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THE SIERRA CLUB BULLETIN

MARCH/APRIL 1981

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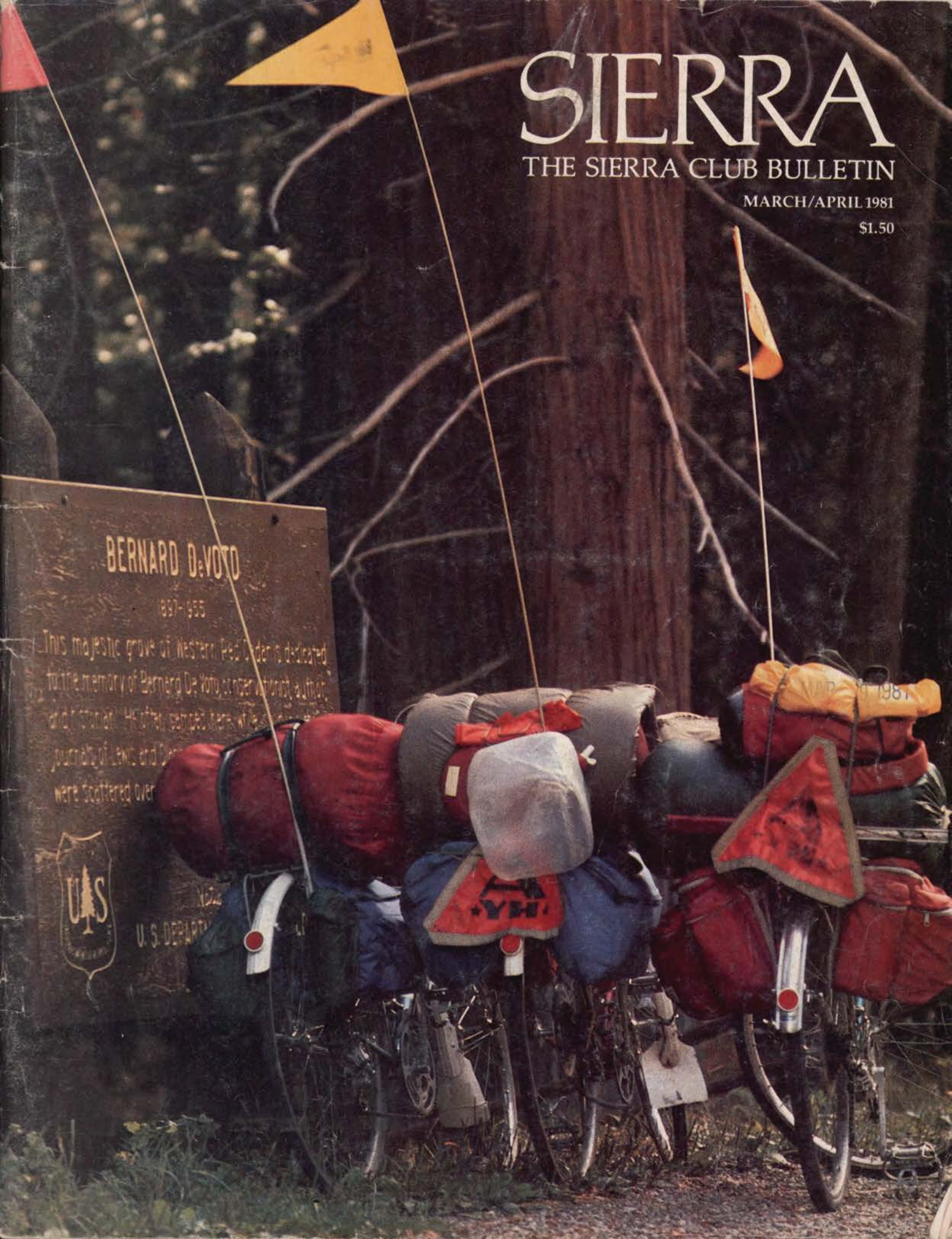

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Cover: Bicyclists on the TransAmerica Bicycle Trail are resting their cycles and exploring on foot a few miles west of Idaho's Lolo Pass in Clearwater National Forest. Hemistour photo.

Uranium Mining and Water Pollution

Carol Polsgrove's article, "In Hot Water: Uranium Mining and Water Pollution," which appeared in the November/December issue, leads readers to believe British Columbia's seven-year moratorium was the result of a public inquiry. The real story is much more interesting.

Briefly, the federal and provincial governments started a joint uranium exploration program in 1973 and 1974 to locate new deposits of uranium. As exploration progressed and became more intensive, one community after another discovered that this activity was actually taking place in their watersheds.

Opposition grew and culminated in late 1978 with 21 small groups jointly calling for a moratorium on uranium exploration and a public inquiry. In early 1979 the government established a royal commission to inquire into standards for uranium exploration and mining but did not grant a moratorium.

As the year progressed and the inquiry got under way, the cries for a moratorium became more strident. The pressure increased as the Sierra Club and Katy Madsen of Summerland kept uncovering new claims staked while the inquiry was under way, including claims right in Summerland.

The provincial legislature was scheduled to open on February 29, and a protest rally was scheduled to coincide with the opening ceremonies. The government, however, not wanting to have its pomp and ceremony disrupted by rabble, abruptly cancelled the royal commission and ordered a seven-year moratorium.

Although all environmental groups were pleased with the moratorium, no one, including industry, was pleased with the cancellation of the inquiry. The commission has since submitted its abbreviated report to the government; the report has not yet been made public.

When the moratorium ends in a little more than six years, we will have to go through the whole process again.

Robert Miles, Secretary
Sierra Club of Western Canada

The Watchung Reservation

There seems to be a regrettable oversight in the November/December 1980 issue about the course of proposed highway I-78 through the Watchung Reservation in New Jersey. In "Highway Robbery," the text accurately states that of the Watchung Reservation's 2000 acres, about 140 acres in the northeast corner would be cut off. The map, however, is distorted; it shows the proposed highway running through the middle of the reservation.

Walter Janicek, Secretary
The Executive Committee
North Jersey Group, New Jersey Chapter

The real route of I-78 through the Watchung Reservation.

Please permit me to present the other side of the coin with respect to I-78 and the Watchung Reservation ("Highway Robbery" by George Schindler, *Sierra*, November/December 1980).

First, I-78 is complete and open to traffic from the Holland Tunnel to Pennsylvania and beyond. The missing six-mile section is causing an increase in traffic that the local streets were not designed for and should not be expected to carry. The road must either be completed or local residents expected to accept a level of noise and air pollution that far exceeds the levels Mr. Schindler feels will be annoying to visitors to the reservation.

Second, although the loss of any woodland in this crowded state is unfortunate, I for one do not find the Watchung Reservation of sufficient value to "save regardless of cost." It already has many more miles of road through it than would be added by I-78, and it contains the remains of an old Nike missile base, which no one seems anxious to have removed.

In closing, I would like to suggest that in the fight for conservation, if we want to win the big ones, we had better not waste our powder where it isn't truly important.

Peter M. Rosenfeld
Berkeley Heights, New Jersey

Hints on Hummingbirds

The article on hummingbirds in *Sierra* for July/August 1980 was most interesting and the pictures were great! I am concerned, however, that no mention is made of the fact

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that hummingbirds will become dependent on the feeder and neglect to migrate if feeding is continued into the fall. Then any small lapse in feeding means that they die, having no other source of food.

Nora Hirsch
Sacramento, California

In the July/August issue of *Sierra*, the article on hummingbirds mentioned how to make your own hummingbird food. It said not to use red food coloring because of the harm the food coloring might do. How do experts feel about the use of commercial hummingbird foods, which have included "approved artificial food coloring?" I am presuming because of that ingredient that perhaps it would be better to make your own food decorated with red ribbons as the article mentioned. Is this correct, or is the amount of food coloring in commercial food too small to cause harm?

Suzanne Lock
Fresno, California

Matthew Leddy, Department of Birds and Mammals at the California Academy of Sciences, replies:

The letter from Nora Hirsch brings out a very good point—some birds will remain north of their wintering grounds if they are provided with food and then will become dependent upon the people for their livelihood. It is important to keep feeding the birds throughout the winter, be they hummingbirds or seed eaters.

The question from Ms. Lock regarding red dye has elicited different answers depending upon whom I ask. Some say it makes no difference and others are against it. Personally, I feel that since the birds are attracted to the color of the flower rather than the color of the nectar, why not mimic nature and avoid the chance, however remote, of injuring the birds by using dye?

Corporate Decisions

I would like to add to points made by David Kaplan in his review of *The Sun Betrayed* in the January/February *Sierra*. I am an exploration geologist in the oil and gas industry and am angry with the very narrow perspectives of the energy industry. I would like to discuss briefly how decisions are made by the upper management of a corporation.

The people who have ascended to loftier management positions have done so because of their loyalty to the corporation and because of their ability to make tough economic decisions that preserve its livelihood. They are bound by both tradition and stockholders to pursue investments that will maximize the profit of the corporation and ensure its growth and longevity. No one directly associated with a corporation wants a management that makes decisions on any other basis.

The actions taken by corporations that may greatly delay the development of renewable energy seem to me far more a product of the constraints of our economic traditions and the general corporate ignorance about the limits of resources and workable renewable energy alternatives than they are of deliberate conspiracies by corporate management.

This does not preclude the possibility of collusion in the energy industry to delay the development of solar energy, but that possibility seems less realistic to me. The people who occupy the upper management levels of the corporation I work for are very sincere and dedicated, and I think the corporate problem we face with developing solar energy stems far more from established economic tradition than it does from some wicked predilection on the part of management.

The great difficulty we are faced with is forcing management to pursue social courses of action that are not necessarily profitable for their corporations, which is hard to do because of entrenched economic practices. Anyone who ignores the power of corporate self-interest to determine the future course of our society will ultimately have to live with things they may not want and that they may be incapable of rectifying.

I am angered by the oil industry's slighting of renewable energy, and I have tried and will continue to try to awaken other oil industry explorationists to the severe problems that their own corporations may be creating for all of us by dismissing the present importance of renewable sources.

Norman M. Meader
Oklahoma City, Oklahoma

Sierra Club Annual Dinner

The Sierra Club Annual Dinner will be held on Saturday, May 2, at the Imperial Palace restaurant in San Francisco, California. The social hour will begin at 6:30. After dinner there will be a main speaker, and annual honors and awards will be presented. Tickets are $15 each. Please send your check and a self-addressed, stamped envelope to: TICKETS, Sierra Club, 530 Bush Street, San Francisco, CA 94108. Requests should be received by Friday, April 24. For further information, call Ann Root at (415) 981-8634, extension 500.

Letter From China

Sampling the air in the Forbidden City will show whether ancient bronze is threatened by acid rain.

ELLEN WINCHESTER

Ellen Winchester, now in her fifth year on the Sierra Club's Board of Directors and third year as Club Secretary, recently had the opportunity to live in China for three months. She was accompanying her husband, a geochemist who studies air pollution and was in China conducting cooperative research with Chinese scientists on the composition of fine particulate matter. Ms. Winchester looked carefully not only at the widely reported cultural changes taking place, but also at the state of environmental protection in the world's most populous nation. The recent program of modernization does not specifically mention environmental protection, but Chinese officials seem to be facing the fact that modern technology has environmental costs that must be considered and impacts that must be mitigated in the course of development.

