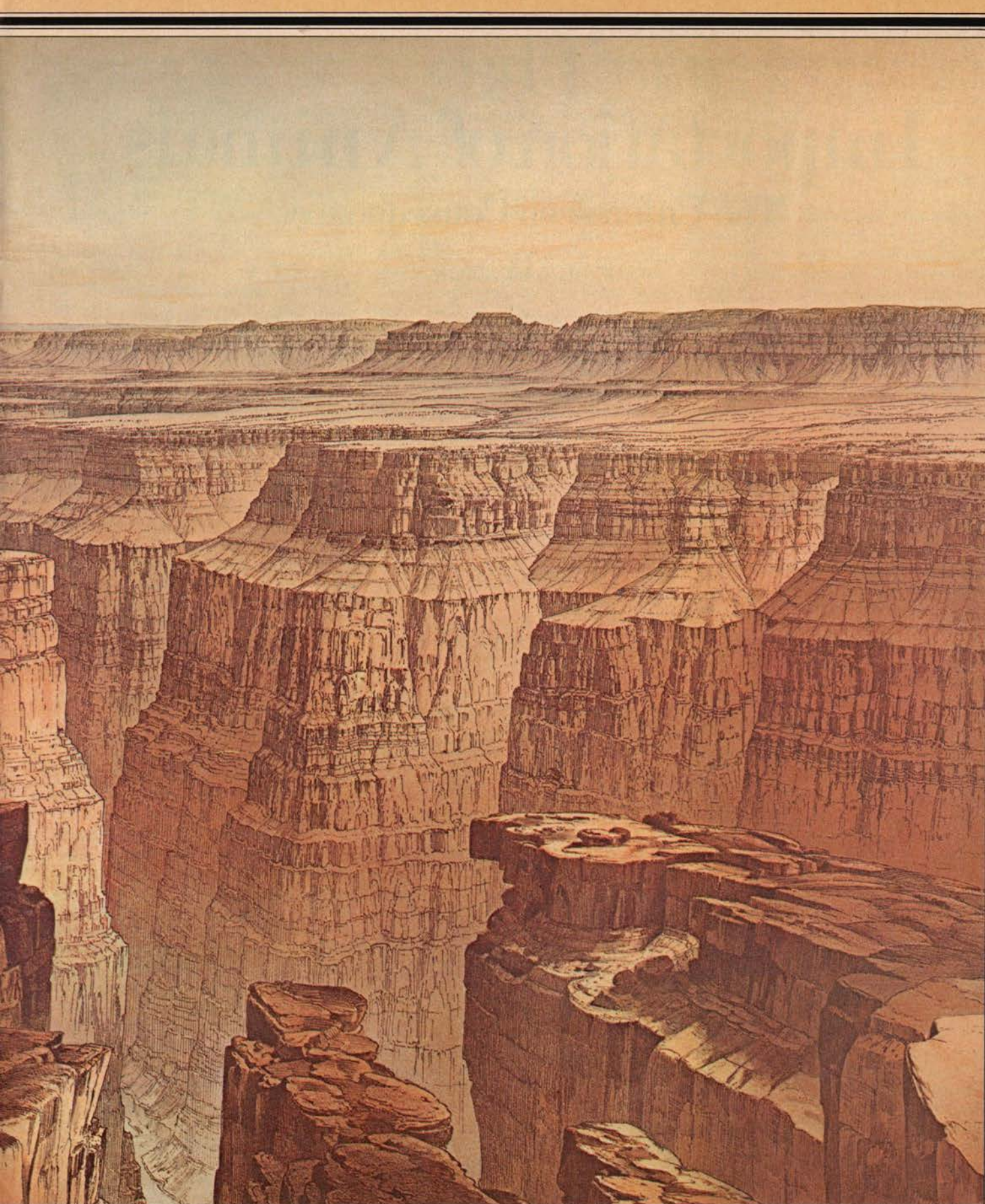
# THE TOROWEAP

CLARENCE E. DUTTON

**A**T LENGTH we approach the lower end of the Toroweap. The scenery here becomes colossal. Its magnitude is by no means its most impressive feature, but precision of the forms. The dominant idea ever before the mind is the architecture displayed in the profiles. It is hard to realize that this is the work of the blind forces of nature. We feel like mere insects crawling along the street of a city flanked with immense temples, or as Lemuel Gulliver might have felt in revisiting the capital of Brobdingnag, and finding it deserted. At the foot of the valley the western wall is nearly 1,500 feet high, the eastern about 2,000, and the interval separating them is about three miles. Suddenly they turn at right angles to right and left, and become the upper wall of the Grand Cañon of the Colorado. The Toroweap now opens into the main passageway of the great chasm. The view, however, is much obstructed. At the foot of the eastern gable is a medley of rocky ledges of red sandstone, while around the base of the western gable are large masses of basalt reaching more than half-way across the valley. In front rises a crater, which is about 600 feet high, seemingly a mere knoll in the midst of this colossal scenery. Beyond it, and five miles distant, rises the palisade which forms the southern upper wall of the chasm, stretching athwart the line of vision interminably in either direction. Its altitude is apparently the same as that of the palisade above us, and its profile is also identical. Climbing among the rocky ledges which lie at the base of the escarpment, we at length obtain a stand-point which enables us to gain a preliminary view of the mighty avenue. To the eastward it stretches in vanishing perspective forty miles or more. Between symmetric walls 2,000 feet high and 5 miles apart is a plain, which in comparison with its limiting cliffs might be regarded as smooth, but which in reality is diversified by rocky hummocks and basins, and hillocks where patches of soil give life to scattered cedars and piñons. Of the inner chasm nothing as yet is to be seen. Moving outward into this platform we find its surface to be mostly bare rock, with broad shallow basins etched in them, which hold water after the showers. There are thousands of these pools, and when the showers have passed they gleam and glitter in the sun like innumerable mirrors. As we move outward towards the center of the grand avenue the immensity and beautiful proportions of the walls develop. The vista towards the east lengthens out and vanishes against the blue ramp of the Kaibab, which lies as a cloud upon the horizon. To the west the view is less symmetric and regular, and the eye wanders vaguely among cliffs and buttes of stupendous magnitude, displaying everywhere the profile with which we have become of late familiar. Much of the distance towards the west is obstructed by the crater, but the portions in view bewilder us by the great number of objects presented, and oppress us by their magnitudes. At a distance of about two miles from the base of the northern wall we come suddenly upon the inner chasm. We are not conscious of its proximity until we are within a few yards of it. In less than a minute after we have recognized the crest of the farther wall of this abyss we crane over its terrible brink and gaze upon the water of the river full 3,000 feet below. □



THE GRAND CAÑON AT THE



FOOT OF THE TOROWEAP-LOOKING EAST

# The Importation of Animals

## The Unforeseen Consequences

GEORGE LAYCOCK

**W**HEN THE RUMOR first spread that the Ohio Division of Wildlife was experimenting with a new variety of carp in the shallow ponds of the old fish hatchery, my initial impulse was to dismiss it as false. We did not need another carp—after all, the old one promises to last indefinitely.

The century-old story of that original carp's invasion of American waters has become a classic. The carp arrived here welcomed and blessed by all except the few spoilsports who were "against progress." Typical of the supporters' reaction was the excited response of Nevada's first Fish Commissioner, H. G. Parker. In his report to the governor in 1879, Parker made a plea for \$1000. "My first expenditure therefrom will be for the introduction of carp . . . a German fish, and the most delicious of all known fishes." He praised carp in glowing terms as a food fish with no superior and insisted that the people of Nevada would possess a grand luxury once the carp was established. "Carp should be as plentiful to our people as chickens," he said. "One of my greatest aims has been to stock our waters with the best species of carp."

He knew, as did fisheries people across the country at that time, of Rudolph Hessel's recent success in importing a breeding stock of carp from Germany. With the blessing of the federal government, Hessel established the fish in ponds in Boston, then in Washington, D. C. Legislators were excited about the carp. Here was evidence that the politicians in Washington were watching out for the folks back home. Congressmen practically lined up to get their share of young carp to ship back to their own states. Within two years the fish had gone out to 38 states and territories and begun its swift invasion of American waters.

From a carp's viewpoint the whole proj-

ect was an astounding success. The carp advanced from stream to stream and lake to lake, taking over waters previously occupied by native fish, rooting in the mud, silting spawning waters and, perhaps worst of all, proving soon enough that it lacked great merit either as food or as a sporting fish.

In short, importation of the carp proved to be a disaster of shocking proportions.



*Carp have long been thought useful and attractive (like this one painted by Hiroshige)—until recently, that is. Many areas in the U.S. have discovered that carp are unpleasant and persistent invaders.*

The action could not be reversed; the carp is so entrenched that even today there is little hope of eradicating it, despite continuing research and management efforts.

I was told by Ohio officials that the new "grass carp," also known as the white amur, could in no way become the problem the old-fashioned carp had proved to be. The grass carp was needed, the story went, to help keep waters free of weeds, and it would do so because of its hearty appetite for vegetable matter. Promises were also made that the white amur, which can weigh as much as 70 pounds, would prove valuable as a sport fish. These were strong inducements; many creatures have been

imported with less to recommend them.

There is nothing new about our fondness for non-native species. The earliest settlers to reach these shores brought their favorite domestic plants and animals, and soon wild animals were also imported for release in the New World. Thousands of such introductions have been tried. In this way America adopted the common pigeon, house sparrow, starling and assorted other species completely foreign to New World ecosystems. Not all the imports released in the wild have flourished. To survive, a newly introduced species must find food, shelter and conditions that allow it to rear its young; this entails discovering an unoccupied niche or pushing aside animals already present.

Old lessons seem to be forgotten or ignored, however, and each new generation casts longing glances at foreign creatures on distant shores. In one recent year imported wildlife included 114,446 mammals, 689,404 foreign birds, 2,504,096 reptiles, 583,441 amphibians and 112,291,686 fish, largely for the pet and laboratory trades.

Reasons for our everlasting search for promising exotics are varied. Animals may be introduced because somebody believes they will provide sport for hunters or fishermen. Others are imported because of sentiment. Immigrants from Europe fostered the importation of a long list of familiar songbirds from other lands. Between 1872 and 1874 a group of "acclimatizers" in Cincinnati spent \$9000 to import European songbirds at \$4.50 a pair, among them skylarks, starlings, European robins, song thrushes, house sparrows, dunlocks, nightingales, blackbirds, siskins, great tits and corn crakes. Yet just half a century earlier John J. Audubon had been astounded at the abundance of beautiful native birds in and around Cincinnati—

orioles, cardinals, warblers and tanagers, and many more. Other acclimatization societies were busy in St. Louis, Portland, Philadelphia and elsewhere.

Exotic species are sometimes introduced for economic reasons. Sugar cane planters in Jamaica and some of the Hawaiian Islands faced an infestation of cane rats. They imported and released a breeding stock of mongooses to eliminate the rats. This in turn created more problems and the planters have yet to control the mongoose population. Similarly, house sparrows were imported, at least in part, in the mistaken belief that they would control insect pests of shade trees.

The quickest way to learn for myself whether or not there was truth in the rumor that grass carp were newly installed at the nearby fish hatchery was to pay it a visit. The manager, working in the ponds with an assistant, told me that they had acquired the new experimental carp from Arkansas (the epicenter of the current American infestation of these fish) and hoped the carp could be used to keep the hatchery ponds free of the algae that choke them through the summer months.

The first grass carp came to the United States from Taiwan in 1963 and were shipped to Auburn University in Alabama. The idea was that they might help control some of the proliferating exotic weeds that infest waters throughout the southeastern states. A later shipment arrived at the U.S. Fish and Wildlife Service fisheries research station at Stuttgart, Arkansas. Both federal and state biologists in Arkansas praise the grass carp. The state has stocked it in more than 100 lakes and streams and fish farmers there continue to promote its spread to new waters nationwide.

Concern about the grass carp's effects led to the 1969 Conference on Exotic Fishes and Related Problems conducted in Washington, D.C. by the Sport Fisheries Institute and sponsored by The American Fisheries Society and The American Society of Ichthyologists and Herpetologists. Professionals at that conference begged for serious research on the grass carp before additional stocking was carried out.

That plea, however, has been largely ignored in Arkansas. Grass-carp enthusiasts have also ignored the warnings of biologists that this fish could seriously compete with native species and, if it spreads into northern waters, destroy wild rice crops and bring new hardships to native waterfowl. Other states have heeded the warnings and banned importation of the carp. Among them is Missouri which, because its neighbor is Arkansas, must face the threat of grass carp regardless of its

strong feelings against the entire project. Grass carp can already be found in 40 states. Having reassessed its initial flirtation with the grass carp, Ohio soon disposed of its experimental stock and joined the growing list of states banning the fish. Unfortunately, stock is still available, and some pond owners are reportedly purchasing grass carp and freeing them illegally.

Other exotic fishes have also muscled their way into American waters in recent years. Perhaps the most famous of these is Florida's walking catfish. This fish, capable of breathing air, has a choice of locomotion methods. When population pressures or other factors trigger a reaction, the fish climbs out of the water and sets off cross-country, "walking" on its pectoral fins. First released about 1965 by aquarium dealers in southern Florida, it has since infested waters throughout southern and central Florida. Florida fisheries biologists view the walking catfish as a distinct threat to native game fish but no longer hold hope of eradicating it.

Also in Florida, there is persistent concern that the piranha might become established. If this has not already happened, it could occur easily enough in a state where the aquarium industry is a major enterprise. Anyone doubting that piranha might be turned free should consider a case of some months ago in Rocky River near Cleveland, Ohio. Boys fishing that stream caught a piranha that promptly cut one boy's hand severely. A second piranha was then found in the same fishing hole. Although these tropical fish are unlikely to survive northern winters, the episode is a certain indication that an aquarium owner no longer wanted the meat-eating pets but could not face destroying them.

Almost as dreaded are the tiny South

American fishes known as candiru. They too could probably establish themselves in southern states. South American natives have a deep fear of these fish, and with good reason. The candiru are small enough to work themselves into the urogenital openings of both men and women bathers. Removing the fish from its victims often requires surgery.

Florida has suffered most from infestations of unwanted exotic species. Scientists point to a long list of established foreign species including the blue talapia, imported in 1961 for weed control and now crowding bass and bluegills out of their native waters. "By the end of this century," predicts Dr. Walter R. Courtenay, zoologist at Florida Atlantic University, "there will be very few native fish left in the fresh waters of southeast Florida. There is just no way we can prevent the exotics from taking over."

Meanwhile experiments continue with introductions of peacock fish, also from South America, which are considered by some to be exciting sport fish. But little is known about the peacock fish's effect on any kind of native fish. Texas is also interested in establishing Nile perch in its large reservoirs where water is warmed by electric power plant effluents. The Nile perch is a predator that can weigh as much as 300 pounds.

Curiously, exotics that are established accidentally may develop their own defenders who stand ready to fight control efforts. For example, the Wild Burro Protection Association acts as advocate for the personable little burros infesting the dry slopes and canyons of Death Valley National Monument in California, the Grand Canyon and other western lands. These descendants of the North African ass have long served as beasts of burden. They

### In the Beginning . . .

**I**PSWICH SPARROWS nest only on Sable Island, a small low outpost in the Atlantic 100 miles off Nova Scotia. Their estimated breeding population is only 4000 birds. They were first threatened with extinction when rabbits, introduced long ago as a source of food, depleted the island's vegetation. The rabbits were followed by rats, which escaped from a wreck; they too posed a serious problem to the sparrows, but almost exterminated the rabbits. Cats were then introduced; they successfully cleared out the remaining rabbits and all the rats, but they ate sparrows too. So dogs were taken to the island to destroy the cats. This they did, ably assisted by the lighthouse-keeper's gun. Will they become feral dogs perhaps? No, as there is nothing to support them—unless they prey on the island's 'wild' horses. In spite of everything, the Ipswich sparrow survived.

*Reprinted from Animal Invaders, by Clive Roots, Universe Books, New York, 1976.*

found their way into western lands in the company of "single-blanket jackass" prospectors who burdened them with their worldly belongings, including shovels, pans and coffee pots. The old prospectors passed on, leaving their burros to care for themselves, and today the progeny of these burros number 1600 in Death Valley alone.

The burros' impact on the desert ecosystem is substantial. Studies show that those in Death Valley consume in excess of ten tons of forage daily. In addition, they dom-

inate desert water holes. Their most obvious victim is the desert bighorn sheep, which has been dwindling in numbers as the burros flourish. The native bighorn may well become extinct in Death Valley unless something is done soon to bring the burros under control.

But bighorn sheep are not the only victims. Forage consumed by the burros is the natural food of seed-eating birds and of rodents on which birds of prey survive. No animal can enter an existing ecosystem

without sending ripples throughout that wild community.

Imported goats, too, continue to destroy the vegetation of fragile lands on which they were released. The Sierra Club recently brought a suit against the Hawaii Department of Land and Natural Resources contending that the department's purposeful maintenance of feral goats and sheep on the Island of Hawaii critically threatens the habitat of the Palila, an endangered bird living only on the slopes of Mauna Kea. In one national park on the Big Island, National Park Service employees have been working to bring the goats under control.

Goats are also damaging San Clemente Island, a 21-mile-long piece of federal land off the Southern California coast. These free-roaming goats are descendants of animals released by early explorers or whalers. When the Navy took charge of the island in 1934, there were 30,000 goats there. Recently 6500 goats were rounded up and shipped to the mainland, leaving behind another 3000 that had taken refuge in the rocky canyons. The goats continue to destroy the island's endemic plants; scientists believe eight species have already been destroyed, and eight more are threatened.

Of the thousands of efforts made to introduce exotic wildlife to new lands, most fail. And of those that establish populations, few species are considered a valuable asset. Even the pheasant and the brown trout have had destructive biological impacts, and the fact that no one measured these impacts, nor any longer can measure them, does not mitigate the damage. Shuffling animals about the earth is risky and often irresponsible. Even the most thorough scientific studies cannot predict with certainty how an animal will adjust to a new environment. A classic example of this occurred when eastern gray squirrels were transplanted from New Jersey to the British Isles. Once they began spreading through English woodlands, the squirrels developed an unexpected eating habit: they learned to eat the bark of valuable cultivated trees, often girdling and killing them. Says a publication of the U.S. Fish and Wildlife Service, "There is some risk with any importation."

The only safe way to approach the whole question of exotics is to leave wild animals where they occur naturally. The next best answer is to control the reshuffling of wildlife through legislation. □

*George Laycock is author of Alien Animals (Anchor Press, 1966) and, most recently, Mysterries, Monsters and Untold Secrets, (Doubleday, 1978).*

## Clean and Dirty Lists

Import control efforts are largely the responsibility of the U.S. Fish and Wildlife Service. A section of the Lacey Act makes it illegal to import any of a list of species designated harmful by the Secretary of the Interior. But this is a limited list, including only such obvious candidates as the mongoose, fruit bat and walking catfish. Some Fish and Wildlife biologists feel strongly that the list should be far more comprehensive.

Late in 1973 the Fish and Wildlife Service issued new regulations including a list of those species it considered safe enough to risk importation by the pet industry and others: a "clean" list. If this limitation and the principle behind it had been adopted, anyone who wanted to import an unlisted animal would have to prove it harmless. The Sierra Club was among those who praised the concept and urged its adoption.

Then the pressures set in. Reaction came mainly from the pet industry, especially the importers of fish, who chipped away at the foundation of the plan. Fish and Wildlife brought out a weakened version of its plan in 1975, and still the importers hacked away at it. Two years later, attempting to salvage some control from the wreckage, the agency issued a third plan that completely abandoned the clean list concept; this most recent effort lists a larger number of exotics that importers may not bring in. In stark contrast to the first set of proposed regulations, the Secretary of Interior cannot add new names to this list unless the government proves the animals to be harmful. "And we cannot do that," one Fish and Wildlife Service biologist told me, "without releasing the animal and observing it."

If the proposed regulations are adopted as they now read, and the burden of proof that imported species would be harmful remains on Interior,

then the secretary would have great difficulty adding names to the list, and protection against harmful exotic species will be weakened. "We may not be able to add anything," a Fish and Wildlife Service employee complained, "and we may even have to take off those animals that are on the list. Those inclined to play this risky game of wildlife roulette have fashioned the rules to their liking."

The U.S. Fish and Wildlife Service is still studying its third set of regulations intended to extend the restrictions of the Lacey Act. The regulations were published in the *Federal Register*. No action has been taken on them since comments from the public were formally received in May 1977. However, President Carter issued an executive order, also in May 1977, directing executive agencies to "restrict the importation of exotic species" to the extent to which the agencies have been authorized by statute. This order does not increase the authority of federal agencies, but it does give some guidance to agencies such as Fish and Wildlife and the Bureau of Land Management whose actions may involve exotics.

In his environmental message of May 1977, President Carter directed the Secretary of the Interior and the Secretary of Agriculture to write legislation to govern the importation of exotic animals. No legislation has yet appeared. It's too early to know how much pressure Carter will bring to bear, but the time is ripe for influencing the legislation to be produced. Letters supporting President Carter in his moves to restrict the importation of exotic species should be sent to the White House, and the President should be urged to obtain legislation that puts the burden of proof on importers, rather than requiring Interior to prove the potential harm of imported species. □



# An Environmentalist Looks at the Panama Canal Treaties

NICHOLAS A. ROBINSON

**T**HE PUBLIC debate over the Panama Canal treaties has not focused on their environmental aspects. This is unfortunate—environmental protection is a prominent feature of the treaties now awaiting Senate ratification, as well it should be. Consider the following environmental aspects of the Panama Canal:

- The Isthmus of Panama is narrowest (30 miles) and lowest at the Canal. The oceans on either side harbor very different aquatic biota, and most ecologists warn of the unknown and serious dangers of mixing the Atlantic and Pacific ecological communities, either by a sea-level canal, by accident, or by allowing seawater into Gatun Lake. Freshwater Gatun Lake, part of the eastern half of the canal, is crucial to the separation of the Atlantic and Pacific ecological communities and is currently protected from marine intrusion only by the system of locks on either end and by the flow of freshwater into the lake. Protection for Gatun Lake is, therefore, a matter of the highest importance.

- The tropical rain forests that flourish in the Canal Zone are home to extraordinarily diverse flora and fauna, including some sixteen endangered species. These forests and those of the Darien Peninsula to the north also serve as natural barriers to disease-bearing animals that might pass from South America to Central or North America. This is no mere suppositional danger. In federal court proceedings three years ago, the Sierra Club successfully sued Transportation Secretary Coleman to require a full assessment of the environmental impact of U.S. aid to Panama and Colombia in completing the Pan-American Highway through the Darien Gap. In that case, testimony was presented that the rain forests of the Canal Zone and the Darien Gap had prevented the spread of a hoof-and-mouth disease (aftosa) to livestock in the North. This disease is held in check in the U.S., but it is widespread in South America. The court noted that if the disease were not isolated below Panama,

its transmission to the U.S. "could result in the destruction of up to 25% of North American livestock and an economic loss of ten billion dollars, as well as the extinction of such endangered species as the American bison."

- The Canal itself can either help or hinder the spread of other diseases. Ships from all over the world pass through its locks. Inadequate sanitation and quarantine safeguards could result in the rapid spread of disease; adequate safeguards could greatly hinder transmission of disease around the globe.

- Panama is an important station for scientific research and data collection. The Smithsonian Tropical Research Institute maintains a research station within a biological reserve on 6000-acre Barro Colorado Island in Gatun Lake.

The new Panama Canal treaties include a "Canal Treaty," a "Permanent Neutrality and Operation" treaty, and agreements to continue the research facilities of the Smithsonian Tropical Research Institute. Aside from requiring military and civilian ships to comply with reasonable health, sanitation and quarantine regulations, no substantial environmental issues are presented in the "Neutrality and Operation" treaty. It's the Panama Canal Treaty that presents the three issues at the heart of environmentalists' concern: establishment of a joint commission on environmental impacts; specific instructions for environmental protection of Panama; and the sea-level canal. Article VI of the Panama Canal Treaty provides for "protection of the environment" and, despite the article's legalistic terminology, it is worth quoting at length:

"1. The United States of America and the Republic of Panama commit themselves to implement this Treaty in a manner consistent with the protection of the natural environment of the Republic of Panama. To this end, they shall consult and cooperate with each other in all appro-

priate ways to ensure that they shall give due regard to the protection and conservation of the environment.

"2. A Joint Commission on the Environment shall be established with equal representation from the United States of America and the Republic of Panama, which shall periodically review the implementation of this Treaty and shall recommend as appropriate to the two Governments ways to avoid or, should this not be possible, to mitigate the adverse environmental impacts which might result from their respective actions pursuant to the Treaty.

"3. The United States of America and the Republic of Panama shall furnish the Joint Commission on the Environment complete information on any action taken in accordance with this Treaty which, in the judgment of both, might have a significant effect on the environment. Such information shall be made available to the Commission as far in advance of the contemplated action as possible to facilitate the study by the Commission of any potential environmental problems and to allow for consideration of the recommendation of the Commission before the contemplated action is carried out."

Establishing this Joint Commission will be nothing new for the U.S.; we already have bilateral environmental commissions with Canada and Mexico. In addition, we cooperate on environmental matters with the U.S.S.R., Japan and Germany. But the Canal Treaty, for the first time, makes an environmental commission a key part of what is largely a nonenvironmental agreement dealing with defense, security, commerce and foreign-policy aspects of U.S.-Latin American relations. Moreover, these environmental concerns were included in the treaty without the urging of environmentalists. For the first time, the State Department considered environmental issues without being pressured to do so.

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rules are needed to require study of the environmental impact of any development—for example, the impact on the two oceans and the endangered species that live between them. The procedures agreed upon must ensure participation of Central and North American environmental agencies and organizations in any relevant planning and decision-making. Furthermore, objective criteria must be established for when an "action" must be submitted to the Joint Commission and how the acting agency must respond to the commission's recommendations. Training and assistance will be needed to develop the Panamanian half of the Joint Commission. And, as always, adequate support staff for the Joint Commission must be provided.

In addition to setting up a Joint Commission, the Canal Treaty contains a series

of specific instructions. Operation of the Canal must include "measures necessary to ensure sanitation," control of water levels in Gatun, Alajuela and Miraflores lakes, meteorological and hydrographic services, "protection of the environment by preventing and controlling the spillage of oil and substances harmful to human or animal life and of the ecological equilibrium in areas used in operation of the Canal and the anchorages," stabilization of the banks and slopes of the Canal, and a variety of other specific measures intended to protect the environment.

The third important environmental issue is discussed primarily in Article XII of the Canal Treaty: the question of "a sea-level canal or a third set of locks." This issue is perhaps the most familiar to environmentalists, who have repeatedly pointed out the dangers of mixing the dis-

*The Secretary of State released this statement with the Final Environmental Impact Statement on the Panama Canal Treaties in January 1978. It was prepared by the Department of State following three meetings with the Sierra Club's national representative in Washington, the Club's international representative from the U.N., volunteer leaders from the Club's International Committee and international lawyers representing the Club from The Center For Law and Social Policy.*

*-The Editor*

**Statement on the Panama  
Canal Treaties and  
Environmental Protection**

Since Panama's unique geographic location makes it important to the environment of many nations, both the United States and Panama are conscious of the need to protect the environment and respond to the public health needs of the Canal Zone and the surrounding area. . . .