PEOPLE WHO VISIT China, either as tourists or as members of scientific delegations, talk about having a wonderful time. They list with awe the number of dishes served at banquets and point out improvements in the quality of life since the imprisonment of the Gang of Four. Their faces glow with the remembered pleasure of seeing West Lake in the snow or the Summer Palace in any season.

My own reaction to what I have seen here is a kind of wondering disquiet. The power of a country self-sufficient enough in resources (except for some garnishing imports of cotton and wheat) to feed and maintain a population of almost a billion people is intimidating. The country is like a giant missile poised to be sent off somewhere—but where?

Today China is visibly relaxing the puritanical dogma now officially described as a left deviation of the Gang of Four. Single-family businesses are encouraged again, to soak up unemployment. Larger apartments are available to ranking managers.

Clearly an effort is under way both to encourage and to satisfy rising expectations. Television is a well-developed industry, and black-and-white TV sets are broadly distributed. Owning a color TV set is a status symbol. Television is an obvious arm of the government's public information apparatus, but it also provides entertainment and fragments of information about life in Europe and the United States. In addition to university courses in math, physics and English, TV audiences are shown how to put their hair up on rollers and cook gourmet meals.

Department stores in cities large and small are well-stocked with housewares, candy and cosmetics. A young student with whom I practice speaking Chinese tells me that she can now buy anything she wants, such an exciting change from the very recent past that she forgets to speak slowly.

She lives in one of the new tall apartment buildings rising helter-skelter in and around every city. Farmers still have the right to refuse to sell their land and often do, preferring larger houses and open space to city life, so that many an ambitious institution is forced to expand in a hopscotch pattern.

Crowds of people are in the parks—groups from the military services, school children, shuffling old people, country people brought in for the day by truck or bus. When they have finished with the parks, they move slowly through the restored historic buildings—the Imperial Palace in Peking and many lesser palaces, temples and pagodas both here and elsewhere, some seriously damaged during the Cultural Revolution and now beautifully restored. Hope is in the air, as exhilarating as May wine, especially among those young enough to have missed the Cultural Revolution, with its loss of education and status.

But will it last? The stern Cotton Mathers of communism must still be in plentiful supply, grudging every fen going into the spread of privilege for careful gradations of important people. I wonder especially about what goes on in the minds of officials who arrange for special treatment of foreign visitors. We live in hotels to which Chinese (except overseas Chinese) can be admitted only as our guests; we are required to eat in separate dining rooms (where food is usually more elaborate, not necessarily better).

For these imposed privileges, we must pay twice as much as the Chinese for meals, lodging and transportation, and we are told the need for foreign exchange is the reason for our segregation. I doubt that reason

Photographs by J. W. Winchester

Left: *The Tianshan Range in Xingjiang province.* ***Near right:*** *The creeping city crowds farms near Nanjing.* ***Far right:*** *Factory smoke clouds the air in Urumqi, capital of Xingjiang province.*

impresses the bicyclists forced into the mud on the shoulder of the road, or the patient people waiting in a queue to get into a public garden or theatre, watching the foreign visitors march in ahead to the best seats.

Even scientific colleagues doing field work together or traveling together *and eating the same food* are not permitted to eat together. The only times my husband and I have been permitted to eat with his coworkers have been when they gave us a banquet, when we gave them one, or when we were all the guests of some official. We are not invited to the homes of colleagues.

How we feel about this curious discrimination is not important, but if the Chinese people look at special privilege with normal resentment, it is not hard to imagine a future when Western visitors will again be considered "foreign devils."

More urgent sources of social tension abound. We're told underemployment and unemployment are increasing. Managers may be hesitant to hire new workers, because firing during a slack is impossible. Government offices and institutions are often stacked with drones who get in the way of capable people. Family life is not easy when spouses have different days off, as they frequently do. Freedom of choice in jobs and job location is still virtually nonexistent; housing is tight; very long daily commutes by bus or bicycle are the lot of millions. Spouses may be assigned jobs in different cities.

Housing is poor, even in the big, new apartment buildings. Few families other than those of high-ranking officials have more than two small rooms, a tiny kitchen and a microscopic toilet to accommodate four to six people. As far as the eye can see, the major housing in all the principal cities consists of miles and miles of slums. In Xian, the ancient capital, they smell as though ancient systems of sanitation are still in use.

Still, comparing the vast old districts of Peking with the slums ringing Buenos Aires, Manila, Rio de Janeiro and other famous cities with huge population influxes, a very important difference is that Peking is *clean*—aside from coal soot. It is far cleaner than American cities and has neither garbage, trash nor dog feces littering the streets and sidewalks. Considering the density of population and the poor quality of much housing, that is an enormous accomplishment. People are adequately and cleanly dressed. In summer women sit on their doorsteps washing clothes in tiny basins almost idly, as though it were a pastime like knitting.

Women's roles are evolving. Official information makes a great fuss about the advancement of women since pre-Liberation days, and I would not for a minute dispute the general truth of these assertions. Enough old ladies still hobble around on once-bound feet to confirm the fact that women are far freer than they once were. But their lives are still tough. Even highly educated women with high-status jobs have all the stresses of difficult professional work plus the major responsibility for supervising the family welfare and doing the cleaning and laundry by hand. Men are exhorted to share equally in these labors, and many do share at least to some degree. But I have met few wives and mothers who did not speak of being overtired and who did not lament, albeit guardedly, the heavy burden of housework.

Both men and women with scientific training or any other kind of academic education are in short supply. For millions of young people now in their late twenties, hope for the future was cut off when they were pulled out of middle school and sent to the country during the more than ten years of the Cultural Revolution (1966–76) and its aftermath. Some who were part of the marauding hordes of Red Guards have had a hard time adjusting to more settled lives. Some have been absorbed into rural populations. Others have managed to return to the cities, and, of these, a few were lucky enough to pass university entrance examinations in the years immediately following the reopening of the universities.

But the admissions system for returning students, based on age, made entering a university particularly difficult for those who had been deprived of a middle-school education. By the time they had managed through part-time study to fill the gap, the universities were no longer accepting students in their age group. The loss to the country and the personal anguish of these people, to whom higher education is a primary status

symbol, are quite difficult to comprehend.

Viewed in the historical perspective, with civil tranquility the country could overcome the loss quickly. In 1978 it had 850,000 students in college, 64,480,000 in secondary school and 146,240,000 in primary school. Among these there should be enough nascent geniuses to equal the world supply up to now. When they finish their educations, what a formidable power China will be!

In the meantime, every aspect of development suffers from a shortage of trained leadership. Chinese who were studying in the United States at the time of Liberation and later became U.S. citizens are now returning in droves to teach for a semester, visit old friends and relatives and be treated like celebrities. Foreign teachers are hired to fill out university faculties. It is hard to resist the impression that everybody who is anybody is going to the United States for study or research—and that they will get a leg up when they return.

Meanwhile, the infrastructure to put new graduates to work is developing. The Chinese Academy of Sciences has 30,000 scientists and technicians at 100 institutes dotted around the country. Judging from those I have visited, the instrumentation in these institutes is of far higher quality than the buildings in which they are housed, and the staffs are highly motivated but inadequately prepared. Every lab director or department head apologizes for the poverty of the premises.

He or she is not simply being polite. For example, the Institute of Environmental Chemistry, singled out to me by the deputy director of the Environmental Protection Office as the research facility on which the EPO most relies, is housed in an old building that previously sheltered a school of forestry, since banished to a distant province. Now the institute is threatened by the return of the foresters demanding their old premises. The institute must wait in line for new construction, with computer technology well ahead on the priority list.

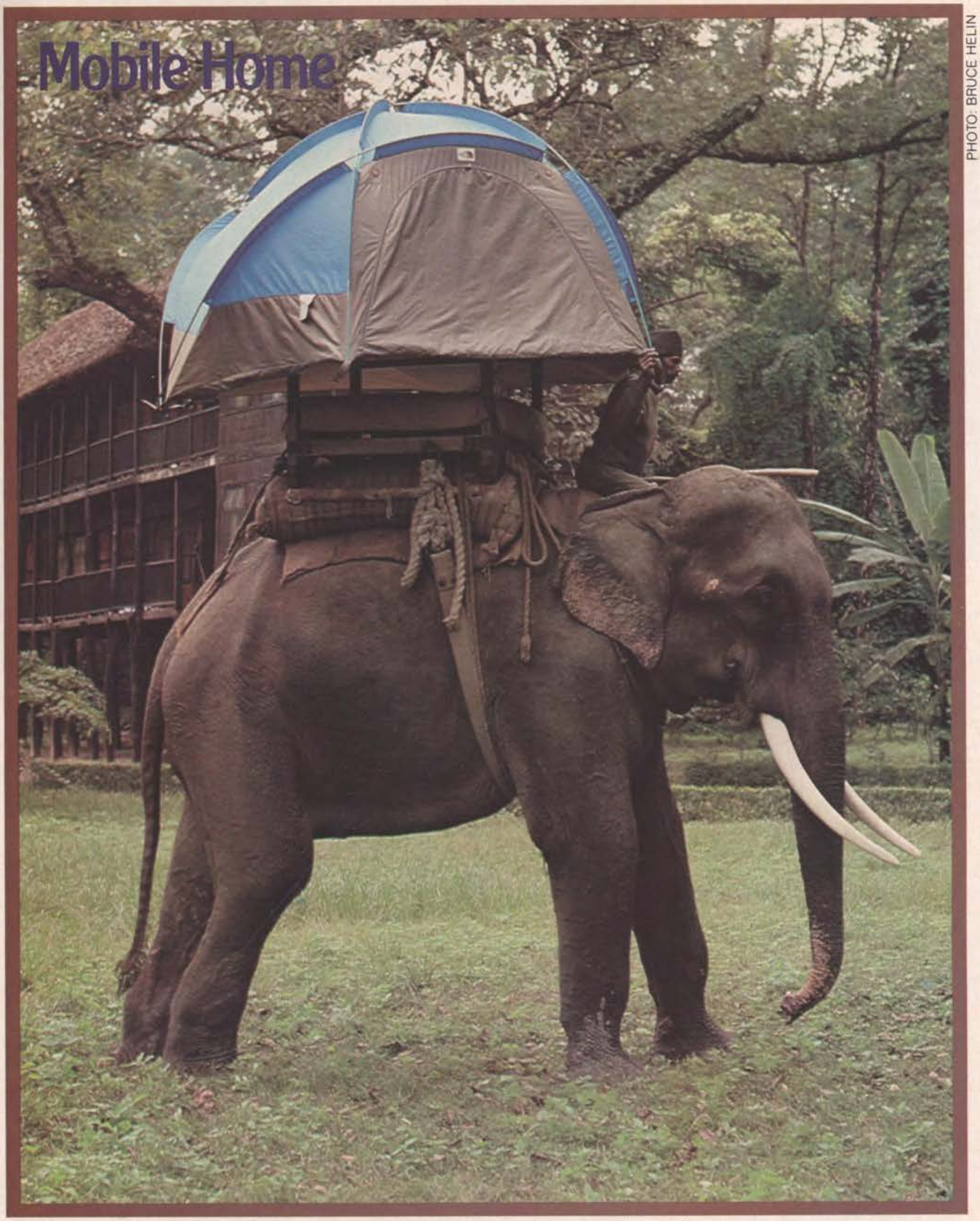
Whatever the problems of the Academy of Sciences, they pale before the problems of the universities. During the time the universities were closed, the Academy institutes continued to function, more or less. Research has traditionally been more their role than the universities'. Bearing that in mind, the state budget planners have funneled more money their way than to the universities. But during the ten-year hiatus, college professors with no students to teach busied themselves with research and persuaded themselves that participation in research was a better teaching tool than lectures about scientific principles.