It will only be through the joint effort of the two governments, following ratification of the treaties, that the commitments made in the treaties will come into effect. For the United States, this will entail provision of relevant information about the Canal Zone and its resources, technical assistance, as well as resources needed to carry out effective programs of environmental protection. To that end, the U.S. Agency for

International Development is developing a project, in cooperation with the Panamanian Government, to provide it with the capability to carry out sound land and water management and reforestation programs.

On the Panamanian side, our diplomatic mission in Panama has noted that the Panamanian Government is taking environmental concerns seriously and has attached a high priority to the problem of protecting the Canal watershed. As evidence of this, the mission reports that both the Panamanian Minister of Planning and the Vice Minister of Agriculture have recently pressed for early implementation of the AID Watershed Management Project. Moreover, in addition to the provisions contained in the Panama Canal Treaty, there is also a basis in international law for U.S. and Panamanian cooperation on environmental matters since both countries are parties to the 1954 International Convention for the Prevention of Pollution of the Sea by Oil and the 1940 Convention on Nature Protection and Wildlife Preservation in the Western Hemisphere, which established Barro Colorado Island as a Nature Monument.

It is our intention that the Joint Environmental Commission shall have the staff and financial support it needs to be effective. We will propose that the American members of this Commission include leading science and environmental figures as well as others from the private and public sectors. In addition, reports on the state of watershed

crete biota of the Atlantic and Pacific ecosystems. Senator Mike Gravel (D-Alaska) pressed to include this provision in the treaty so that north-slope oil from Alaska could reach the Atlantic by supertanker via the canal. At Senator Gravel's urging—and apparently without clearing the idea with his treaty negotiators—President Carter spoke in favor of a sea-level canal on July 21, 1977, at a "town meeting" in Yazoo City, Mississippi. The treaty then had to be expanded to include this issue.

Article XII does not commit the U.S. to enlarging the canal. It provides, as the State Department hastens to assure environmentalists, only for a joint feasibility study, and it bars the U.S. from building another interoceanic canal elsewhere in Central America. The U.S. is given the right to build a third set of locks, but "in

the construction of the aforesaid works, the United States of America shall not use nuclear excavation techniques without the previous consent of the Republic of Panama."

#### Things to Look For

Thus, while Article XII does not read as environmentalists would like, it commits the U.S. to so little that the discrepancy is of little importance. Any feasibility study should, however, await the creation of the Joint Commission and be conducted in conjunction with it.

The Senate has not yet ratified the Panama Canal treaties. But more than ratification will be needed; Congress must pass enabling legislation that embodies a strong commitment to environmental protection. Environmentalists should keep an eye on the legislation and the State

will be assembled and indexed. Federal agencies with expertise relevant to Canal Zone issues will assist in developing information for the Joint Commission on matters which require priority attention. And, recognizing the importance of base-line data showing the current state of Canal Zone ecosystems, including air and water quality, marine life in the adjacent oceans, and flora and fauna, the U.S. will cooperate with the Panamanian Government in assembling that data expeditiously.

The National Environmental Policy Act (NEPA) has provided useful guidance in drafting the Panama Canal treaties so as to avoid or mitigate the adverse environmental effects which might result from the implementation of the treaties. We recognized the importance of the NEPA procedures in formulating environmentally sound policies as well as the value of public participation in the NEPA review process. The final Environmental Impact Statement (EIS) on the Panama Canal treaties, prepared in accordance with the NEPA and issued on December 27, discussed those issues which will be addressed by the Joint Environmental Commission. And, the public comments submitted regarding the draft EIS have been carefully considered and are reflected in the final Statement. More specifically, the final Environmental Impact Statement discusses current and transitional steps needed to protect the Pipeline Road and other important forest areas. It also analyzes the need for a forestry management program and

the possible dangers to flora, fauna and soils should the natural resources of the Canal Zone not be adequately protected.

Finally, in addition to Article VI, Article XII of the Panama Canal Treaty addresses the question of expansion of the existing Panama Canal to accommodate a larger volume of traffic. In that article, Panama grants to the United States "the right to add a third lane of locks to the existing Panama Canal." With respect to a possible sea-level canal, the article provides for a study of the feasibility of such a canal without making a decision or commitment that a sea-level canal will be built. Any study of the construction of a sea-level canal will seek to be both thorough and objective as it examines both the economic as well as the engineering feasibility of such a project. In addition, the study would fully explore the environmental consequences of a sea-level canal and would address the problems identified in the reports of the National Academy of Sciences. Moreover, an Environmental Impact Statement would be prepared in accordance with the provisions of the National Environmental Policy Act. Finally, I should note here that we do not intend to use nuclear excavation techniques in connection with any effort to enlarge the capacity of the Panama Canal or build a new canal, both for environmental reasons and because of the terms of the nuclear test ban treaty.

Warren Christopher  
Acting Secretary, State Department

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Department regulations, which must ensure that among U.S. commissioners will be scientists and environmental experts as well as the usual government functionaries.

The language of the treaties, and even the enabling legislation, will in itself protect nothing. The Carter Administration must provide for energetic administrative implementation of the treaty. Panama, of course, must do the same. The prospects for implementation are good. For example, the Agency for International Development has accelerated an already existing watershed-management project to help train and equip Panama's Department of Renewable Natural Resources, (RENARE); \$10 million is being committed to this program, and the Panamanian government is pushing the U.S. to get it underway.

In addition to overseeing the treaty's enabling legislation and implementation, environmentalists will need to examine more closely the procedural aspects of the State Department's compliance with the National Environmental Policy Act (NEPA). The environmental impact statement released in December 1977 should have been prepared in 1973 when treaty negotiations moved forward in earnest, rather than in July 1977 when the final treaty texts had already taken shape. Had more time been given to environmental analysis, stronger treaty provisions for watershed maintenance might have been identified and included. The mechanism of the Joint Commission puts off the day of reckoning on such environmental questions. Despite this procedural shortcoming, however, the EIS process including public comment was completed on these treaties, and the Senate will have the benefit of the final environmental impact statement when weighing ratification. The Sierra Club has since asked the CEQ to require the State Department to write a supplementary EIS on possible adverse impacts related to implementing the canal treaty should the environmental protection sanctions in the treaty not be fully implemented.

Under prior secretaries, the State Department flouted NEPA more than it followed the act's mandate. The Panama Canal treaties are a solid step toward reversing that pattern. They move our foreign policy forward while substantively adhering to NEPA and creatively exploring new paths for transnational environmental protection. □

*Nicholas Robinson led the Sierra Club's International Program from its inception in 1970 until last spring. An attorney, he teaches and practices law in New York.*

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# Son of Kaiparowits:

## The Intermountain Power Project

RUTH FREAR and PAUL G. SALISBURY

WHEN SOUTHERN California Edison announced its withdrawal from the proposed Kaiparowits power project in 1975 (see the August/September 1975 SCB), Utah environmentalists celebrated quietly. "They will be back sooner or later—here or elsewhere," was the cautious response to congratulations. The latest threat to the scenic wonders and clean air of southern Utah's national parks, monuments and wild areas is the Intermountain Power Project (IPP). This new project was actually conceived before Kaiparowits was discarded and is not only equal in size (3000 megawatts) to its predecessor, but is in many ways even more of a threat to the scenic slickrock country.

The parent organization of the new project is the Intermountain Consumers Power Association, a consortium of Utah and Nevada municipal electric cooperatives and Rural Electrification Administration cooperatives. ICPA officials had sought participation in the Kaiparowits project, but the high rates they would have had to pay discouraged them. Deciding instead to produce their own power, ICPA filed applications in 1971 for water from the Escalante and Fremont rivers. Two years later, ICPA approached several California utilities for support, and in 1974 the Intermountain Power Project was born. ICPA was to take 15% of the power and the California group 85%.

The Utah legislature—ever eager for industrial development and growth at any price—enthusiastically passed legislation in 1977 to allow the consortium to issue \$4-5 billion in tax-free bonds. The only provision was that Utah should get 25% of



*The clean air and spectacular vistas of Capitol Reef National Park would have been marred by emissions from a huge power plant nearby. But the Clean Air Act Amendments of 1977—and Interior Secretary Andrus—would not permit deterioration of areas with clean air. So the clean air stayed—and the proposed IPP plant moved.*

Ruth Frear

the power instead of 15%. The extensive national publicity given the Kaiparowits fight, coupled with the widely held misconception that environmentalists had killed Kaiparowits, led IPP officials to stress environmental concerns in their site selection efforts. According to Joseph Fackrell, president of IPP, "The best, most economical site was Escalante [River]. But because of our open planning process, and because of the guidance you [environmentalists] gave us, the first thing we did was to move out of Escalante. It cost us several million dollars to do that. We counted environmental concerns highest." Eliminating the Escalante site forced IPP to reevaluate the Fremont River area in Wayne County, near Capitol Reef National Park. Though several sites were considered, the consortium chose a site they felt would conceal the plant from motorists and most park users.

The consortium settled on an area called Salt Wash, located northwest of North

Caineville Mesa, not far from the prominent Factory Butte and eight miles east of Capitol Reef National Park. Though not visible from the main highway, the proposed plant would be visible to hikers from such places as Cathedral Valley, Boulder Mountain, Thousand Lake Mountain and the Henry Mountains. But IPP officials are wrong if they think environmentalists are principally concerned with the visibility of the plant itself. More critical are the plant's effects on the area's clean air and magnificent vistas, and its impact on a rural—even wild—region.

In April 1977, the IPP board passed a resolution that stated in part that "IPP is an economically and environmentally

sound project, having selected a site such that prevailing winds would direct any emissions away from scenic and recreational areas." Conservationists point to the absurdity of that statement. When the winds blow west, plant emissions will affect Capitol Reef National Park. When they blow north and east, they will affect the scenic San Rafael Swell and Goblin Valley State Park. When the winds blow south, they're likely to harm Arches National Park, Canyonlands National Park or the Henry Mountains. And when no wind blows at all, plant emissions and other pollutants would simply lie stagnant over the scenic area surrounding the plant itself.

Project participants explain that they will use the "best practicable control technology" and supplementary control systems to remove 90% of the sulphur dioxide and 99.8% of the particulate matter from the plant's emissions. "Two years ago, you didn't have to put on 90% scrubbers

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and 99.8% precipitators," says Fackrell. "But we decided to go with what we thought would be [the] best available. We've honestly tried to do what's right and reasonable and fair. But how do you convince people you're trying to do something different when they've seen so much bad?"

Environmentalists are particularly concerned about air quality in Capitol Reef National Park. Hank Hassell, a native of the region, argues, "You can't maintain a Class I airshed in Capitol Reef with a 3000-megawatt power plant ten miles away. I just don't believe somebody's going to build a clean power plant. I'm not convinced it's possible, and any deterioration at all of the air quality in that country would be tragic." Even IPP's own model shows the plant can't meet Class I standards consistently.

## Population and Power

While environmentalists are most vocal about the plant's impact on the region's air quality, the population influx the power plant would bring concerns area officials. In Wayne County, where the plant and its new town would be built, 11,000 new residents would be added to a region whose present population is 1600. The new town would require approximately 1000 acres of land, a water supply of 2.58 million gallons per day and would produce 1.1 million gallons of liquid wastes and 56,000 pounds of solid wastes per day. Its 3100 new students would need up to three new elementary schools, one new junior high and one new high school. Of the estimated 3200 new homes, 90% would be trailers, according to IPP figures. The rural Mormon population of Wayne County would become the minority population as outsiders flocked in for the new jobs. Wayne County residents, however, see only jobs and affluence on the horizon.

Coal for the project is expected to come from underground mines in the Wasatch and Emery fields and would be shipped 50 to 65 miles by rail to the power plant. Mining and shipping the necessary 10 million tons of coal per year would boost the population of Emery County (population 6700) by approximately 7300 and that of Sevier and Sanpete counties (combined population 26,300) by 8800 people.

Sevier and Sanpete county residents, too, hear nothing but the ring of cash registers in their future. Carbon and Emery counties, however, are already reeling from the growth stimulated by the recently developed Huntington and Emery power plants. An association of local govern-

ments of Carbon, Emery and Grand counties—the Southeastern Utah Economic Development District—has told IPP officials they fear fiscal, social and environmental impacts they cannot face alone.

If the IPP project is built, the newcomers to Emery County alone would need 2100 housing units, two new elementary schools and one new junior-senior high school. Since the plant will contribute no tax revenues to Carbon or Emery counties, local money would have to be used to build the roads, schools and water treatment plants needed to handle the population surge. This and the tremendous increase in crime and other problems in the previously homogeneous communities of these counties have increased Carbon and Emery counties' concern about IPP's impact on the region.