Now university professors want a share of the research action. Their laboratories and their buildings make one remember old photographs of Pierre and Marie Curie working in sheds on the periphery of Paris. The University of Peking's environmental chemistry section moved back to Peking from a sojourn in Sichuan more than two years ago. All its laboratory equipment is still in crates waiting for the money and space to reestablish the section.

In view of the symbiotic relationship of government agencies with laboratories and university research facilities in the United States, U.S.-trained students will probably attempt to move the Academy of Sciences and the universities (operated by the Ministry of Science and Technology and the Ministry of Education, respectively) into closer collaboration.

The framework and the intention of such collaboration are laid out in the government's organizational charts. In theory, the Environmental Protection Office is directed by the State Science and Technology Commission, which is composed of 400 or 500 people drawn from both universities and institutes. Organized in 1978, when it initiated an eight-year plan, the commission lays down basic policy and allocates and coordinates research work and pollution monitoring. It is the theoretical source of direction for all the heterogeneous research and development in the country, including energy development, and it is organized into a number of subgroups, such as the environmental chemistry subgroup.

Although I asked the question monotonously, I found it hard to pin down exactly how often these subgroups meet and how they arrive at decisions or transmit them to the equally hard-to-identify people (appar-



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ently two vice premiers) who head the commission—and to the Environmental Protection Office. The evidence seemed to point to annual meetings consisting of three or four days of presenting papers. From my own experience with the obstacles to channeling scientific information to governmental decision-makers, I'm skeptical about how much scientific direction is currently guiding policy in the Environmental Protection Office, which is less than a year old and staffed by 50 people.

That skepticism is based on other factors, too—the shortage of trained personnel; the long-neglected physical infrastructure; the absence of evidence that much of the national budget is going into the infrastructure now; and the fact that, within the functioning laboratories my husband and I saw, the work being done is basically pollution-monitoring of a routine nature. It is called "turning the crank" in America and offers little potential for the kind of analysis that provides answers to questions of cause, effect and control, and raises more questions.

Nevertheless, measured against the years of the Cultural Revolution when environmental protection was apparently considered either a bourgeois myth or a dispensable luxury, considerable progress has been made in two short years. The environmental protection law announced on September 13, 1979, by Ye Jianying, chairman of the Standing Committee of the National People's Congress, is a grand statement of first principles covering everything from urban planning to wilderness protection.

Its value extends far beyond its literal provisions. It gives the Chinese people sanction to *care* about environmental values, to fight for them in their communes, production brigades, neighborhoods and factories. It gives status to the academic disciplines involved, including the social sciences as they relate to environmental management, law and economics. Long experience in survival has taught these people to be extremely cautious about exhibiting an energetic interest in anything that the government does not explicitly designate as virtuous. The environmental protection law provides that guidance as clearly as the Sermon on the Mount. In translation it rings with something like the authenticity of divine revelation. Even the bruising fact that an environmental law is only as good as its enforcement does not dim its lustre.

My husband's Chinese colleagues, environmental scientists in the fields of atmospheric physics and environmental chemistry, members of university faculties we met in Peking, Nanjing and Shanghai, and staff members of miscellaneous monitoring stations whom I have met around the country have—with a few high-ranking exceptions—been almost totally ignorant of both the new law and the organization, powers and responsibilities of the new Environmental Protection Office. A few seemed to regard it with amusement, perhaps as window dressing to make China look good abroad, or as a bone thrown to a starveling dominion of science.

Eventually inquiries were made on my behalf to set up an interview with an EPO official. Rather to the surprise of my go-betweens, the EPO's head of foreign affairs, An Yang, and Deputy Director Qu Geping agreed to meet with me. Qu gave me an outline of the organization that definitely sounds like a workable base upon which an imposing edifice can be built. He reeled off the seven branches of institutional endeavor the EPO will depend on for research: the Academy of Sciences; the Academy of Social Sciences; the universities—here he paused to add that these now have the greatest number of workers and the highest degree of activity; the research institutes under other government ministries; provincial institutes of environmental protection working under provincial governments and dealing mainly with pollution control; environmental institutes established by the big industries to cope with the technical problems of their own processes; and 70 to 80 research institutes under the supervision of the EPO itself.

His office, Qu emphasized, deals with policy, standards and regulations. Enforcement is up to the provincial governments and their environmental protection bureaus. Emission sources that evade air- and water-quality standards are punished with fines or taxes, and several polluting industries have already been relocated. (I was told by members of the Environmental Monitoring Center of Peking—staff of 170—that the Guan Ming Chemical Plant, a thermometer factory and another small factory using benzene in making cans have been relocated in Peking. When I asked whether they had a municipal sacrifice area in which to relocate polluting industries, they laughed and added hastily that relocation also implies improved pollution control.)

Qu told me several times that industry is very reliable in policing itself. Interviewing an official in a country where one is a guest is not the same as interviewing an official at home. I did not ask him why the complex of steel mills, phosphate and electric power production installations in Nanjing was permitted to continue emitting an ugly plume replete with SO_2 that is dropping acid on an agricultural belt to the north of the city. Crops are dying, and the commune in the region has protested, so far without effect. The most simple kind of SO_2 monitoring was initiated in Nanjing in the spring of 1980.

Neither did I ask how long it would be before city planners, in accordance with the environmental law, would relocate industry in Urumqi so that the homes of workers were not crouched at the feet of industrial smoke stacks, or would provide a little greenery as relief from the smoke and dust among the mud-brick hovels built for workers in chemical plants on the shores of Xinjiang's salt lakes. After getting a very upbeat answer to a question about expanding education in the environmental sciences, I refrained with difficulty from pointing out that the University of Peking, one of the two or three leading universities in the country, at this moment has only one graduate student in environmental chemistry and only ten in all the branches of environmentally related education in its curriculum.

Public education is in fact one area of EPO activity that has already realized enviable success. Qu was justifiably proud of a recent major EPO effort; in March and April it used all the media, including TV documentaries, in a massive propaganda effort that opened a whole new area of interest for millions. Faces brighten when I identify my environmental concerns to curious hotel personnel or taxi drivers, the few non-professional people a traveler has access to. They know what environmental protection means, and problems of desertification in Gansu, deforestation in Yunnan and air and water pollution everywhere have caught their imagination. The shooting of a panda in Sichuan aroused particularly indignant protest.

Coal is the major source of energy for industry in China, but its use for domestic space-heating is greater and is the country's largest and most worrisome source of air pollution. Particulate pollution from coal smarts eyes and grimes homes and clothing from mid-November to mid-March, the season when home heating is permitted north of the Changjiang (Yangtse River). China's cities need pollution-controlled district heating facilities and the invention of small, cheap, non-polluting coal stoves.

When I asked Deputy Director Qu about plans for developing stack-gas scrubbing technology, I got the curious answer that it was unnecessary because China has smog in only a few areas, such as Lanzhou. We had seen a lot of smog in Urumqi and heard that in winter it sometimes becomes ice fog, and we had seen, smelled and tasted it in Nanjing, Peking and Shanghai, but Qu evidently had something more concentrated in mind. He added that a few electric generating

Chinese scientists carry equipment up the Great Wall to test air quality.

Crosstalk

CAROLE ROSEN

This is the text for a performance of xiangsheng, or "crosstalk," a popular form of entertainment in China that involves two people. One provokes the jokes and the other makes them, much as a straight man and a comic might do in Western comedy. The following patter illustrates the increasing concern over pollution; it was written by Hou Bo Lin, father of xiangsheng and one of China's celebrities. It was originally published in Chinese Youth Daily *on May 8, 1980. Carole Rosen, who translated it into English, is a New Yorker now teaching in the English Department at the Tienjin Foreign Languages Institute in China.*

A. I hear that crosstalk players are all quite knowledgeable. Is that true?
B. Well! Some are, they're quite knowledgeable. But not me. My knowledge is limited.
A. Have you done any research in the field of science?

plants had installed facilities to recycle SO_2.

Most coal in China is deep-mined, but there is some stripmining. The Chinese recognize the problem of restoring stripmined land, Qu said, but it was not one to which they were devoting much attention. He thought they were considering covering the mined areas with earth and planting trees. Simple! As to acid drainage from deep mines, he had never heard of it, but coal mining was not his province. China has so many regions where coal is mined that he supposed acid drainage must be a problem in some of them.

Since the EPO also regulates radioactive pollutants, a question about uranium milltailing disposal and the disposal of nuclear waste was in order. The answer was that China has no nuclear power reactors. (It may have them soon; we met a delegation in Sweden looking into a purchase.) China does have an active bomb-testing program and therefore has both mill tailings and wastes, but for obvious reasons I did not pursue that question. In Urumqi, staff from the newly established local EPO Institute had asked my husband about methods for disposing of radioactive slag and ash from coal, because some Xinjiang coal has an unusually high uranium content. Whether that uranium content has an impact on public health seems not to have been established, but the danger to miners is a concern.

My last question to Qu concerned solar energy. That was also out of his line, but he described some progress in water heating in Peking and the use of photovoltaic cells in the desert to electrify cattle fences. Demand is not large, but the Energy Commission is conducting research, he said.

Passive solar use is nothing new here, where peasant houses in north China from prehistoric times have been thick-walled on the north. In the deserts they are thick-walled on all sides, shaded with grape arbors where possible. Sunlight has been used to dry fruits and vegetables for thousands of years; today in the Turfan Depression it dries raisins for export in high, airy, latticed buildings built with sun-dried mud bricks.

At a banquet the night before we left Urumqi I learned about a small solar energy office that had just opened in the city and requested a visit. Instead, four members of the office staff turned up in our hotel room the next morning. The office employs only 20 people; of these, half are physicists and some are engineers. They are concentrating on research into more efficient fruit and grain drying, greenhouses for growing vegetables in winter, water heating—and someday they will work on space heating.

They claim interest in solar energy is high, as well it should be in a region where heating and cooking with coal costs a small family 300 yuan a year, about $200. (Manual laborers, such as the women sweeping the parks with twig brooms, earn no more than 60 yuan a month.) They spoke of a solar stove costing 50 yuan, but they had heard of it being available in only one city, Shanghai.

The answers to all my questions were slow in coming and followed voluble consultation. The staff expected to have a building within three years; for the present they were crowded into a few small offices. They were shy and apologetic, yet they did convey to me a keenly felt sense of mission.

Putting it all together, however, it appears that the chances for a great leap forward in the development of solar energy in China are, for the present, not large.

In none of the above circumstances where I have found faint cause for praise should I be interpreted as damning Chinese progress in environmental protection. I have simply tried to learn how China in the 1980s is moderating the total stress it puts on the world ecosystem. The sum of my observation is that this immense country has only begun to view modern technology as Janus-faced, with one face as hazardous to life as the other is benign.

The "four modernizations" toward which the country is striving—industry, agriculture, science and technology, and national defense—do not explicitly mention environmental protection. Conquering nature, as with enormous flood-control, hydroelectric, irrigation and reforestation projects, has been the slogan of a generation. The concept of living with nature, although rooted in tradition, may take another generation to rehabilitate.

But bringing life completely into balance

B. Science? Need you ask? Astronomy, geography, physics, mathematics, even electronic computers.
A. You've researched them all?
B. I understand none of them.
A. Perhaps I haven't made myself clear. I am not talking about any advanced, technical questions. For example, what about the question of air pollution?
B. Pollution is a new science which I certainly don't understand.
A. You'd better hurry up and study it.
B. Don't make it sound so simple. Scientists all know many foreign languages. Not me.
A. Don't you know any English?
B. I know a bit. "Sankhayew" (thank you); "bya-bya" (bye-bye); "yesa."
A. Enough! This itself is pollution.
B. It seems that this new science will be impossible for me to master.
A. Why?
B. Because I myself am a form of pollution.
A. To be precise, this science is called Environmental Protection.
B. Now I really don't understand. I've never heard of it.
A. You're not lying?
B. No, I'm not.
A. Then it's just ignorance.

with the land's carrying capacity depends more on domestic and international peace, and on sustained national purpose while environmental controls compete with other programs for funding, than it does on the pace of progress in a half-decade or in a generation. The social and economic gains of the last 30 years are evidence of the Chinese capacity for broad social and technological organization.

Furthermore, with respect to resource conservation, the country has a foundation of achievement that should be the envy of the West. Thousands of years of using every drop of water and every scrap of dung, habits of recycling ingrained in impoverished people and labor-intensive production practices have already made China a "conserver society." It is not now and has never been a throwaway society. Its development of public transit in cities; its use of bicycles and minimal use of automobiles (accounting for low levels of exhaust pollutants in the atmosphere); its limited space used for housing, which economizes on energy for both construction and heating; its campaign to limit population growth to one child per family; its use of fermented human waste as fertilizer; and its production of biogas from agricultural organic wastes—these are all achievements that remain distant goals in the West.

The problem for the Chinese now is to stay frugal in resource consumption while satisfying their rising demand for richer and more varied lives. □

B. How can you call this ignorance?
A. Do you or don't you need sunlight?
B. Of course I need it. Thousands of things depend on the sun to grow.
A. What if there's not enough sunlight?
B. Then those things certainly won't grow well.
A. It seems you haven't grown too well.
B. I don't know about that. I think I'm not too bad—I'm tall, my weight is okay, I'm pretty good looking, all in all.
A. You're as beautiful as a flower.
B. You think I look more like a rose or a peony?
A. A cactus.
B. And rather prickly.
A. A cactus needs sunlight, water and air very much. Isn't that just like you? Of all these things, the most important is air.
B. Right. People also need these things.
A. It doesn't matter if the cactus doesn't have water for a week—it won't die.
B. But I'd be dying of thirst.
A. The main point is that air pollution causes the most terrible destruction to living things.
B. This I still don't grasp. Tell me, how terrible?
A. Let's take Peking for example. There's a population of approximately 6 million. On the average each family has five people.
B. That's about 1,200,000 families.
A. Take away 200,000 families using liquefied petroleum gas.
B. That's still about 1 million families.
A. Each family has a coal-burning stove. Is there any family that doesn't have smoke pouring out of the chimney?
B. Only those whose fire has already been extinguished.
A. Peking has 1 million families and 1 million chimneys. Add to that those factories that haven't taken pollution control seriously. In the winter when there is no wind it's impossible to see a clear, blue sky.
B. This pollution is certainly terrible.
A. Don't be afraid. You aren't being polluted in isolation. Pollution is the fairest thing. The leaders on top, the common people below, the party, government organizations, trade unions, youth league, women's federation, workers, peasants, merchants, students, soldiers—no matter whether you are an ordinary person or have power and influence, all are treated equally before it.
B. So that's who has for so many years made the error of "equalitarianism." [China is now criticizing the idea of absolute equality in such areas as income; people should be reimbursed according to how much they work, not according to an abstract principle of equal pay.]
A. Right! No matter who you are, when you stand before pollution you receive equal treatment—it discriminates against no one.
B. That's a pretty tall story.
A. You don't believe me. Three years ago, next to our house, a factory was set up. When production began we were all really happy—watching the chimneys so tall they are touching the clouds—seeing the black smoke pouring out.
B. How majestic!
A. But as time went on it certainly wasn't.
B. What do you mean?
A. I don't know what substance was in the smoke, but it was really awful smelling. We all went to find the factory manager to take it up with him. He was very apologetic.
B. He sounds okay.
A. "Neighbors, I'm really sorry. We have equipment to prevent this but we just haven't installed it yet. First we must concentrate on production. Just put up with it for a few more months, and as soon as we finish this busy period, we'll install the equipment."
B. What will happen over those next few months?
A. "Don't worry. Our plant's labor insurance plan will provide each of you with a cloth mouth mask."
B. The plant manager's attitude is pretty good.
A. But after a few months things got really bad.
B. Now what?
A. How is it that my mother suddenly had no hair?
B. She's old—perhaps it's due to illness.
A. My niece is only seven and she now looks like a little boy.
B. Those two must have contracted some illness.
A. All the tens of families I visited were this way. Those who work outside the neighborhood were a bit better off, but those who stayed at home all day were completely bald.
B. This is not a smoke problem, it's a water problem.
A. We brought some "typical examples" to see the plant manager.
B. Typical examples?
A. Those bald ones.
B. What a situation!
A. The plant manager's attitude was beyond reproach.
B. What did he say?
A. "Please sit down. Have some tea. I know. Your mouth masks are old. We'll distribute new ones."
B. He's still giving out mouth masks? He should be giving out wigs!
A. "Take it easy. It's probably due to the problem of water pollution. This affects the hair. Everyone, don't worry."
B. People have already gone bald and you tell us not to worry about it?
A. "When this plant first started operating I didn't know that we might have a pollution problem. Now we've already started to deal with this situation. As soon as the equipment is installed everything will be all right. About the problem of baldness—what can I do? Look [takes off his hat]. Am I not also bald?
B. He was also bald?
A. Didn't I tell you "it discriminates against no one?" □

Is Clean Water a Thing of the Past?

PETER STOLER

POOR RICHARD'S aphorism is unarguable; "when the well's dry, we know the worth of water." We also know it when the well's contaminated and, like the Ancient Mariner, we see water that we cannot drink.

The United States has been getting a dramatic demonstration of Poor Richard's wisdom. The country is not about to run out of water. Last summer's drought notwithstanding, the U.S. has no less in the way of water than it has ever had, although it is making ever greater demands upon its water resources. But the country may soon have a lot less water to drink, for the simple reason that the water in America's national well is going bad. The very stuff of life is being transformed into a chemical cocktail capable of causing a variety of problems from genetic damage and birth defects to cancer.

It is not going bad quickly. It is not going to go bad all at once so that Americans will wake up one morning unable to slake their thirst. But it is going bad steadily, and it will continue to go bad unless the nation wakes up to the problem and, more important, decides to do something about it. "Back in the Old West," says Dr. Irving Selikoff, head of the Environmental Sciences Laboratory at New York's Mount Sinai Medical School, "they used to hang people for poisoning wells. Now we're doing it ourselves."

We are indeed, as the following incidents indicate:

• On New York's densely populated Long Island, home of nearly 3 million suburbanites, some 500 private wells have been closed because they are contaminated with Temik, a pesticide that does a fine job of controlling the golden nematode that might otherwise put the area's potato farmers out of business, and does an even finer job of poisoning the people into whose wells it is carried by rain. Other poisons, many of them emptied into creeks and sewers by local industries, are also seeping into the region's porous soil and then into the underground aquifers that individuals and municipalities must tap for water. "Consequently," concludes a report by the New York Public Interest Research Group, "the sole source of Long Island's drinking water is in danger of deteriorating into a severely contaminated industrial sewer."

• In New Jersey, which boasts one of the country's heaviest concentrations of chemical plants, more than 100 wells in rural Jackson Township have been closed because of chemical contamination from a nearby landfill, and residents are blaming high local rates of cancer and kidney disease on the contamination. Water quality elsewhere around the state has also come into question. According to a study conducted by the state's Department of Environmental Protection (DEP), even though water tested in 500 wells turned out to be cleaner than federal drinking-water standards required, it was still far from pure. All 500 wells revealed at least traces of 50 chemicals the investigators were searching for, including such known or suspected carcinogens as vinyl chloride and carbon tetrachloride and the pesticides aldrin and dieldrin.

• In Michigan, wastes buried by Hooker Chemical Company on its property near Montague have seeped into the ground, contaminating some 20 billion gallons of groundwater, threatening wells and forcing the company to build a $100,000 pipeline to carry uncontaminated city water to homes whose wells have been rendered unsafe. Among the contaminants found in the groundwater was the carcinogen hexachloropentadiene, or, as it is more commonly known, C-56. The same chemical has been turning up elsewhere in the country, including the Love Canal neighborhood in Niagara Falls, New York, from which nearly 1000 people have been evacuated.

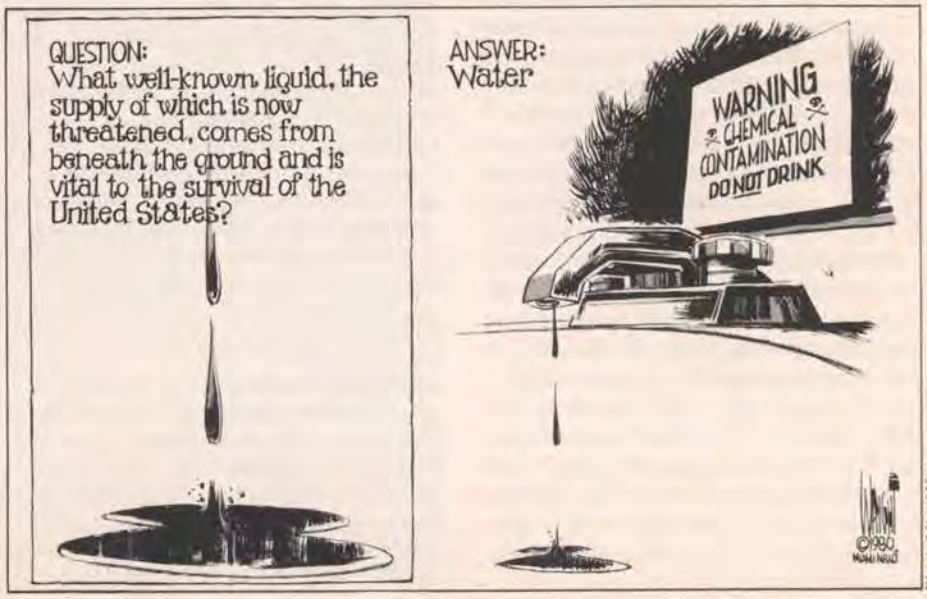
• In Colorado, chemical wastes dumped into a lagoon at the U.S. Army's Rocky Mountain Arsenal have begun showing up in local wells. Several dozen of these wells have been closed, at least for drinking purposes. A few local farmers must have water trucked in to keep their farms going. In California's San Gabriel Valley, state public health officials closed 39 public wells, sources of drinking water for 400,000 people. The water contained trichloroethylene (TCE), a chemical used in cleaning solvents. TCE is suspected of causing cancer.