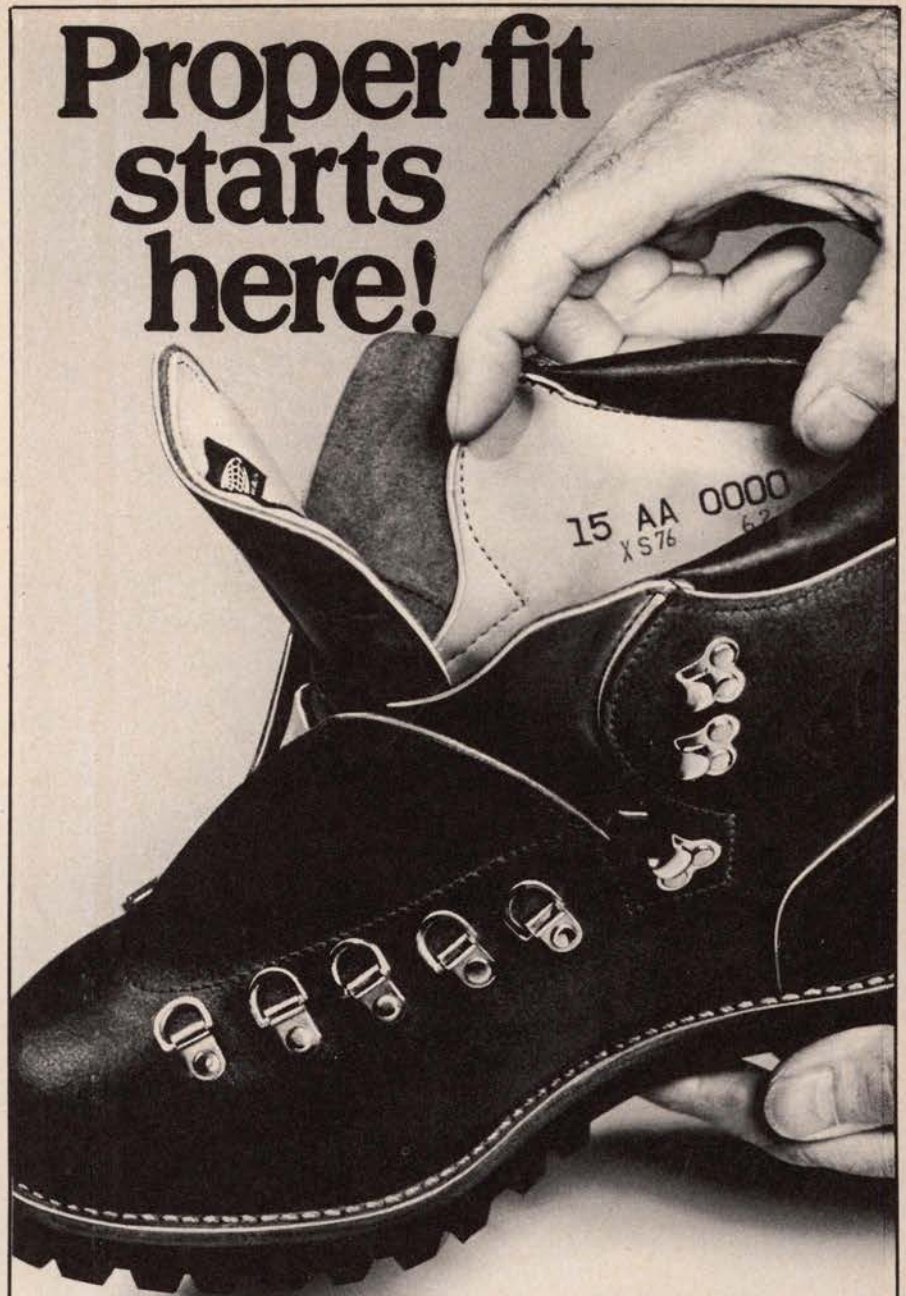
As national attention has begun to focus on IPP, the controversy over siting has grown more heated. A state Power Plant Siting Committee has studied possible sites for IPP; and the Interior Department supported conservationist objections to the proposed Salt Wash site because of its proximity to national parks.

The Utah Chapter of the Sierra Club at one point drew up a map of Utah that showed where power plants should *not* be built. Finally, the Interior Department and the siting committee settled on Lynndyl, in Millard County, as the best location for the plant. It was also the only area considered that was outside the Sierra Club's "forbidden zone," and where farmers and residents in the area agreed that their water should be used for energy development rather than agriculture. In late December the IPP board voted to commit funds to study the Lynndyl site and one other—but they still preferred the original Salt Wash location.

The Secretary of the Interior has virtually given his blessing to an IPP power plant at the Lynndyl site (while refusing to approve sites that might compromise Class I air quality in national parks). Environmentalists view that site as the least offensive, but it has recently taken on a new, more threatening aspect. IPP spokesmen have stated that because of its location, coal from the developed coal fields in Utah could not be brought to the site economically. Thus coal for a power plant at Lynndyl would probably come from a new coal field—to be developed in the Kaiparowits Plateau. □

*Ruth Frear is a librarian at the University of Utah and the Club's southwest regional vice president. Paul G. Salisbury is an architect and planner at Utah State University and chairs the Utah Chapter.*

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# Six Birds in Their Homes

EDITH THACHER HURD  
*Illustrations by Clement Hurd*

**T**here are many different habitats for birds. There are open fields where meadowlarks live. There are forests where thrushes and woodpeckers live. There are marshes with reeds and cattails where the long-legged Great Blue Heron wades in the shallow water looking for small fish to eat. There is also the seashore and the sea where ducks and sandpipers, pelicans and gulls live. Each bird finds the place where there are the right things for it to eat and to build its nest and to raise its young. This place is called its habitat.

The pictures on the next pages show only two habitats, the marsh and seashore. Each shows three birds that you may see there at some time in the year.



## The Red-Winged Blackbird

The male Red-winged Blackbird is black all over except for patches of red and yellow on its wings. It lives in marshy places where the female weaves her nest of marsh grasses.

The nest hangs like a little basket from reeds or cattails.

The male does not incubate the eggs or feed the young.

He sits nearby to guard against predators, such as snakes or people, that might try to steal the eggs or babies.

He sings a squeaky sort of song:  
o-ka-le, o-kalee.

This keeps other blackbirds out of his territory.



*Edith Thacher Hurd and Clement Hurd have worked together for many years writing and*

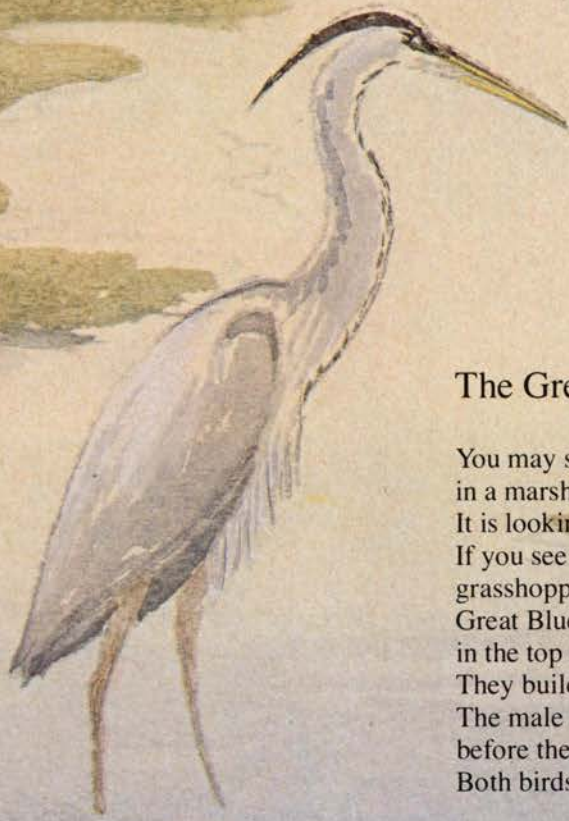


## The Belted Kingfisher

The male Belted Kingfisher has a belt of bluish feathers across its chest. The female has two belts, one of bluish feathers and one of rusty brown. They both have crests of bluish feathers on their heads. Sometimes a Kingfisher sits all day beside a pond or river, waiting to catch a fish. Sometimes it hovers over the water, waiting to dive for a fish. The male and female Kingfishers dig a small cave or tunnel for their nest. They dig with their sharp beaks and scratch the dirt out with their feet and toes. The eggs are always white. They have no spots or color because they are safe in the cave or the tunnel.

## The Great Blue Heron

You may see a Great Blue Heron walking slowly in a marshy place or river. It is looking for small fish or frogs to eat. If you see it in a field, it is looking for grasshoppers, snakes or perhaps a field mouse. Great Blue Herons build their nests in the top of tall trees. They build them of sticks and green boughs. The male and female do a love dance in the nest before they mate. Both birds incubate the eggs and feed the young.





## The Brown Pelican

The most interesting thing about the Brown Pelican is the way it goes fishing.

It flies slowly over the water until it sees a school of fish down below.

It folds its wings and dives like an arrow.

It catches the fish underwater.

It catches the fish in the big pouch that hangs from its bill.

When it comes up, the Pelican empties the water out of its pouch and swallows the fish.

Sometimes Brown Pelicans fly in a long line along the shore.

They hardly seem to use their wings at all as they glide slowly over the breaking waves.



## The Sanderling

The Sanderling is one of the smallest of all the sandpipers.

It runs up and down with the waves on the beach.

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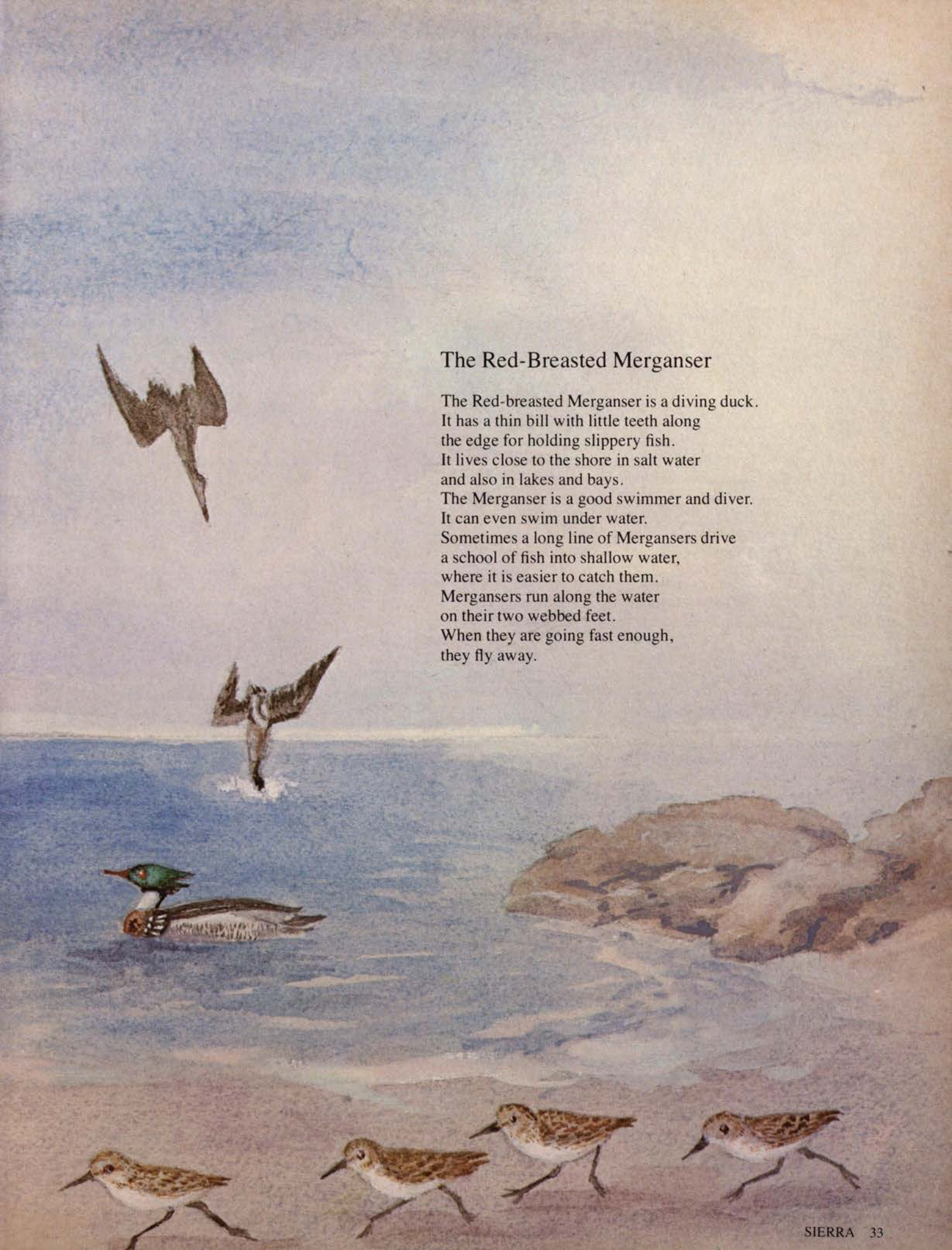
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# Does the Weaver Become the Web?

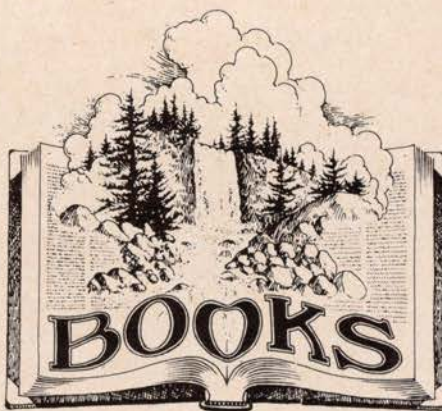
STEPHEN O. ANDERSEN

*Autonomous Technology, Technics-out-of-Control as a Theme in Political Thought* by Langdon Winner; MIT Press, Cambridge, Massachusetts, 1977. Cloth, \$17.50.

**M**OST CONSERVATIONISTS are familiar with a problem manifest in contemporary environmental issues—"technology out of control." Evidence of the distressing possibility that our society may be unable to control its technology has appeared in controversies over the Concorde, nuclear power, water projects, the Alaska pipeline and supertankers.

Wide-spread opposition to costly new technologies of dubious social merit has drawn citizens into environmental action groups and has provided an international perspective for local environmental conflicts. Many of today's complex technologies ignite grave human concern. Those who make and sell the systems assure us that new things will always seem a little suspect to those unfamiliar with their workings. Be patient, we're told, and we will end up liking them. Environmentalists have stood up well against the advocates of poorly conceived technological schemes and have succeeded in their demand that machines and artificial systems be more compatible with the natural environment. But we have not developed an acceptable understanding of the broader dilemmas technology now poses for mankind.