Similar examples are common. The Environmental Protection Agency knows of more than 40 instances of groundwater pollution in Massachusetts. It can cite 16 in Connecticut, 25 in Pennsylvania, a dozen in New York, well over 200 in California and at least one in each of 20 other states. "I think that we are facing a real crisis," says former EPA Administrator Douglas Costle. "Groundwater pollution is going to be the major public health problem of the next decade or so."

Understandably. More than 100 million Americans rely on groundwater for their drinking water. But, according to Costle and his colleagues at the EPA, at least half of all U.S. groundwater either is threatened with contamination or is already contaminated.

How did this happen? How did so much of our groundwater become so threatened?

The answer is simple: Our groundwater is threatened because it has been ignored. For



Wright/Miami News

the past decade, the U.S. has been taking tremendous strides to protect its drinking water. But it has concentrated its attention on surface waters. Such legislation as the 1974 Safe Drinking Water Act has helped reduce both the volume and toxicity of wastes emptied into rivers, streams and lakes. Adopting strict standards has helped reduce organic contamination that causes digestive distress. "U.S. drinking water," says Costle, "is better, cleaner and less likely to cause intestinal ailments than it has been in decades."

Costle is correct. But U.S. surface waters are still far from perfect. Proof was provided rather dramatically in 1975 when the EPA revealed that, however hard one might have to search to find coliform bacteria in drinking water, no one need look too far to find some things that could prove a lot more frightening. According to EPA findings, the water supplies of 80 U.S. cities contained chemicals that may cause cancer.

The EPA study grew out of suspicions about the quality of the water in New Orleans, which gets most of its water from the Mississippi and which has one of the nation's highest rates of stomach and intestinal cancers. To determine what might underlie this incidence, the EPA tested New Orleans' water for the presence of some 70 chemical pollutants. It found that the water contained 66 of these contaminants, including two—chloroform and carbon tetrachloride—considered potential carcinogens.

The EPA then studied the water supplies of 79 additional cities, including major population centers such as Philadelphia, the District of Columbia, Baltimore, St. Louis, Kansas City and San Francisco, as well as such smaller cities as Lawrence, Massachusetts, Greenville, Mississippi, and Whiting, Indiana. All showed traces of at least six chemical pollutants. Besides chloroform and carbon tetrachloride, investigators found traces of bromodichloromethane, dibromochloromethane, bromoform and 1,2 dichloroethane in the water consumed daily by an estimated 100 million Americans.

This was not the only study, however, to sow suspicion about the safety of the water Americans drink. The Environmental Defense Fund conducted a research project that found the Hudson River, which provides drinking water for at least 150,000 New York-area residents, contained such hazardous substances as benzene, tetrahydrofuran, polychlorinated biphenyls (PCBs), toluene and xylene.

But if U.S. surface waters were endangered, groundwater, a resource 50 times greater than all American rivers and streams combined, was even more threatened. Filtered through layers of sand and percolated

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through granite, hidden from sight and protected from casual contamination by the earth's crust, groundwater has long been considered one of the world's unspoilable resources. For decades Americans regarded groundwater as pure.

For years it was. But no longer. Water from a deep well may still contain so few bacteria that it appears sterile, but this same water may contain something far worse in the form of chemicals that can cause cancer or genetic damage. "We are reaching the point," says the EPA's Gary Dietrich, "where we might have to consider putting a label on every tap: 'Caution—drinking this water may be dangerous to your health.'"

The source of this contamination is chemicals. Of all American industries, none has grown as fast, particularly in the years since the end of World War II, as the chemical industry. In 1941 the American petrochemical industry produced a total of 1 billion pounds of synthetic chemical compounds. By 1977, this figure had risen to 350 billion pounds. The industry currently produces some 50,000 different chemicals; it is adding new compounds to the list at the rate of 1000 to 2000 a year.

In the process, it is generating enormous amounts of waste. The EPA estimates that the U.S. chemical industry generates more than 77 billion pounds of hazardous chemical wastes—solvents, containers and vehicles, residues and toxic by-products—each year. It has been producing at this rate for at least a decade.

Worse, the EPA calculates that only about 10% of these wastes are being disposed of in an environmentally safe manner. Some of this stuff is being burned in high-temperature incinerators or is chemically deactivated, but the rest is being gotten rid of—more casually. According to the EPA, some of the latter, anywhere from 10% to 30%, is stored on the property of the companies that generate it. Some is simply left in barrels stacked "out back." Some is dumped into lagoons. Some is poured into the ground.

The rest is dumped wherever possible. Thousands of tons of wastes are buried in landfills such as the Love Canal, an abandoned waterway into which Hooker discarded an estimated 20 million pounds of wastes over a 30- to 40-year period. Some is carted to fields leased specifically for that purpose, such as Kentucky's infamous "Valley of the Drums," where acre upon acre is covered with steel drums containing—or leaking—toxic chemicals. Some is carried to municipal landfills whose operators, unaware of what the barrels contain or too greedy to care, allow haulers to dump it along with other less-dangerous garbage.

Quite a bit is dumped illegally because it is both easier and cheaper than putting wastes into safe landfills or having them burned in incinerators. In New Jersey's Plumsted Township, a pleasant rural community on the edge of the Pine Barrens, state Department of Environmental Protection officials have found thousands of barrels of toxic chemicals in creek beds and ravines or buried a few inches beneath the surface of the region's sandy, porous soil. "We don't know how big a problem we've got here," said David Henderson, a former professional football player who handles enforcement for the DEP, "but I'd be surprised if we didn't have to close at least a few wells."

In North Carolina, the driver of a tank truck opened a valve and let more than 1000 gallons of toxic chemicals run out as he drove along a rural road one night. He contaminated several miles of roadside soil.

Some other "midnight dumpers" found an even more unusual way to get rid of wastes in Pennsylvania. According to state law-enforcement officials, who have indicted several New Jersey men for the incident, haulers pumped liquid wastes through a borehole behind a gas station into an abandoned mine, assuming that no one would ever know. No one did for several years. Then the wastes, in an acid stream that could quickly eat the paint off an automobile, began flowing out of a shaft near Pittston known as the Butler Tunnel and into the Susquehanna River, where they created a slick 30 miles long before environmental authorities managed to control it.

For years people, from the dumpers to many environmental officials, thought such practices were, if not exactly permissible, then certainly tolerable. "We assumed that groundwater was untouchable," said EPA's Dietrich. "I guess we figured that anything we buried in the ground would stay buried."

Unfortunately, the stuff people put into the ground did not stay buried or even stay put. Two years ago, in what seemed like a grotesque parody of the Day of Judgment, heavy rains exposed many of the thousands of barrels quietly leaking their toxic contents into the ground and the homes surrounding the Love Canal, triggering an environment-

EPA Groundwater Strategy

In recognition of how serious a problem contaminated groundwater is, the Environmental Protection Agency (EPA) has proposed a National Groundwater Protection Strategy and held workshops and hearings on it across the country in January. Testimony will be used to formulate final EPA policy on groundwater.

Basically, the proposal emphasizes prevention of future contamination. It does not propose new legislation, but instead recommends coordination, follow-through and implementation of existing federal programs. The proposal says, "It shall be the national goal to assess, protect, and enhance the quality of groundwaters to the levels necessary for current and projected future uses and for the protection of the public health and significant ecological systems."

More specifically, the goal is to have taken the following actions by 1985: initiate groundwater protection strategies in all states; implement existing federal regulatory programs; evaluate groundwater quality, correct the most hazardous conditions, and manage areas of groundwater contamination; and provide a process for states, local governments and the public to set priorities among competing activities that may use or contaminate groundwater.

To accomplish the goals, the proposal suggests both a management approach and technical requirements. The management approach would encourage states to develop strategies for implementing the national goals; would develop a groundwater classification system to pinpoint areas that need different levels of protection; would establish minimum national requirements for high-priority problems such as toxic chemicals and pesticides; and would require EPA to coordinate existing federal programs on groundwater protection.

The technical requirements would be to establish siting practices for facilities, and management practices for design, construction and operation; to set effluent standards for discharges of specific contaminants; to specify performance standards that must be attained by any technology; and to consider economic incentives for complying with the above programs.

For information on how the update of the protection strategy is faring, you can contact either the EPA or the Sierra Club. At the EPA, write to Marion Mlay, Environmental Protection Agency, Room 1011 East Tower, 401 M Street S.W., Washington, D.C. 20460. At the Sierra Club, write to Jessica Radolf, Project Coordinator, Sierra Club, 530 Bush Street, San Francisco, California 94108. □

al disaster of epic proportions. At about the same time, officials in New Jersey were beginning to close wells in Jackson Township and trying to figure out the reason for an apparent clustering of cancer cases in suburban Rutherford, while also explaining why their state, with its high concentration of chemical plants, also had one of the country's highest cancer rates.

"I think the discoveries of the past few years have awakened us to the danger," says Mount Sinai's Dr. Selikoff. "We had some signs before that. But Love Canal really brought everything out in the open."

What Selikoff does not say is that many of the alarms were sounded by him. He was one of the leaders of the research team that established the connection between exposure to asbestos and an otherwise-uncommon cancer called mesothelioma. He was also involved in establishing the link between exposure to vinyl chloride and an even rarer cancer called angiosarcoma of the liver. But he will not say that other chemicals cause other cancers. "We just do not have the medical knowledge at this time to say that exposure to chemical A will cause cancer B," he says. "But we can show that certain cancers are more likely to occur in people who have been exposed to certain chemicals than they are in people who have not been exposed. We can't prove anything yet. But I think we've got good reason for suspicion."

Most researchers agree. The majority of the polysyllabic chemical products currently showing up in water turn out, when subjected to a test developed by the University of California's Bruce Ames, to be capable of causing mutations in bacteria. The same test shows a high correlation between mutagenicity and carcinogenicity, suggesting that chemicals that cause mutations may cause cancer as well. (See page 19.)

Also, statistics compiled by both the National Cancer Institute and the American Cancer Society show that the incidence of cancers—especially of those connected with chemicals—is actually increasing in the U.S. despite progress in treating other non-chemically connected cancers. "Environmental cancer is going to be the disease of the century," Dr. Selikoff told his colleagues at a meeting two years ago. He sees no reason to revise his statement now.

Facing these facts, most state and federal officials agree that the U.S. has a major water problem. Most also agree on the solution to the problem. It may be too late, at least with existing technology, to do much about the groundwater that is already contaminated. But it is not too late to take action to prevent further pollution.

Several states have already acted and have begun cleaning up chemical dumps. New Jersey and some 20 other states have enacted legislation requiring generators of toxic wastes to account for every pound of the stuff and have instituted "manifest" systems requiring everyone involved with waste—generators, haulers, disposers—to keep careful records of what they produce, where they take it and how they dispose of it.

The federal government is also moving. Regulations that took effect in November require manifests for some 60 classes of chemicals and impose stiff penalties on anyone who disposes of them illegally.