A new book by Langdon Winner, *Autonomous Technology: Technics-out-of-Control as a Theme in Political Thought*, probes deeply into many important issues. Other works such as *The Limits to Growth*, Barry Commoner's *The Closing Circle*, Noel Mostert's *Supership* and Amory Lovin's *Soft Energy Paths* have identified specific aspects of our society's encounter with modern technology. Langdon Winner's book brings together the common threads in history, philosophy and politics that unify the separate problems. *Autonomous Technology* examines a wide variety of instances in which people



have said "Technology seems to be beyond our control." Neither a debunker nor a doomsayer, Winner analyzes the context and significance of these fears.

Winner begins by observing how frequent and diverse have been the complaints about runaway technology during the past century or so. The American transcendentalists, for example, distrusted this technology intensely. Emerson warned, "Machinery is aggressive. The weaver becomes a web, the machinist a machine. If you do not use the tools, they use you." Citing the views of scientists, engineers, poets, novelists, philosophers and film makers, Winner succeeds in showing that distrust permeates modern thought. We need only think of such movies as *Colossus: The Forbin Project* or *2001: A Space Odyssey* to recall images of powerful computers that rebel against human masters. Beyond science fiction, however, is the sobering conclusion of physicist Werner Heisenberg that the "expansion of technical civilization . . . has gone far beyond any control through human forces," or that of economist John Kenneth Galbraith: "we are becoming the servants in thought, as in action, of the machine we have created to serve us."

Winner asks, "How can we account for the fact that so many intelligent persons have embraced an idea so strange and unlikely?" Certain fundamental beliefs about the relationship of human beings to technology have begun to break down,

calling into question the fondly held ideas:

- that people know best what they themselves have made
- that the things people make are under their firm control
- that technology is essentially neutral.

Of course, distrust of technology is an ancient theme. Prometheus, after all, also had reason to doubt the neutrality of technology. But each age must review its relationship to technology: Winner examines why these traditional understandings about people and technology have collapsed in the modern world.

Environmentalists will find the chapter on technological change especially relevant. Winner distinguishes between different categories of change: technological evolution, determinism, drift and the technological imperative. Using historical illustrations and theoretical analysis to make his case, he discusses the human problems associated with these types of change. Thus, in his discussion of "determinism" Winner points out that in the early 1960s the Skolt Lapps of Finland deliberately chose to adopt the snowmobile in their reindeer herding. What they did not choose, however, was the wide-ranging disruption of the environment and the reshaping of their culture that the choice entailed. In cases of this nature Winner stresses the irony of saying that technological change is fully "voluntary" or "chosen."

*Autonomous Technology* goes beyond the specific manifestations of technological dynamism to inquire into its ultimate sources. In his chapter, "The Flaw and Its Origins," Winner argues that we must rise above our tendency to see problems in a narrow, one-by-one perspective. "Roughly the same motives and outlook that encourage greater and greater industrial productivity, rapidly expanding investment in research and development projects, and an unprecedented rate of innovation in all spheres of life, are also those mirrored in the 'need' for a new

manned bomber, in the eutrophication of lakes, and in the willingness to 'solve' serious social problems with a tech-fix." But why do we plunge into technological projects in such willful, reckless ways? Winner surveys historical, religious and philosophical explanations of the relationship between Western culture and nature. He also considers the recent attempt to devise a "new ethic" for our treatment of nature. While the book does not settle these questions, it goes a long way in showing what an adequate answer might look like.

The provocative discussion of a phenomenon Winner calls "reverse adaptation" may well prove to be the most helpful feature of the book for conservationists. As modern technological systems become larger and more complex, and as we become increasingly dependent upon them, there is a tendency for the normal relationship between ends and means to be reversed. In important instances, society is unable to establish independent goals for its technological means. Instead, those very "tools" dictate goals for society itself. Citing tendencies

evident in recent disputes over the energy crisis, the ABM, the SST and other questions, Winner outlines the logic of the forms in which reverse adaptation can take place.

The supersonic transport is a fine example. Initially the SST may have been developed to maintain the public image of the United States' warplane industry and to protect our worldwide monopoly on passenger aircraft sales. When environmentalists opposed the technology because of its threat to the ozone balance in the stratosphere and because it epitomized gas-guzzling resource waste, the aerospace industry argued the plane would save jobs. Later, Concorde owners were to argue that its noise level was acceptable. If, on the other hand, the SST emerged as a response to a desire to save time, it would have been rejected in favor of more cost-effective timesavers such as urban mass transit or faster airport baggage handling. An equal investment in aircraft comfort and entertainment might have made longer flights more attractive. Instead, image, monopoly, profit, atmospheric pollution, noise, resource depletion and jobs to sup-

port these endeavors became the battle issues, while no one seemed to ask whether any basic human needs would be satisfied by the machine. Did consumers demand the SST? In ways like this a large socio-technical organization may try to control the markets or political processes that regulate its operations: it may seek a "mission" or create a "crisis" to justify its further growth. Winner holds that tendencies of this kind are, in fact, inherent in the development of large-scale, technologically sophisticated organizations. If these tendencies are not to subvert the decisions by which society guides its progress, a special measure of diligence and a new kind of sensitivity will be required from us all.

Perhaps the most chilling chapter considers the subject of "technocracy"—government by technical elites—and the problems it creates for democracy. Another section draws upon themes common to such writers as Lewis Mumford, Jacques Ellul and Herbert Marcuse in developing a comprehensive theory of technology's intrinsic political character. "Technological politics," Winner ex-



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plains, "encompasses the whole of technology's capacity to transform, order, and adapt animate and inanimate objects to accord with purely technical structures and processes. It is the system of order and governance appropriate to a universe made artificial." In this artificial universe, problems of individual responsibility frequently arise. Winner points to the examples of Adolf Eichmann, Lieutenant Calley and others in twentieth-century warfare to demonstrate that the very complexity of technical systems has become a bizarre excuse for "inhumane" actions. When everyone becomes a mere "cog in the machine," no one, it seems, is responsible.

Is Langdon Winner actually telling us that technology is out of control? The answer comes in his last chapter: "Frankenstein's Problem." Winner sees Mary Shelley's novel, *Frankenstein*, as a paradigm of the problem of autonomous technology. Victor Frankenstein "is a man who creates something new in the world and then pours all of his energy into an effort to forget." Winner draws the parallel between Frankenstein and today's technologists: "Victor embodies an artifact with a kind of life previously manifest only in human beings. He then looks on in surprise as it returns to him as an autonomous force, with a structure of its own, with demands upon which it insists absolutely. Provided with no plan for its existence, the technological creation enforces a plan upon its creator. Victor is baffled, fearful, and totally unable to discover a way to repair the disruptions caused by his half-completed, imperfect work. He never moves beyond the dream of progress, the thirst for power, or the unquestioned belief that the products of science and technology are an unqualified blessing for humankind. Although he is aware of the fact that there is something extraordinary at large in the world, it takes a disaster to convince him that the responsibility is his. Unfortunately, by the time Victor overcomes his passivity, the consequences of his deeds have become irreversible, and he finds himself totally helpless before an unchosen fate."

*Autonomous Technology* is required reading for serious environmentalists. It will strengthen the will to win ecological battles and make us better prepared to undertake them. Most important; the book gives its readers an occasion to rethink some of the most pressing issues of our time and set them straight. □

*Stephen Andersen teaches economics at the College of the Atlantic, Bar Harbor, Maine, and was formerly a staff economist at the Sierra Club.*

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# News

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## ■ **Senator Metcalf Will Be Missed**

Senator Lee Metcalf died in his Montana home in January. A senator for seventeen years and a member of the House before that, Metcalf was an outstanding public servant sensitive to environmental concerns. Over the years, the Montana Democrat fought against stripmining, the timber industry and grazing interests, and he was a champion of wilderness preservation. Recognizing his outstanding achievements in conservation, the Club's board of directors adopted a resolution to dedicate the club's efforts to protect the National Interest Lands in Alaska to his memory. On the Hill, Metcalf's death has significant implications for environmentalists. In addition to his key position on the conference committee working on the National Energy Act, Metcalf was Chairman of the Public Lands Subcommittee of the Energy and Natural Resources Committee.

## ■ **NRC Rejects the Plutonium Economy**

After two years of judicial challenges and administrative proceedings in which the Club participated, the Nuclear Regulatory Commission (NRC) has ruled that it will terminate its proposal to permit plutonium to be recovered from nuclear wastes for further use as a reactor fuel. More specifically, the NRC decided not to continue with a study — that a federal court had ruled was a legal prerequisite to plutonium recovery. The decision is widely regarded as one of the most significant victories in the long struggle for adequate nuclear power safeguards.

## ■ **California Energy Commission Slams Sundesert**

Environmentalists and the utility industry have both been watching a crucial conflict — whether California will approve the construction of Sundesert, a nuclear plant proposed for Southern California. If approved, Sundesert will provide a new lease on life for the faltering nuclear industry — especially since it would be built in California, where anti-nuclear activism has been intense. If rejected, Sundesert will prove a heavy blow to the nuclear industry.

The California Energy Commission, with the strong backing of Governor Brown, approved a pair of studies that bode ill for the proposed twin-reactor 1900-MW nuclear plant. A report on alternatives to Sundesert indicates that the actual expected demand for new electricity is much lower than Sundesert's boosters claim. California, in other words, doesn't even need the plant. The report outlines additional conservation programs that could reduce the need for generating capacity and points out that new growth can be more efficiently accommodated by improvements to existing power plants.

The second report, on nuclear waste, was mandated by the "nuclear bills" of 1976 (enacted as a moderate alternative to California's Proposition 13, the Nuclear Safeguards Initiative). These bills require the Energy Commission to determine that a safe and proven method for storing nuclear wastes exists before new nuclear plants can be built. The Commission was forced to conclude, on the basis of present evidence, that such a method does not exist and that federal plans for building commercial-scale waste-storage facilities are too optimistic.

Sundesert proponents have approached the state legislature for an exemption to the nuclear laws, but environmentalists are pleased that Governor Brown has opposed this strongly, calling such tactics a "mockery" and "fraud" of the original purpose of the nuclear legislation. In addition, the governor's 1978 budget, recently submitted to the legislature, contains major funding for demonstration projects of alternative sources such as photovoltaic generation, geothermal energy, wind energy and biomass conversion.

## ■ **Board of Directors Adopts 1978 Conservation Priorities**

At its January meeting the Club's board of directors adopted a revised set of legislative and administrative priorities for the balance of the 95th Congress. The campaign to set aside parks and wilderness in Alaska continues to top the list as the "mega-campaign." The major campaigns include: 1) wilderness issues, including RARE II — the Forest Service's review of roadless areas; wilderness in Bureau of Land Management lands and new area proposals; 2) the National Energy Act, which is nearing completion, and solar and alternative energy initiatives; 3) enactment of the Redwood National Park Expansion Act; 4) completion of the Outer Continental Shelf Lands Act amendments; 5) rulemaking under the new Clean Water Act; 6) implementation of important parts of the Clean Air Act; 7) environmentally relevant aspects of the anticipated Carter Administration urban package; 8) Mining Law Reform (see story in this issue); and 9) the Highway Trust Fund.

"Lesser campaign" priorities include the addition of Mineral King to the National Park System, implementation of the National Forest Management Act, protection of the Boundary Waters Canoe Area, urban recreation studies and proposals for new urban recreation areas, establishment of new Wild and Scenic Rivers, water project funding and water resource policy, completion of legislation on waterway user charges and Locks and Dam 26, selected nuclear issues, the Lobby Reform Act and establishment of a Tall Grass Prairie National Park.

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# News

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## ■ Northwest Energy: New BPA Administrator Appointed

In response to calls from Northwest environmental groups, the Carter Administration has replaced the Ford-appointed Administrator of the Bonneville Power Administration (BPA) with S. Sterling Munro. Northwest conservationists had hoped the job would be filled by a person with proven credentials in energy conservation — most are cautious about the new appointment.

Munro spent 22 years as Senator Henry Jackson's (D-WA) political aide; he has a reputation for expertise in natural resource issues. He recently served as a consultant to a local public utility and to the Alaska Resources Development Committee of the Seattle Chamber of Commerce which is campaigning **against** the conservationist-supported Alaska National Interest Lands legislation. Environmentalists are also concerned about Munro's close ties with the chief architects of the legislation recently introduced in Congress that would greatly expand the role of BPA and provide federal financing for privately built coal and nuclear plants. Conservationists will be watching closely to see that Munro establishes his clear independence and avoids behind-the-scenes dealings with these interests.

## ■ Budget Increases for Environment

The \$500 billion budget President Carter sent to Congress holds some good news for environmentalists and appeared to fulfill a number of campaign promises. The budget calls for a major increase for the Land and Water Conservation Fund to purchase new areas, a new National Heritage program to help states preserve important local sites, more money for the Fish and Wildlife Service and the Park Service, a large increase in the budget for the Environmental Protection Agency (including a 60% increase in funds for the control of toxic substances), more flexibility in road and transit programs, a huge increase for energy conservation programs, and **no** funding for the controversial Clinch River Breeder Reactor. A major item of unwelcome news is that the budget seeks continued funding for water projects that the President tried unsuccessfully to kill last year, including the Russell Dam on the South Carolina-Georgia Border.

Historically, the budgets the President sends to Congress have often been changed beyond recognition by the time they reach the final appropriations phase. However, the President's proposals do carry a lot of weight since they have the cumulative expertise and prestige of the executive agencies behind them.

## ■ Timber Industry Poll Shows Public Likes Wilderness

A recent poll sponsored by the forest industry found that the public is strongly opposed to increased sales of timber from the national forests. The study, conducted by Opinion Research Corporation, also concluded that only 7% of the public felt there was "too much" wilderness, while 32% thought there was "too little." (Males aged 18-29 agreed by a 51% majority that there was "too little" wilderness.)

A representative of the American Forest Institute said that the industry will probably ignore the pollster's recommendation that the industry deal only with policymakers and not directly with the public. "What the poll really showed was a terrible anxiety that we are running out of something people want, an outdoors experience," he said. Future public relations efforts for the timber industry, he continued, should concentrate on relieving that fear and replacing it with worry about the "economic costs" of wilderness.

## ■ Prospects Hopeful for Mineral King

The Carter Administration has announced its support of bills sponsored by Senator Alan Cranston and Representative John Krebs — both California Democrats — to add Mineral King valley to Sequoia National Park. The Administration feels that the proposed \$80 million Disney resort in the Southern Sierra would degrade the wilderness quality of the adjacent park. The legislation would shift jurisdiction over the valley from the U.S. Forest Service to the National Park Service. M. Rupert Cutler, assistant secretary of agriculture for conservation, research and education, had supported a Forest Service compromise plan for a 5000-acre ski area within the 25-square-mile valley. But Disney representatives, who had proposed a much larger resort, protested that such a small development would hardly repay the high cost of construction. Conservationists, on the other hand, fear that even a small resort would eventually be enlarged to increase profits.

Environmentalists believe that the Carter Administration's support will kill the eight-year old ski resort plan. The valley is almost completely surrounded by Sequoia National Park. It was originally excluded from the park because mining was still going on when the park was created in 1926. But the valley hasn't been mined for years, and Interior Department officials now assert that the area should be left undeveloped — a goal heartily endorsed by conservationists.

## Roughing it in Nepal

# Off the Beaten Path

PETER ROGERS

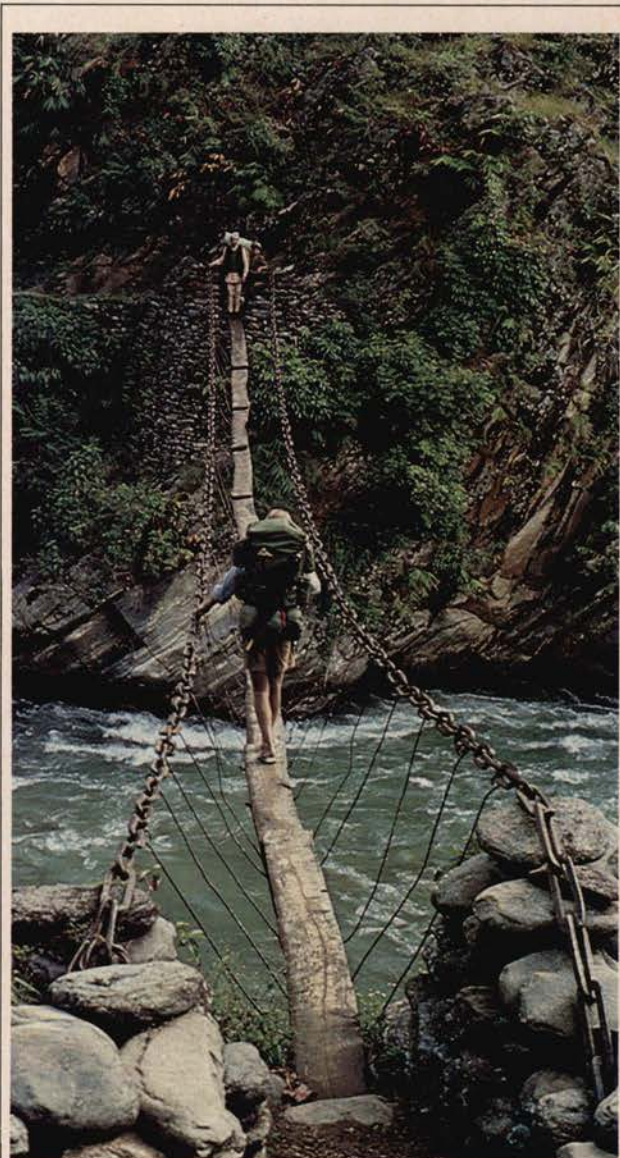
I would have pedaled on if a figure in blue had not seen me and yelled “Peter!” so loudly that I nearly lost control of my ancient three-speed. I recognized the voice instantly, even on a Kathmandu thoroughfare, and I felt relief and joy at having found an old friend in Nepal.

Nat was a college climbing companion and high school classmate; before graduation he had mentioned vague plans of visiting the Himalayas with his friend Sarah. That we should meet these many months later was as lucky as it was coincidental. I had been in Nepal for two weeks and had just returned from a short trek into the Helambu region. I was in the process of planning a long trip of my own. Nat and Sarah had come to trek also, so our reunion was perfectly timed.

We set about with naive frenzy, not realizing how much real planning is necessary for a mere journey by foot; friends on commercial treks had climbed off the plane and into their hiking boots, having left the red tape and the outfitting to a trekking agency at home or to one of the dozen in Nepal. It was fortunate that Sarah had met a trek organizer, Mike Cheney, while studying in Kathmandu. Mike and his organization helped us plan a customized trek. We were aiming toward some lesser-known terrain south of the Dhaulagiri; the route would combine part of Herzog’s 1950 approach with some remote and perhaps untrafficked villages.

With a Nepali vocabulary of five words between us, we needed a guide and translator, and porters were also a necessity. The trails in Nepal are well maintained—they carry commerce and are used for communication—but they are unrelentingly steep; it would be impossible for us to carry the amount of food and gear we would need. Cheney put us in the care of a Sherpa named Ang Kame and a cook named Sanghi, both of them veterans of several high camps. We discussed our plans with them and agreed that an unfrequented area might well pose problems of finding a route and maintaining a food supply. It appeared, in fact, that trekkers had not traveled much of our proposed path; Cheney was interested in our choice, however, and we were enthusiastic.

The trekking permits were obtained, a portable kitchen was purchased for Sanghi, and at the bank a small sack was filled with thousands of rupees for trail expenses requiring



Photographs by Peter Rogers

*A typical bridge in the Helambu region. These rope bridges may look makeshift, but they are surprisingly sturdy. This is crucial, since everything that must be brought in moves by trail, carried by porters.*

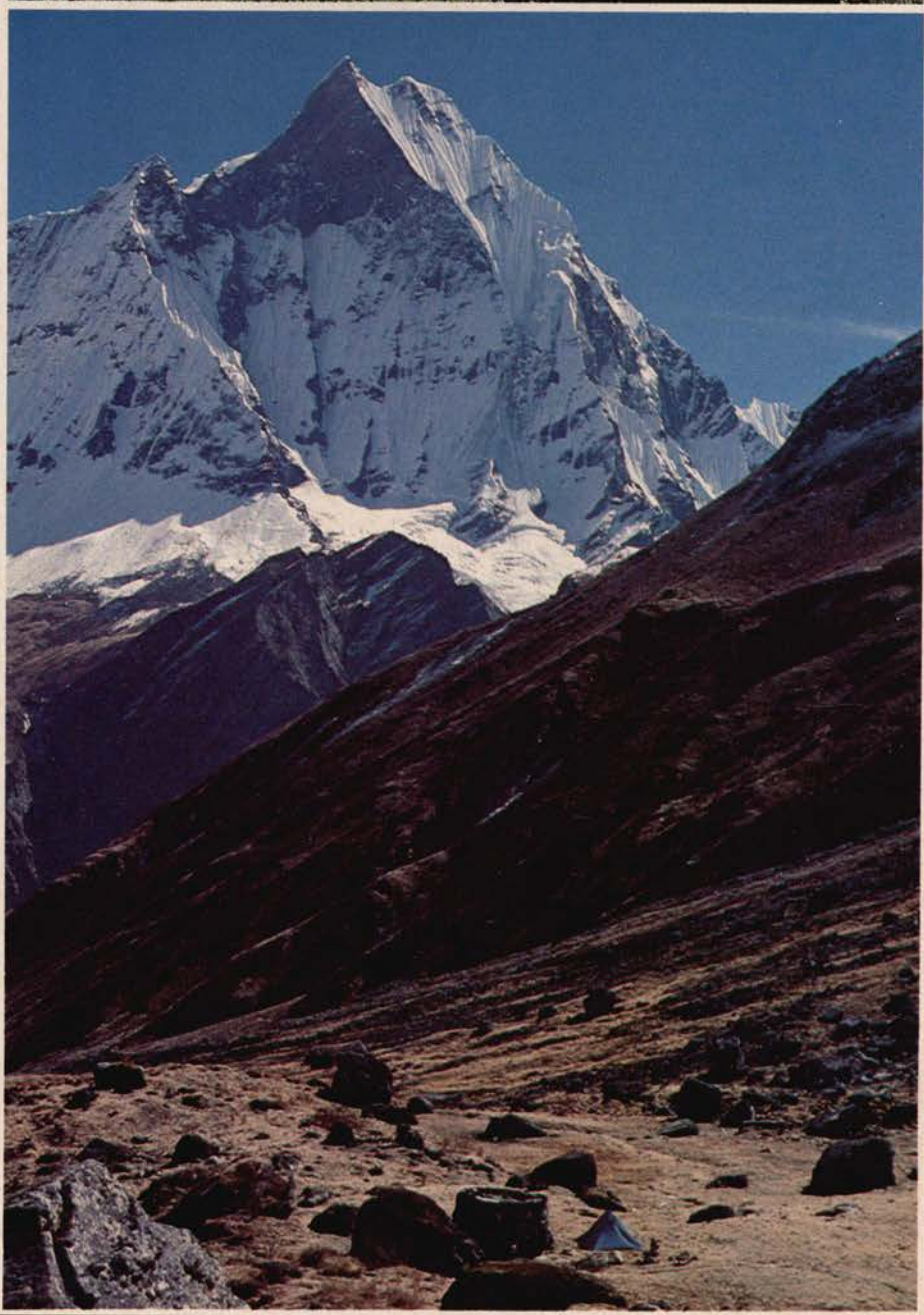
small change. Early expeditions in Nepal were forced to carry the daily porter payment in coin, a task for a dozen additional porters!

Arriving in Pokhara, we found all the porters committed to larger, prearranged treks; it required Ang Kame's persuasion, impressive even across a language barrier, to enlist two stalwarts to our cause. The bazaar was our next stop, where we hoped to buy staples for most of the journey. Sanghi sensed a chronic sahib sweet tooth and bought 25 pounds of sugar. To our surprise, we ate it all.

We intended to buy little food en route; many villages still operate on or just above subsistence level, and prices have been outrageously inflated because of trekkers. Villages on a well traveled route import surplus food for trekkers "living off the land," but remote villages eat or must trade what they grow. The balance is delicate and, in some villages, has been upset by trekkers' dependence on locals to supply food. Firewood is also scarce in some areas and can cost more than kerosene. In Pokhara we purchased large amounts of the latter and of rice, flour, lentils and chick peas, as well as the aforementioned sugar. Several tins of fruit and butter were added—luxury items. The porter loads were packed (66 pounds each, not including the porters' own food and clothing). Sanghi carried the kitchen set only; as Ang Kame explained to us, the cook's work would begin when the porters' work ended. Nat and I juggled tents and stuff sacks on our own heavy loads, and we were on our way.

We did not yet understand that a customary trek is not a backpacking trip. By our own standards, we sat in the lap of luxury, but that image altered when we passed a few large organized groups. These trekkers hiked with cameras at most, while their porters trudged along under loads of wicker stools, collapsible tables and cases of white bread (several weeks into the trek I even heard a Sherpa rousing his employers with three blasts on a whistle!) Our loads were too heavy that first day, so we took on a third porter, or kuli; his prodigious smoking habits soon earned him the name Ganja (marijuana) Kuli, but he remained with us for the rest of our five weeks on the trail.

Our band of eight moved through narrow village streets and over time-worn trails under the fitful sky of a late monsoon. The traditional trekking roles gave a bit here and there as we helped gather wood or fetch water, and our own loads remained considerable despite the addition of the third porter. High spirits flourished



as we slipped into daily routines and had time to communicate. Apart from common ties such as photography or love of the mountains, there grew a bond of shared adventure between Nat, Sarah and myself.

We followed the popular trekking route as far as Beni; early days, early nights and miles of steep trail strengthened our lungs and legs while drawing us all together through laughter, concern and exhaustion. Six to seven hours on the trail each day yielded endless vistas and humbling visual confrontations with Dhaulagiri's south face, or equally picturesque clusters of wood-frame houses straddling terraced ridges. Sanghi graciously agreed to situate our lunch stops outside the villages to avoid the flies and the stares which were most disconcerting at first. We consumed huge amounts of food, yet somehow managed to lose weight; breakfasts were meager, but lunch and dinner were good hot meals.

Following standard practice, we fed and provided a tent for our cook and Sherpa—and even fed our porters when surplus food was available. Porters are usually responsible for their own food and lodging as long as there is a village nearby and for that reason are paid daily. Advances to the porters in Pokhara had apparently paid for new sneakers, which vanished mysteriously the third or fourth day on the trail.

Policy decisions were blessedly unanimous among Nat, Sarah and myself, but the constant uncertainty inherent in a do-it-yourself trek balanced the joy of saving money. An example was the "great flour miscalculation" that came to light only when Sarah made a cursory check of our staples; there was little flour left, and we had expected, by then, to be less than halfway through our supply. The situation was remedied but raised doubts about the advisability of leaving such things to anyone but ourselves. We had the time and patience to be responsible, but occasionally we envied the members of the organized groups. They could afford to be totally relaxed, often arriving in camp to find their tents set up and their meals almost ready.

Greater distance from Pokhara resulted in fewer outstretched hands and more greetings of "Namaste" ("I salute the god in you."). The Nepalis work the ancient terraces in an endless cycle of rain and sun, and the rice of the valleys gave way to

millet, corn and potatoes as we climbed to higher elevations.