The system will unquestionably increase the cost to corporations of getting rid of their wastes, and some companies, eager to avoid extra costs, have been rushing to beat the deadline by getting rid of chemicals they have had around for a while. On a recent inspection tour, EPA's Dietrich flew over a field in Illinois and noticed that it was empty. When he flew over it a week later, he found it covered with barrels. "Someone," he observed, "is trying to get rid of some garbage before the cost of getting rid of it goes up."

Dietrich and others expect more such dumping as the deadline draws nearer for compliance with the agency's new regulations. But once the rules are in effect, most companies are expected to comply. Although a "superfund" established by Congress in December's lame-duck session provides $1.6 billion to clean up the worst chemical messes and allows the government to recover cleanup costs from companies responsible for the dumping, Dietrich and others who have studied the problem feel that it will be cheaper for the companies to keep their own houses in order than to let the government do it. "The purpose of all these rules is to foreclose the cheap option," he says. "I think companies will generally find it more economical to comply than not."

If Dietrich is right, further contamination of U.S. water supplies can be prevented and work begun on cleaning up existing messes. This work will not be easy. The EPA has identified at least 50,000 sites around the nation where chemicals have been dumped and has classified 2000 of these as potential environmental disasters.

Cleaning up the sites—at a cost that can go as high as $500 a barrel—and preventing further contamination by chemicals will be expensive. But the cost must be borne, and not just for aesthetic reasons. Pollution extracts a price from us—not learning to live with contaminated water, but rather dying from it. □

Peter Stoler is chief of the New York Bureau of the Time-Life News Service.

Detecting Cancer

MARK and
JUDITH MILLER

THERE IS AN ALARMING increase in the incidence of cancer. In 1900, 4% of deaths were due to cancer; in 1959, the figure was 15%. The cancer rate has continued to rise rapidly in recent years. According to a recent federal study, the rate of cancer cases increased about 10% between 1970 and 1976—and cancer now accounts for more than 400,000 deaths a year. In recent years more effort has been made not only to find a cure for cancer, but also to find its causes. One approach is to test new chemicals being introduced into the environment to find out whether they are likely to cause the disease.

But there is considerable debate among the experts about which tests are worthwhile and what they really show. These esoteric questions are of vital concern to all of us whose lives are at stake, and the principles being debated may be easier to understand than we had supposed.

Russell Train, former administrator of the Environmental Protection Agency, made it clear in 1976 how important it is to find the causes. Speaking to the National Press Club, he said that one out of every four Americans then alive would ultimately contract cancer. "The situation with respect to children is . . . deeply disturbing," wrote Rachel Carson, the late eminent naturalist, in 1962. "Today, more American school children die of cancer than from any other disease."

Of the various suspected causes of cancer—heredity, viruses, radiation and chemicals—only the last two have changed markedly enough since the turn of the century to explain the shocking rise in cancer. We have spent three quarters of a century gorging our water, soil, air, food and bodies with incompletely tested chemicals and drugs in the name of improving our standards of health, welfare, productivity and living. The upshot, Train noted, is that close to 90% of human cancer is now believed to be caused by environmental factors. "It is what we don't know that can really hurt us, even kill us," he concluded. (Some things we do know about continue to kill us—such as cigarette smoking, a common "environmental" cause of cancer.)

Because of this threat, federal laws require a chemical or drug to pass safety tests on animals before large numbers of people are exposed to it. Many environmental laws that deal with this problem—particularly the Toxic Substances Control Act—require testing new and existing chemicals. Such laws require chemicals to be proved "innocent" before they reach the marketplace. But there are those, such as Dr. Henry Grabowski, an economist at Duke University, who would scrap the existing drug controls and replace them with a system under which a drug could be marketed without proof of safety but individuals injured by the drug would have the opportunity for substantial legal redress against the drug manufacturer.

The reasoning behind Dr. Grabowski's proposal is that current FDA controls unduly stifle the economy and the innovativeness of the American drug industry. But all the money in the world cannot grow arms and legs on a thalidomide baby, or cure the vaginal cancer in a teenage girl whose mother took diethylstilbesterol while pregnant, or replace an industrial worker's liver made cancerous by exposure to vinyl chloride.

The question "to test or not to test" is answered by Senator Edward Kennedy: "I strongly believe you have to come down on the side of the protection of the consumer."

So we do the tests. A tougher question is what to do with the results. What do the results tell us about a chemical's potential for causing cancer in humans? Put another way, how good is current cancer-testing technology?

Four methods are currently being used: (1) analysis of a molecule's architecture, (2) long-term animal tests, (3) short-term "test-tube" tests and (4) epidemiological studies in human population.

Molecular Architecture

A chemical's molecular structure may give a hint that the substance might cause cancer, especially if the structure bears a close resemblance to a known carcinogen. The present state of the art, however, does not permit reliable predictions on the basis of structure alone because two similar-looking molecules, after ingestion, may enter different biochemical pathways, be changed into dissimilar products and, as is often the case, the product rather than the original molecule may be the actual carcinogen.

Furthermore, drugs are commonly manufactured by one company and tested by another. To protect trade secrets, the manufacturer does not tell the tester the name or molecular formula of the chemical under test. Not being privy to a chemical's structure completely thwarts a tester's attempts to deal with the molecular architecture-carcinogenicity relationship.

Long-Term Animal Tests

"Animal tests are the best current method for predicting the carcinogenic effect of substances in humans. All substances demonstrated to be carcinogenic in animals are regarded as potential human carcinogens, because no clear distinctions exist between those that cause cancer in laboratory animals and those that cause it in humans. The empirical evidence overwhelmingly supports this hypothesis," concludes a June 1977 report assembled by a blue-ribbon panel of cancer authorities for the Congressional Office of Technology Assessment.

Theoretically, man's closest evolutionary relatives, the primates, would predict best for man. But current cancer-testing standards require that a test substance be administered continuously to an animal and its first-generation offspring throughout both their lifetimes. Primates live about 50 years, so studies using them would take a prohibitively long time to complete and would be prohibitively expensive.

On the other hand, a rat costs about $35, has a lifetime of two to three years and, because it is a mammal, is biologically close enough to man to serve as a practical testing ground for carcinogens. In fact, Dr. James Sontag of the National Cancer Institute says in *Origins of Human Cancer*, "At this time the only species that meet the necessary selection criteria for large-scale, long-term carcinogen bioassay are the rat, mouse, guinea pig, and hamster. . . . Still, limiting carcinogen bioassay to laboratory rodents, a properly designed and conducted study could provide a great deal of information that could be used in assessing human risk."

The first thing that makes lay people skeptical about cancer tests is that the animals are given doses of a chemical much greater than a person would ordinarily encounter. If Canadian rats get cancer from an amount of saccharin equivalent to a person's drinking 800 cans of diet soda every day, does that prove saccharin causes cancer in humans? After all, nobody drinks that much soda. Why aren't the rats fed a realistic amount of saccharin, say the equivalent of three cans of

diet soda? Many people drink that much.

Actually, this "realistic" experiment, called a "mega-mouse" study, can be performed only on paper because the tests must be both statistically significant and manageable in size and cost.

To illustrate the problem of size, assume that one wishes to detect an increase in the cancer rate as low as 1%. If the background, or normally expected, cancer rate is 5% (a reasonable figure), then in a test group of 100 animals, an increase of 1% would mean that one additional animal—or a total of six—would develop cancer. But the difference between five and six is not statistically significant. Consequently, the number of mice in the test group would have to be increased severalfold. In this case a researcher would likely want a test group of 100,000 so that the increase in cancers would be from 50 to 60, a number more likely to be statistically significant.

Therefore, if one is trying to detect an increase in the cancer rate of 1 in 100,000, there would have to be 1,000,000 mice in the control group and 1,000,000 in the test group for each dose level. If three dose levels are selected, there would be 4,000,000 mice, each involved in the experiment for 18 months to two years.

"Even with unlimited funds to conduct these experiments, the probability that they could be conducted with no mistakes in handling, feeding, loss of animals, or any other of the myriad common laboratory errors that ruin the best-planned experiments of mice by men is very low," say R. Marvin Schneiderman and his colleagues at the National Cancer Institute.

In practice, manageable numbers of mice are employed. A group size of 50 is recommended. Even so, researchers like to use separate groups of males and females in each test, so every test will have a male and female control group as well as male and female groups of test animals at every dose level. In the case of three doses, the study would require a total of 400 animals.

But 50 animals cannot detect a cancer rate as low as 1 in 100,000, because 1/100,000 of 50 is only a fraction of a single animal! To get around this problem, each animal is administered a high dose of the chemical, much larger than the amount people are ordinarily exposed to. The dose is high enough to produce at least five cases of cancer if the drug in fact is capable of producing cancer.

The procedure used to determine the size of the administered doses is explained in a National Cancer Institute publication called *Guidelines for Carcinogen Bioassay in Small Rodents*. In short, "the highest dose used for determination of carcinogenicity should be one which produced a minimal to moderate amount of toxicity. . . . If three doses are chosen, multiples of 1, ½, and ¼ the maximum dose are suggested. It is important to aim at including a dose that does not materially decrease the life span." In the case of saccharin the doses would be equivalent to 800, 267 and 89 cans of diet soda.

One of the very relevant findings in the Canadian study was that, despite receiving a chronic massive dose of saccharin, the rats' only apparent ill effect was bladder cancer. If physiological stress due to the size of the dose was the cause of cancer, and not the fact that saccharin itself is a carcinogen, why didn't the rats also exhibit other signs of ill health—blood-sugar imbalance, enlarged liver, arthritis or abnormally high incidence of hardening of the arteries? Why only bladder cancer? Such a finding lends support to the suspicion that saccharin does indeed cause cancer.

To determine an expected but untested cancer rate at ordinary doses from three tested incidences at high dosages, a scientist invokes a statistical trick known as a *mouse-to-mouse extrapolation*. On a graph showing dose administered versus cases of cancer, three points corresponding to the experimental results are plotted. These points are connected to show what is termed a *dose-response curve*, which usually exhibits a linear configuration in the range tested.

Extending this curve down to low dosages by means of various statistical formulae—the mouse-to-mouse extrapolation—produces heated disputes among experts. "In the judgment of many experts, a linear extrapolation is the most prudent in the absence of any evidence for more complicated relationships," contends Dr. Sidney Weinhouse of the Temple University School of Medicine. "It has the virtue of simplicity, and there is a great deal of experimental and epidemiologic evidence in its favor. . . ." Russell Train, former EPA administrator, agrees, and adds that "this linear pattern of response has been observed in humans who were exposed to certain forms of ionizing radiation and who developed lung cancer as a result of cigarette smoking. It is also the pattern of response observed for the induction of genetic mutations; possibly genetic damage is the fundamental derangement in cancer cells."

Dr. Paul Gehring of Dow Chemical's Toxicology Research Laboratory challenges the validity of assuming that the curve is linear at low dosages because it was found to be linear at high dosages. "Translation of the data to predict the hazard of low-level exposure is presumptuous guesswork at best," he argues. "The presumptuous guesswork has been sophisticated by the statistician who has applied his stochastic, statistical processes, and 'stochastic' . . . is defined as guesswork. Not considered in making such statistical extrapolations is that the metabolic rate of many chemicals changes with the magnitude of the dose."