Upon reaching the market town of Beni, we stopped for a day to buy food, hire additional porters for the rough trails ahead and do some laundry. The trail beyond Beni ascended 4000 feet the first day; the new porters grumbled, but the original three said nothing. As we approached the mountains, the talk of high camps and ice climbing increased. Sarah put in her bid for an alternate plan of crossing a high pass to reach the main trekking route, but Nat and I wanted to climb even if a summit were out of bounds, and Sarah went along, with reservations.

The rains stopped, and we passed through villages with storybook names: Kor, Damdam and Jinh. The villages grew successively smaller as our path followed the swift Rahugat Khola to its source. Yet some towns supported schools, where occasionally we were able to get trail descriptions from English-speaking teachers.

### *The Way Back*

Gradually, the smaller peaks to the south of Dhaulagiri dominated our northern vista; we hoped to make a partial ascent of one of these peaks for a view of the Annapurna himal to the east. Nepal strictly regulates ascents to its summits, so that our goal could not be the peak itself. We had only conflicting directions and a rough map to guide us; Ang Kame could translate our inquiries to the locals, but responses were vague. No one but shepherds, difficult for us to find, ever ventured above the valleys.

One brilliant morning, Nat spent several minutes examining the foreshortened walls and ridges above us through small, powerful binoculars; he later complained of headaches and dizziness along with an increasing light sensitivity that soon developed into total loss of vision. Sarah and I shared worry and long periods of watching over our now helpless companion, but after a full day, Nat's vision returned. Snow blindness is not uncommon on glaciers, but we had not yet reached the tree line!

At the last village on our route, the two porters hired in Beni quit. The weather was getting worse, and the trails were bad. The stamina and loyalty of our three original porters became apparent as the two abandoned loads were divided among us all with no complaints.

The few inhabitants of Patlabash had never seen trekkers and were politely curious about us and our belongings. We welcomed visitors to our camp with tea and

listened to their stories through Ang Kame. There's little privacy while trekking, although only in the larger towns such as Beni had we grown tired of the intrusions born of curiosity. Our realization that our own presence was an intrusion gave us patience.

Our last human contact was a buffalo herder who spoke of trails which might lead us up into the mountains themselves; a day beyond his hut we entered a realm of daily hail storms and light snow flurries. The porters used one of our tents and some extra clothing along with blankets purchased in Beni to pass the freezing nights.

At tree line we came upon a long, narrow tiger trap built of stone; lichens indicated the great age of the stonework. Water was scarce, but the daily hail and snow could be collected and melted. Here the porters set up camp to await our return from the high country. Ang Kame and Sanghi would carry our gear to a distant knoll visible through the mist, then return to remain with the porters.

With Sherpa and cook, we scaled steep slopes of rock and grass to the knoll at about 14,000 feet. A space was made for the small tent that Nat, Sarah and I would share, then Ang Kame and Sanghi wished us luck and took their leave; Sanghi left us a hundred tortilla-like chapatis wrapped in a towel. By the fading light of afternoon, I read aloud the symptoms and treatment of altitude sickness and pulmonary edema. Acclimatization had been slow and steady, so we were optimistic; settling into our sleeping bags, we were acutely aware of never having slept this high before.

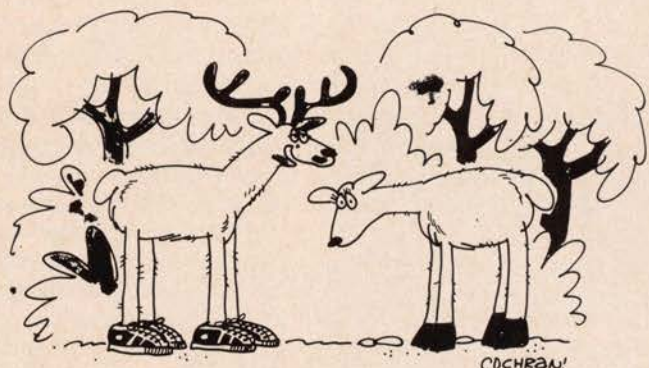
During the next three days Nat and I searched for a route around massive buttresses laced with iced couloirs. Slabs frozen at dawn ran with streams by noon, while falling rock and ice echoed around us. Near our high point we discovered tracks of a hare and a larger pursuing animal, presumably a snow leopard, and reflected upon how high and far we had come. To the east, across the deepest valley in the world, lay Annapurna himal and the Great Barrier. Above us lay the ice and rock of an insignificant summit, perhaps never climbed. We retreated to the relative safety of our tent, pitched on a narrow saddle of snow, where Sarah had waited while we climbed. It was time to go back.

Return journeys in Nepal are never all downhill, but at least now we knew the way. It was good to have Sanghi cooking instead of myself, and there was nothing to anticipate but the enjoyment of our trip back to Pokhara. Near a ridge crest we sent a band of monkeys screeching off into the forest and marveled at the large soaring

Above Left: *Hiking into one of the last mountain villages on the trail north to Dhaulagiri.*

Below Left: *Looking across Annapurna basecamp—"the Sanctuary"—toward Machapuchare, "fish-tail mountain."*

# You Think We're Joking?



"If you think I could slip silently through the forest before . . ."



"Would you step out here for a moment, please?"



"Rest assured if I95 goes through here I guarantee that it will become a troll free highway."



"Old Ben knows every rock in this river."

birds that hovered so near Sanghi's kitchen. The hours of sunlight increased as we dropped back into the valleys and more favorable climes. Stone platforms under massive pipal trees, often decorated with orange and red flowers, offered shaded rest along the trail. At Chingkhola, two resident Gurkhas described our route to Tatopani in Oxford English, and we enjoyed a last few days off the main tourist track.

Ganja Kuli lived up to his moniker and danced about our campfires, and Ang Kame solemnly ascribed the parentage of half a village's children to Sanghi. When the latter was asked to procure a local brew named rakshi, it was found that he had not only done so but had started to sample it as well! Our loads were light, the trails were wide and dry, and this was trekking at its finest.

After resupplying at Tatopani, we turned southward along the Kali Gandaki. By then I had resolved upon a trip to Annapurna basecamp; the route was well-traveled and the view said to be awesome, and my Nepali vocabulary now contained most of the words I would need along the way. Nat and Sarah wanted to go directly back to Pokhara, so we parted company in Sikha, and I struck out armed with directions from Ang Kame and chapatis from Sanghi. From Ghandrung I had only to follow the stream of European trekkers and their occasional candy wrappers to the head of the Modi Khola. There were houses to sleep in and rocks to sleep under along the way, plus all the tea and hard-boiled eggs a person could want.

When I reach almost 14,000 feet, Annapurna basecamp drove the thoughts of trail-acquired leeches and sore feet from my mind. The camp is surrounded by a dozen peaks as high as 26,000 feet, and "sanctuary" aptly describes the alpine meadows fully encircled by towering ridges and cornices. An early start from the sleeping cave called Hinko, combined with an unusually clear day, resulted in a full two hours of viewing bliss. Having accomplished this goal of my own, I sped back to Pokhara in two days. The others had taken their time and arrived the same evening.

Our porters were paid, tipped and sent off with best wishes and articles of our clothing; cook, Sherpa and three weary but satisfied tourists boarded a bus back to Kathmandu. Over a final dinner the five of us relived the experiences and lessons of the trip, finding humor in our errors and pride in our minor achievement. □

*Peter Rogers is a mountain climber, traveler and beekeeper.*

## The Vice Presidents

**L**AST summer some 700 Sierra Club volunteer grassroots leaders were urged by President Bill Futrell to make better use of the services of the Club's ten regional vice presidents. Doing so, he said, would promote better and faster communication between members and the top levels of the Club's leadership—both volunteer and staff. In Futrell's view the ten VPs should serve as the "middle management" of the Club's volunteer structure. Some leaders are a bit unclear about the role of the vice presidents and how they fit into the Club's organizational structure. (They, of course, chair regional conservation committees [RCCs].) The 700 leaders were the chairs and conservation chairs of both the 300 regional groups and the 50 chapters. At least one of those 700 asked whether or not the RCC chair—whose primary concerns are conservation issues—had sufficient time, interest and qualifications to deal with all the other areas of the Club's activities.

In an attempt to clarify the role and functions of the vice presidents, a questionnaire was mailed to each of them. It asked the vice presidents (1) how they defined their role, (2) how much attention they could give to non-conservation matters, (3) what steps they had taken or would take to set up some sort of "middle management" apparatus in their region and (4) what general recommendations they had for improving communications and coordination of activities within the Club's volunteer structure. The response was gratifying. Eight out of the ten replied, and some gave detailed reports of their experiences while others wrote thoughtful letters. Almost all made suggestions—including a plea for a 36-hour day.

In 1970 the board appointed a few prominent, activist volunteers to serve as regional vice presidents. Their chief duty was to speak for the Sierra Club in their areas on national or regional Club policy or activities. The present system of ten regional vice presidents doubling as regional conservation committee chairs was established by the Board of Directors in 1973. On the questionnaire and in their letters, the current VPs agreed that their principal role was as regional spokesperson for the Club, but that their prime responsibility, as RCC chairmen and chairwomen, was to conservation.

In practice, most of the VPs have informal, unstructured contacts with regional chapters and groups. All try to keep in touch with chapter chairs—some once a



ROBERT A. IRWIN

month. Several visit each of their chapters' executive committee meetings once a year. Budgetary restraints and long distances, however, preclude frequent visits; the two California chairs probably visit chapters most often. Bob Rutemoeller in the North and Susan Steigerwalt in the South each have six chapters to cover in their relatively compact regions. Occasionally they—and VPs in other regions as well—get distress calls from a group or chapter that needs help to solve some sticky personality problem or needs advice on procedures, Club policy, leadership development or member involvement. Generally, the VPs try to act unobtrusively as facilitators or mediators. Just being there as a good listener with an informed "outsider's" point of view is helpful, Ruth Frear, the Southwest VP, commented. Occasionally, however, a toe or two gets stepped on, Ed Easton, who chairs the Appalachian RCC, pointed out. "Part of our job is to not step on toes; but to see that the Club is effective may, now and then, require it," he added.

In two regions some tentative steps have been taken toward the development of *ad hoc* volunteer bodies somewhere between the Sierra Club Council and the chapters. The Midwest RCC, according to Chair Roger Pryor, has on several occasions pursued nonconservation projects. One was a very productive Chapter Newsletter Editors' Workshop conducted in the spring of 1976 as part of the regular MRCC meeting and attended by all nine Midwest chapter editors. Another, at last fall's meeting in Minnesota, concentrated on chapter fund-raising. That two-hour workshop was conducted by the North Star Chapter, which has been able to raise \$40,000 annually. Pryor believes that these workshops made good use of both time and money. But, he added, "these kinds of things *do* take away from our time for con-

servation matters." The success of those and other such ventures has generated a demand for more regional sessions in the Midwest. Pryor hopes to see the Regional Council meet annually.

Vice President Rutemoeller is also convinced that some kind of regional council meetings should be tried, but believes their focus should remain on how all of the Club relates to conservation issues. His conclusion stems from his concern that the Sierra Club Council is too large. In order for it to work more effectively, he maintains, it would have to meet three or four times a year, which would be prohibitively costly to the Club and take more money away from conservation efforts.

Regional councils or all-chapter meetings can improve communications and coordinate activities within a region. However, only if national leaders participate in them can such meetings provide any kind of a national-to-local, or middle-management service. The VPs themselves have not been able to provide that service as fully as needed. Every one of the vice presidents who responded to the questionnaire said there is not enough time or funds available to do the job properly. To do so, more than one of them commented, would mean becoming a full-time, nonpaid staffer.

Some possible solutions were suggested. Taking part of the workload off the RCC chairs was Steigerwalt's recommendation. Her Southern California RCC is run on a partnership basis, with a sharing of ideas and responsibilities among its members, particularly its executive committee. She points out that an RCC chairperson has "neither the time nor the resources to do all the jobs that ought to be done in functioning as a mediator between the national Club and the chapters." To a great extent, she says, the Southern California RCC itself fills that role by implementing the conservation policies of the Club. In particular, the Sierra Club RCC has helped organize the Chapters' Meetings (as noted above) and has also worked with the Northern California RCC in both state-wide chapter fund-raising and

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In many of the vast, sparsely populated RCC regions, communication and coordination problems are difficult. RCCs are kept busy trying to put out environmental brush fires with a handful of firefighters. Little time or energy remains for other problems. Norman Nelson, who chairs the Northern Plains RCC, comments that with only about 1600 members spread out over five huge states there is "a very small 'gene pool' for our leadership."

Marvin Baker, the Southern Plains RCC chair, volunteered a general recommendation that might solve the problem of having a "two-hat" person who is much too busy chairing an RCC to do justice to the job of serving as a regional vice president. Baker suggests that the positions be separated "if middle management means a significant commitment of energy. Perhaps only a retiring RCC chair should then be elevated to regional vice president."

It seems obvious that as the Sierra Club approaches a membership of 200,000 and as three more chapters (Pacific Northwest, Chatahoochee, and Delta) come closer to splitting because they have grown so large, establishing some sort of a "middle management" structure for our volunteer-run organization is in order. Your comments, ideas and suggestions will be helpful. Send them to William Futrell, President, 530 Bush Street, San Francisco, California 94108.

## Outreach to Women

ON NOVEMBER 5, the Club's Board of Directors initiated an outreach program to women's groups at the local and national levels. All units of the Club are being urged to consider women's organizations as potential allies on conservation issues and solicit invitations to speak on Club priorities at their local meetings. Areas in which women's groups have already expressed interest include toxic substances, air and water pollution, urban development and jobs, housing and appointment or election of women conservationists to public office.