For example, the dose-response curve of vinyl chloride, a liver carcinogen, is nonlinear because as the dose of vinyl chloride increases it progressively depletes a body chemical responsible for detoxifying it. As the detoxifying chemical is used up, vinyl chloride seeks out other chemicals, including DNA, the chemical of which genes are made. Because high concentrations of vinyl chloride react with different body chemicals than do low concentrations, the dose-response curve is not linear.

The reason the shape of the curve is important is that the curve's trajectory determines what incidence of cancer is predicted as one moves from high to low dosages along the curve, and in Dr. Gehring's opinion, "currently employed [linear] extrapolation techniques are likely to overestimate risk [of cancer]."

Experts are also markedly divided over whether or not carcinogens have a *threshold*, a dose below which they cause no cancer at all. "Another problem unfortunately not amenable to scientific solution is the existence of a threshold," writes Dr. Weinhouse. "Is there a lower limit of exposure below which normal repair and recuperative processes will prevent cancer? This is perhaps one of the most pernicious questions that confront the regulatory agencies. It is the refuge of the apologist for industry and has support from traditional toxicology. However, there is as yet no evidence whatever that a threshold exists for the irreversible process of carcinogenesis. . . . Prudence requires the assumption that thresholds for carcinogens do not exist."

Dr. Gehring, on the other hand, emphasizes that a substantial body of evidence indicates the existence of a threshold.

Resolving the uncertainties of curve shape and threshold is of utmost importance because knowing those two parameters is vital to calculating "safe" levels of exposure to carcinogens. In fact, a number of federal agencies—including the EPA—explicitly assume that there is no such thing as a threshold dose of a carcinogen. Accordingly, an interagency committee recently stated that "methods do not now exist for determining a 'safe' threshold of exposure to carcinogens."

But besides experimental results, a host of complicating factors must be dealt with in arriving at a "safe" dose. One of these is the phenomenon called *synergism*, the interaction of two chemicals to produce an effect greater than the sum of the two effects taken

independently. Synergism frequently raises the cancer rate above what is expected. For example, Dr. Irving Selikoff of New York's Mt. Sinai Medical School studied 370 asbestos workers. Other studies have shown that asbestos alone can cause fatal lung cancer. But in this study, of the workers who did not smoke, none died of lung cancer although they had asbestos fibers in their lungs. Of the asbestos workers who smoked, 24 died of lung cancer. Smoking alone without exposure to asbestos would account for only 3 of the 24 cases of lung cancer. The conclusion was self-evident: the combination of smoking and asbestos was synergistic, producing an extraordinary increase in observed cases of lung cancer over the number expected.

The lesson here is frightening. It is that the chemicals in the environment cannot be considered only individually. Their interactions may pose a much more serious health hazard than previously supposed. Dr. Umberto Saffiotti of the National Cancer Institute is planning a fascinating investigation of synergistic effects. Animals will be exposed to a mixture of many different carcinogens—for example, all those commonly found in air pollution. Each carcinogen will be present in a concentration comparable to that found in the human environment. The incidence of cancer from the mixture will be compared to that from each component of the mixture given alone, to see if synergism is operating.

"Another problem is that of *latency*," notes Dr. Weinhouse. "Experimental cancer develops slowly, often requiring a large portion of the animal's lifetime, and this is presumably true also for man. We know from occupational data and from cigarette smoking that this may be 10, 20, or 30 years. Experimental data depend on the dose, and this offers the hope that at very low doses, the latent period will be longer than a normal lifetime."

Other factors can influence the test's outcome. Whether a chemical is transformed as it passes through the body is important, for most chemicals that cause cancer do not do so themselves; instead, they undergo chemical change in the animal, and the resultant chemical is the true culprit. The animal species tested matters because different carcinogens may attack different species. Also, the genesis of tumors is influenced by the dietary and nutritional state of the host. For instance, fat-enriched diets enhance the formation of certain types of tumors. In addition, the test must be run on both males and females because there are many examples of sex-related differences in response to carcinogens.

Nevertheless, the greatest uncertainty in any long-term animal cancer test lies in the final step, the *mouse-to-human extrapolation*, where rodent data are used to assess human risk.

Dr. David Rall, chairman of the National Institute of Environmental Sciences, analyzed the issue exceptionally well at a 1974 National Academy of Sciences symposium on Statistics and the Environment. Although all mammals have a strikingly similar physiology, he noted, mice and humans differ in several important respects. For example, compared to a mouse, a person's metabolic detoxification chemistry is slower while the binding of foreign chemicals to body tissues is greater. This might mean that a human retains material in the body relatively longer than a mouse does. If this is true, cautions Rall, then equivalent doses of carcinogens could be more carcinogenic for people than for mice.

The difference in size between mice and humans is a pitfall when it comes to figuring out equivalent doses of a carcinogen for each. Some scientists calculate equivalency on the basis of milligrams of chemical per kilogram of body weight. Most, including Dr. Rall, believe an extrapolation of dose according to the body's surface area gives a truer comparison.

Accurately translating latency time is also

difficult. The complication, Rall says, is that cancer cells multiply twice as fast in mice as in humans, "so that a cancer in a mouse is likely to appear earlier in a mouse's life span than in a man's."

Another uncertainty lies in applying results derived from an inbred, genetically homogeneous mouse strain to a free-breeding, genetically heterogeneous human population. Moreover, Rall writes, "we must recognize that experimental animals usually live in a controlled environment, with relatively uniform diets, temperature, humidity and exposure to other agents. Man, as a free-living animal, has a much more diversified experience—some of which will make some of him more sensitive, more susceptible, and more likely to succumb to environmental assaults."

The hurdles in a mouse-to-human extrapolation are not insurmountable, however. "In spite of all these difficulties, it still seems possible to extrapolate from mouse to man—at least from the median mouse to some hypothetical median man," Rall concludes. This conviction clearly dominated the thinking of 240 of the world's leading cancer authorities who met at Cold Spring Harbor, New York, in September 1976.

Properly conducted long-term rodent tests do have a good track record. "Of the chemical agents that are generally accepted to have produced human cancer, all but one (arsenic) produced a carcinogenic response in rats and/or mice; in most tests, the cancers occur in the same organ as in humans when tested by the appropriate route of exposure. . . . Of the half-dozen instances in which quantitative comparisons can be made between animals and humans, the magnitude of carcinogenic response in the most sensitive animals tested does show a reasonable comparability to that of humans." That's the tests' batting average as of May 1977, according to Drs. R. Albert of New York University Medical School and Russell Train and E. Anderson of the Environmental Protection Agency.

Even if there are still reservations about whether these tests protect the public from cancer-causing exposures, ignoring the findings can also be risky. Dr. L. Tomatis of the International Agency for Research on Cancer in Lyons, France, wrote: "Stilbesterol was known to be carcinogenic in five animal species for many years and in spite of this it was used in human therapy."

Short-Term Tests

Tests on animals require time, though, as well as money and personnel. Approximately 1000 new chemicals flow onto the market every year. To run even a single chemical through a long-term test takes 3½ years, requires at least 500 animals, and costs as much as $750,000. A mere 47 labs are in the long-term cancer-testing business; there's too much business for them to handle.

Consequently, scientists are developing quick, cheap, *short-term* tests that screen large numbers of chemicals to see which merit further study in long-term tests. Dr. Frederick Robbins, dean of Western Reserve University School of Medicine, says that these short-term tests "take at most a few weeks, [and] examine the capacity of a substance to cause mutations or other genetic alteration. These tests are based on the presumption that cancer is related to cellular DNA alterations and that detection of such changes is indicative of a chemical being potentially carcinogenic."

Of the various short-term tests, the one getting the best marks in the scientific community is the *Salmonella*/Microsome test, commonly referred to as the *Ames Test*, after one of the University of California biochemists at Berkeley who developed it. (His partner was Joyce McCann.) The test is simple, costs $200, takes three days and is very sensitive. Dr. Ames contends that thousands of chemicals a year can be screened by the test. More than 1000 governmental, industrial and academic laboratories throughout the world currently use it.

The Ames Test uses a *Salmonella* bacterium that cannot grow because its genes cannot synthesize the amino acid histidine, a nutrient necessary for growth. When exposed to a *mutagen*, a chemical that induces genetic mutations, the bacterium's genes mutate to a state in which they can make histidine. The mutated bacterium grows, reproduces and produces a colony of progeny that shows up on the surface of a culture plate as a small white dot.

To make the bacteria metabolize the test chemical as humans do, an extract from rat or human liver is added to the culture dish. The extract contains enzymes that ordinarily carry out metabolic conversions in humans.

If a known number of bacteria lacking the ability to make histidine are spread over the surface of a culture plate, and then a known dose of a mutagen is spread over the culture, white dots on the culture show every place a bacterium mutated. Drawing a dose-response curve shows what percentages of the bacteria mutated when given the various doses of the chemical.

In effect, the Ames Test relies upon the widely held conviction that any substance that causes cancer also causes mutations. Of 300 chemicals tested by the procedure, 90% of the ones known to be carcinogens were discovered to be mutagens, too; and 87% of the ones known to be non carcinogens also turned out to be non-mutagens.

Still, as good as they seem as screens for carcinogens, the Ames Test and other short-term tests cannot replace long-term tests. For example, toxicologists at Imperial Chemical Industries in Britain said that "combined use of the two most reliable [short-term] tests [one being Ames'] might have missed vinyl chloride and diethylstilbesterol."

It is the size of the evolutionary jump from bacteria to humans that troubles skeptics. That is why researchers are now studying other short-term tests that use mammalian systems. In the new tests, carcinogens are dropped into dishes in which human or other mammalian cells are growing. Then the experimenters look for genetic damage or transformation of normal cells to cancerous.

Epidemiological Studies

Epidemiological studies, which analyze the incidence of a disease in human populations, provide the ultimate proof that a substance causes human cancer. The task is to demonstrate a cause-and-effect relationship between exposure to the chemical and occurrence of cancer, a terribly difficult undertaking. Cause has been tied to effect only when the carcinogen is very potent, when the exposed population can be readily identified and observed over a long period of time, and when an unexposed control population exists.

The main drawback of human studies is that people must develop cancer before the danger can be pinpointed. Moreover, once people have been exposed, removing the offending substance from the environment does not keep the body count from going up. "The fact that approximately one in five asbestos workers, exposed under conditions which existed in the past, now die of lung cancer is a critical problem," warns Dr. Selikoff. "The U.S. Public Health Service has estimated that there are now approximately one million men and women in the United States who are currently employed as asbestos workers or who were formerly so employed. . . . We may look forward to an extraordinary number of asbestos lung cancers in the next three to five decades."

A good number of cancer experts now suspect that chemicals and radiation induce 80% to 90% of human cancer. The logical conclusion is that chemicals suspected of causing cancer must be identified and removed from the human environment; or, if they have noteworthy benefits, exposure to them must occur only when necessary. □

Mark and Judith Miller are a husband-and-wife team of journalists from St. Louis who do investigative and scientific reports.

Catalyzing Favorable Reactions:

A Look at Chemical Industry PACs

EDWARD ROEDER

IF YOU THINK the main way America's chemical manufacturers are interfering with your life and your children's lives is by polluting the air, diverting water to their own uses and poisoning the water supplies, think again.