A national Ad Hoc Committee for Outreach to Women's Groups has been formed and is headed by Director Helen Burke. It will meet in conjunction with each board of directors meeting. National projects being considered include a speakers bureau, a talent bank of women in the environmental movement and a national conference or newsletter. Interested Club members (women and men) are encouraged to contact Director Burke, c/o the national office. □

## How Club Elections Work

LEWIS F. CLARK

**E**ACH YEAR the national membership of the Sierra Club elects new members to its board, the top governing body of the Club. The national elections also decide questions of basic policy or changes in bylaws proposed either by the board itself or by the members through petitions. Each of the 50 chapters also holds an election for local chapter officers and local issues.

Candidates for the Board are selected by the Nominating Committee or by petition. The fifteen directors serve staggered terms of three years. Except for resignations, withdrawals or deaths, there are five seats to be filled each year. A director may serve an unlimited number of terms provided a minimum of one year's absence from the board occurs after any two consecutive terms.

The annual national election is held by secret mail ballot, and the ballots must arrive by noon on the second Saturday in April. From six to ten months before the election the Nominating Committee, nine volunteers from different parts of the country, is appointed by the president and approved by the board. The committee chooses seven candidates from all over the country for the five seats to be filled. The committee solicits suggestions from the chapters and from the membership at large. A petition proposing a member of the Club as a candidate for director must be signed by at least 1% of the number of ballots cast at the last preceding national election. This year the qualifying number is 338. Petitions to place issues on the ballot must, to qualify, meet the same 1% rule. The board of directors usually recommends a pro-or-con vote on issues submitted by petition.

Each candidate submits a statement of not more than 300 words. Candidates may use 100 words to identify themselves and to cite significant activities and positions held in the Club. The rest of the statement focuses on the goals and priorities the candidates think would govern their service on the board. Except for minor matters of grammar and punctuation, the Nominating Committee does not edit the statements. Each candidate is invited to submit a photograph of himself or herself. The Nominating Committee draws by lot the position of each candidate's name on the



ballot. The brochure of statements follows the same sequence.

Another committee of volunteers gets into the national election act—the nine judges of elections. The duties of the judges are “to supervise the election . . . count the ballots, tabulate the results and report . . . to the President and Secretary in writing.” The logistics for producing election material are complex now. Some 185,000 ballots are required, one for each member as of January 31. They must be composed, proofread, printed and prepunched with a security number. Accompanying brochures containing candidates’ statements and proposal arguments, if any, must also be composed, proofed and printed. Ballot packets, one for each member family at the same address, are sent out by third-class mail to all addresses in the 48 contiguous states. Ballots for Alaska, Hawaii and foreign countries go by air mail. To prepunch a unique eight-digit security number into the ballot costs less than two cents a printed ballot and makes it virtually impossible for an unauthorized person to reproduce ballots for the purpose of “stuffing” the ballot box—yet manual comparison of member names on a return envelope with master membership lists is not required. The computer instantly recognizes ballots numbered within the correct series. Every year the security number series are changed. The numbers also permit the computer to recognize a ballot fed into the card reader more than once. This type of error is very rare, but there are usually a few of them in each election, and appropriate adjustments are made in the reported totals.

Approximately 40,000 ballots must be counted, each containing from eight to about twenty items. It is necessary, we have found, to do the count by computer. The Oakland, California, post office holds completed ballots under a “phantom” box number until one week before the election. The 25-plus sacks of accumulated ballots are then picked up, and the team of judges begins processing them. Judges extract the ballots and scrutinize each one quickly to make sure that no chads (punchings) are dangling from the card and that it is not wrinkled or warped or patched with plastic; these irregularities can stop the computer reader and increase costs. Irregular ballots must be replaced. Last year this work took over 300 hours.

The ballots are processed in a rented conference room close to the computer headquarters. We start to feed the ballots into the computer on Saturday morning. When all the ballots, including the last-minute ballots collected from the post

office that day, are satisfactorily read into the computer, the actual count of votes and the printout of the several reports (votes, errors, etc.) is accomplished in minutes, if all goes well. Then the judges examine the results to make sure they are sensible and that there are no unadjusted errors.

The ballot-counting computer program is the property of the Sierra Club. It was designed by a Club member who, as a professional programmer, donated part of his services. Such a program would cost several thousand dollars. Although the basic program can be used indefinitely, parts of it must be updated each year to adapt it to the number and names of candidates and the circumstances of the issues, if any, to be voted on.

The judges are selected for their experience with Club operations, personal integrity and willingness to serve reliably. Ballots are kept under lock and key during the period of scrutiny. Judges may not act as proxies for members who cannot decide how to vote, although a few requests to do this are usually received. The Club staff is not involved with the examination or counting of the ballots.

The security system for a secret ballot procedure is a valuable precaution, if only for the peace of mind it brings.

After the report of the judges of elections has been formally made to the board at its annual organization meeting on the first Saturday in May, the board votes whether to accept the report. Subsequently the chairman of the judges requests permission to destroy the ballots. (We do retain a magnetic tape record of all votes, which is kept in a safe-deposit box for several years.)

The secretary, in cooperation with the editor of *Sierra*, arranges to publish the results of the election. Usually other media are alert to publish the news. The secretary also notifies all candidates directly.

For the last seven years, approximately 30% of the members have voted in national elections. Unfortunately, the trend has been downward, to 20.1% last year. Perhaps we should expect that as the Club attracts more members, the percentage of those who bother to vote in the national elections will decrease because of unfamiliarity with the candidates—and apathy.

The directors, the Nominating Committee, the judges of elections, and many chapter leaders would welcome suggestions on how we can get more members to vote in the national Club elections. □

*Lewis F. Clark chairs the Judges of Election Committee and is an honorary vice president of the Club.*

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# The Economic Myth of Nuclear Power

DOUGLAS LA FOLLETTE

*Douglas LaFollette is Wisconsin's Secretary of State.*

**T**HE CONTROVERSY over nuclear power involves a question not only of how to generate power, but also of how to organize our economy and society. In spite of all the risks and the health hazards of nuclear power, its proponents maintain that it is necessary because it is the only means we have available to meet our future energy needs. They also emphasize the number of jobs that building huge nuclear plants would provide.

Unfortunately, nuclear power will not do what its advocates claim. Nuclear power is too expensive and too capital-intensive a form of energy to meet these goals. A cost-benefit analysis of nuclear power in comparison to other energy options that do, in fact, exist shows that it is the worst possible way to invest our scant energy-production dollars. Rather, a policy of energy conservation coupled with the development of more labor-intensive alternative energy sources is the best way to meet our energy crisis and provide more jobs.

Alternative forms of energy and energy conservation cost less, are safer than nuclear power and produce more jobs per dollar of investment. In the utilities industry, it takes more than \$100,000 of capital investment to provide one job. The manufacture of goods such as solar energy components and home insulation requires on the average, only a \$19,500 investment per job. Most alternative energy industries are in this range. Other related industries require even less capital. For example, the installation of solar water heaters creates one job for every \$4000 of capital investment.

A proposal sent to President Carter last year by the staff of the Senate Commerce Subcommittee described how an investment of \$1.65 billion in an energy conservation program would create 100,400 jobs. This kind of program would focus on retrofitting schools, colleges, hospitals and federal buildings; installing solar water heaters and insulation in HUD-owned single-family houses; and constructing bicycle paths.

Wind generation is another energy alternative that would provide more jobs than nuclear power. A comparative study done last year concluded that the operation and maintenance of a large wind system would require a labor force two to four times greater than for a nuclear power plant of equivalent capacity.

Nuclear power production is a large-scale centralized energy system that requires huge amounts of capital and produces far fewer jobs. In comparing it to solar systems, a report done for *Critical Mass* in 1976 found that solar-developed energy creates about two and a half times as many jobs as nuclear power for the same amount of energy produced.

In addition, energy conservation and alternative energy sources such as wind and solar energy afford more opportunity for small, locally owned business enterprises. Nuclear power, with its immense capital requirements and sophisticated technology, is practical for only large corporations.

No matter how you measure it, nuclear power is too expensive. A detailed study by Professor Marc H. Ross of the University of Michigan and Professor Robert Williams of Princeton, published in 1977 in *Technology Review*, concluded that more energy can be saved (or produced) by investing in heating

pumps, insulation, storm windows and industrial heat-recovery systems. For example, the study demonstrated that a kilowatt of energy can be (produced or) saved for only \$120 by converting to heat pumps for heating and air conditioning. An investment of \$450 in home insulation or \$100 in recovery of waste heat will also save a kilowatt of energy. Compare these cost figures to the \$800 to \$1000 per kilowatt it costs to build a nuclear power plant. Clearly, our limited funds should be invested in the alternatives that not only create more jobs, but also produce more energy for each dollar we invest.

Solar and wind power sources are also attractive energy investments. A recent study commissioned for the Federal Energy Administration concluded that cheap solar electricity could be readily available in five years if the government would spend \$440 million to purchase production equipment (less than half of the cost of a single nuclear power plant). This expenditure would be enough to make the solar industry competitive on an economic scale. In five years, the price of solar power cells could be lowered from the present cost of \$15 per watt at peak generating capacity to 75¢ or less. In addition, half a million jobs would be created.

We already have the technology to harness wind power. The wind could provide us with 20% of our electricity needs by 1990. Wind-derived energy, like solar electricity, is quite expensive now, but a relatively small investment to begin mass production could result in a dramatic reduction in costs.

Finally, there is a cost factor of nuclear power which has not yet been fully assessed. Nuclear power is a relatively recent energy source, and we are just beginning to face the problem of how to dispose of the nuclear plants themselves. (This is separate from the problem of the 2500 metric tons of high-level radioactive wastes we already have in this country and don't know what to do with.)

A nuclear power plant has a life span of only 30 to 40 years. At the end of that time, the entire plant must somehow be "decommissioned." Current proposals are to bury or entomb the entire radioactive plant for 100 years, after which it would be dismantled by remote control and its component parts buried at as yet unspecified sites.

One of the first large-scale commercial nuclear power plants to be shut down will be the Oyster Creek plant in New Jersey. Decommissioning is scheduled for the year 2003, and the current projected cost is \$35 million (in 1976 dollars!). It is not surprising that the power company is asking for an electricity rate increase to cover this future expense. It has been estimated that the average cost for decommissioning may run over \$100 million per reactor. This is yet another cost of nuclear power to be borne by the consumer, an expenditure that will provide very few jobs and no additional energy.

A policy of energy conservation, coupled with the development of solar, wind and biomass energy technologies, will meet our energy needs more economically and will provide far more of the jobs necessary for a stable economy. The prevailing myth that only large-scale energy projects such as nuclear power production can cure our economic woes is the major obstacle to such a policy. □

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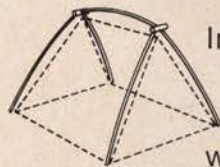
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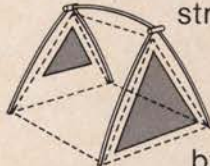
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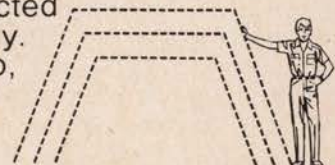


Interchangeable pieces slip together to form the unique compression arch frame. Its feet hold the floor flat while it provides total support for the tent. Shock cords hold tent and fly taut, but minimize stress even in heavy wind.



A full-front screened door and huge rear window provide cross-ventilation. Both are rain-protected by the hooded fly.

There's a Timberline for two, for four—and a new 8x10 Base Camp model with 6-foot headroom. All are expandable with optional vestibules.



Inspect the Timberlines where you shop for quality camping equipment. See why they're the most popular self-supporting tents made.

## Eureka! Tent, Inc.

Box 966, Binghamton, NY 13902

Please send 50¢ if you request a catalog.

Since 1895 . . . thoughtful ideas by the tentful.

a Johnson wax associate

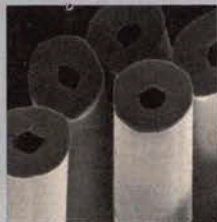
# You want advice on buying a sleeping bag? Ask a Caribou.

Nature made the Caribou's hair hollow.  
We've made Dacron® Hollofil™ II the same way. For more insulating power.

Experts agree that the fur of the Caribou is one of the best furs a man can wear in the arctic. Why? Because the fur has hollow follicles which have remarkable insulating qualities.

Dacron® Hollofil™ II also has remarkable insulating qualities because it, too, is hollow.

Result: Sleeping bags and apparel with "Dacron" Hollofil™ II polyester give you thicker, loftier insulation—without adding weight. Minimize the loss of body heat. Keep you warmer in the coldest weather.



Unique hollow filaments of "Dacron" Hollofil™ II

You can feel the unique softness of



"Dacron" Hollofil™ and compare it with any other polyester-filled bag. Why is Hollofil™ much softer? Because the shorter length fibers are specially coated, reduce fiber-to-fiber friction, creating superior compressibility, re-fluffability and softness. Softness

that drapes over the body better, helping to conserve the body heat.

Experts have proved the performance and durability of Du Pont Hollofil™ II on Mts. Everest, K2, McKinley and Rainier. It performs outstandingly under adverse conditions. Doesn't collapse when it gets wet.

Keeps its even thickness. Even when fully saturated, sleeping bags of "Dacron" Hollofil™ II can be squeezed out and still provide some insulation. Easy care is another advantage you'll appreciate. These sleeping bags can be hand-washed and air-dried, or machine-washed and tumble-dried.

You'll find most manufacturers of sleeping bags offer "Dacron" Hollofil™ II in quality-constructed models usually at very affordable prices.

For a list of suppliers and more information on the advantages of Hollofil™ II write to: Du Pont Fiberfill Marketing Division, Centre Road Building, Wilmington, DE 19898.