They are also polluting democratic government and diverting the political mainstream to the extreme right by spending millions of dollars to influence American elections in which they have no right to vote.

Consider Dow Chemical, which produces Saran Wrap and other household products that may help you keep your kitchen clean. Dow also operates eight political action committees (PACs) that spent, according to nearly final figures obtained from the Federal Election Commission (FEC), a third of a million dollars to influence the 1980 elections. The majority of Dow's contributions, like most of the chemical industry's largesse, went to help conservative Republicans make a nearly clean sweep of last year's elections.

And Dow is not alone. Almost all of the big chemical companies and many of the smaller ones sponsor PACs—a total of 168 PACs have been formed by chemical manufacturers and their trade associations. An exception is duPont, whose board chairman, Irving Shapiro, is personally very involved in politics but does not believe the company has any business operating a PAC.

PACs are funds set up, under the "reforms" of the Federal Election Campaign Act, to raise and spend money to influence federal elections, usually on behalf of an organization with a special interest in legislation. Because of new loopholes in the disclosure law, most of the disclosed money that financed the 1980 congressional elections came from PACs.

Together, the chemical industry PACs spent $6,051,755 to influence the elections during the period from January 1, 1979, through November 24, 1980.

That's not counting the money they'll be giving as "campaign contributions" after the races are over to help winners pay off home mortgages, insurance policies and investment portfolios hocked to pay the high costs of winning.

For example, Senator Charles Percy (R-Illinois) disclosed receiving $28,225 from chemical PACs in 1977-78, when he ran a reelection campaign. But in 1979-80, when he had no race and it was too late for disclosure to matter to the voters, Percy raised another $34,850 from chemical PACs to help pay off a $600,000 debt his campaign committee owed to him personally. It's a neat way for lobbies to avoid timely disclosure and to put money back into senators' pockets by laundering the payments through a campaign committee's financial structure.

Nearly a fifth of the $6 million came from PACs of corporations charged by the Justice Department with responsibility for serious unlawful pollution. (See page 24.)

More than 60%, some $3,651,409, went as direct contributions to federal campaigns. The rest was given to state and local candidates, or spent as indirect contributions (through other PACs or the major political parties), or used to pay for other political activities.

Among presidential primary candidates, Republican Ronald Reagan led the field in scooping up chemical PAC money, getting some $57,048 for his successful bid. Jimmy Carter ranked second with $42,310. Other top recipients among presidential candidates were Republican losers John Connally, who got $31,629, and the new Vice-President, George Bush, who received $20,924.

But presidential races are partly removed from the grip of special interests by public financing that pays for the post-primary campaigns. It was in congressional races that chemical PACs dumped most of their funds.

Does the money from PACs influence legislators' decisions on how to vote in Congress, or do members' voting records influence PAC decisions in giving out the money? Which comes first, the money or the votes? Comparison of congressional voting records and contribution records shows that members who have received larger campaign gifts from chemical industry interests generally voted with the industry and against stricter controls on toxic chemicals and hazardous wastes.

All but 54 of the 401 incumbent representatives who ran for reelection last year got campaign help from chemical manufacturers, as did every senator seeking reelection. On roll call after roll call, those who voted with the chemical lobbies have gotten larger amounts—an average of two to four times as much—than those who voted to provide more funding and authority for the Environmental Protection Agency to detect, curb and prosecute polluters.

Chemical PACs invested more heavily in Republicans, especially challengers, than did most economic interests. Their investment was heavy in both houses of Congress.

Over the past two years, chemical PACs have given at least $1,646,168 to the campaigns of candidates now sitting in the House of Representatives of the 97th Congress. Of the 435 members, 86%, or 373, have received campaign help from chemical PACs, an average of $4413 each.

The 100 senators in the 97th Congress include 94 who have accepted a total of $1,741,973 in campaign gifts from chemical

PACs during or since their last campaigns. The six who received none inlcude Democrat George Mitchell of Maine, who had no campaign because he was appointed to fill the vacancy created when Senator Edward Muskie resigned to become Secretary of State, and Democrat David Boren of Oklahoma, who accepts no PAC money but does accept large contributions from individual executives in the chemical industry. The 94 senators who have accepted chemical PAC money have received an average of $18,532 apiece.

All of the top five recipients of chemical industry money in the new Senate are Republican freshmen who defeated incumbent liberal Democrats. At the top of the list is Charles Grassley, Republican of Iowa, who defeated Democrat John Culver, sponsor of "superfund" legislation that forces chemical companies to pay much of the cost of cleaning up environmental hazards created by spills and unsafe disposal of hazardous wastes.

Culver tried to make a campaign issue of Grassley's anti-environmental voting record. But in Iowa, where outside interests consistently outbid the citizenry in financing congressional races, the effect of Culver's charges may have been more to help Grassley with the financiers than to hurt him with the citizens. Culver got only $2050 from PACs of chemical manufacturers, and lost. Grassley got $94,200.

The three next-highest recipients of chemical PAC money this year were also right-wing Republicans challenging liberal incumbent Democrats targeted for defeat by the "New Right." They included Steve Symms (R-Idaho), who defeated Democrat Frank Church with the help of some $92,000 in chemical PAC money, compared to only $1250 for Church. James Abdnor (R-South Dakota) used $78,125 from chemical PACs to unseat Democrat George McGovern, who got only $3600. Dan Quayle (R-Indiana) received $69,087 from chemical interests to help him defeat Birch Bayh, who got $6400 from chemical PACs.

Among senators elected to this Congress over the past six years, fifteen Republicans have received more than $30,000 each in chemical PAC money. Only one Democrat has done so well. He's Russell Long of

The Top 30 of Each House of the 97th Congress

Recipients of Largest Amounts from Chemical PACs

House of Representatives

Grassley, Charles	R-Iowa	$94,200
Symms, Steven	R-Idaho	92,000
Abdnor, James	R-South Dakota	78,125
Boschwitz, Rudy	R-Minnesota	70,200
Quayle, Dan	R-Indiana	69,087
Long, Russell	D-Louisiana	68,850
Durenberger, David	R-Minnesota	63,375
Percy, Charles	R-Illinois	63,075
Tower, John	R-Texas	54,751
Baker, Howard	R-Tennessee	50,325
Armstrong, William	R-Colorado	50,125
Thurmond, Strom	R-South Carolina	36,818
Warner, John	R-Virginia	32,332
Jepsen, Roger	R-Iowa	34,100
Dole, Robert	R-Kansas	32,500
Kassebaum, Nancy	R-Kansas	30,800
Simpson, Alan	R-Wyoming	29,950
Cohen, William	R-Maine	29,050
Johnston, Bennett	D-Louisiana	28,090
Hollings, Ernest	D-South Carolina	27,400
Goldwater, Barry	R-Arizona	26,509
Cochran, Thad	R-Mississippi	25,950
Pressler, Larry	R-South Dakota	25,200
Glenn, John	D-Ohio	24,550
Murkowski, Frank	R-Alaska	23,700
Hayakawa, S. I.	R-California	22,475
McClure, James	R-Idaho	22,400
Packwood, Bob	R-Oregon	21,350
Specter, Arlen	R-Pennsylvania	20,950
Andrews, Mark	R-North Dakota	20,900

4 Democratic senators, 26 Republican senators

Covers from January 1 of the year preceding their most recent election to the Senate, through November 24, 1980.

Senate

Porter, John*	R-Illinois	$29,575
Fields, Jack	R-Texas	28,050
Roukema, Margaret	R-New Jersey	27,746
Santini, James	D-Texas	23,700
Gramm, Phil	D-Texas	20,769
Shelby, Richard	D-Alabama	19,400
Wolf, Frank	R-Virginia	18,225
Courter, James	R-New Jersey	18,125
Ritter, Donald L.	R-Pennsylvania	17,575
Fiedler, Bobbi	R-California	17,350
Coyne, James	R-Pennsylvania	16,925
Martin, Lynn	R-Illinois	16,925
Foley, Thomas	D-Washington	15,900
Broyhill, James	R-North Carolina	15,700
Benedict, Cleveland	R-West Virginia	14,850
Jones, Jim	D-Oklahoma	14,576
Vander Jagt, Guy	R-Michigan	14,112
Petri, Thomas	R-Wisconsin	13,850
Weber, Vincent	R-Minnesota	13,500
Loeffler, Tom	R-Texas	13,400
Dornan, Robert	R-California	13,232
Hopkins, Larry	R-Kentucky	13,100
Dreier, David	R-California	12,800
Mariott, Dan	R-Utah	12,720
Michel, Robert	R-Illinois	12,700
Martin, James	R-North Carolina	12,500
Sawyer, Harold	R-Michigan	12,450
Findley, Paul	R-Illinois	11,600
Hartnett, Thomas	R-South Carolina	11,535
Byron, Beverly	D-Maryland	11,250

4 Democratic representatives, 26 Republican representatives

Covers January 1, 1979, through November 24, 1980.
**Figures for Porter do not include money raised before February 12, 1980, because Porter won a special election race on January 22, 1980.*

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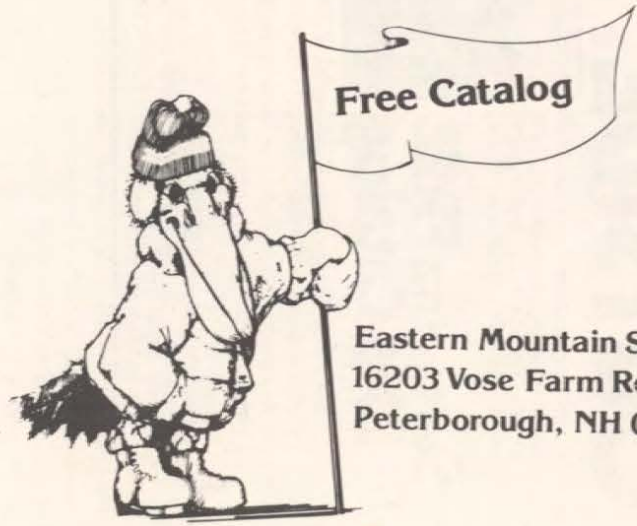

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Louisiana, who as chairman (now ranking minority member) of the Finance Committee has steadfastly served business interests by delaying, blocking and weakening tax legislation, including the tax on chemical companies that creates the "superfund."

The 53 Republicans in this Senate have all received chemical industry money, an average of $25,878 apiece, compared with an average of $7882 to Democrats. Of the 30 senators who lead the list of chemical PAC favorites, 26 are Republicans.

The same picture emerges from "profiles in cash" on House members. Of the 30 who received the largest amounts of chemical PAC money, 26 are Republicans. The House now has 243 Democrats, 193 of whom received a total of $548,267 from chemical PACs, an average of $2256 each. All but 12 of the 192 House Republicans received $1,097,901 from PACs of the chemical industry, and they averaged $5718 apiece, or more than twice as much as Democrats.

The representative who got the most last year is John Porter of Chicago's affluent North Shore. He raised $8400 from chemical PACs to help him in his campaign to win a January special election for the seat vacated when Abner Mikva stepped down to become a federal judge. After that election, Porter raised another $29,575 from chemical PACs for his 1980 primary and general-election campaigns.

Like Porter, the next two representatives on the list of top recipients of chemical PAC money are freshmen. Jack Fields (R-Texas) is a 28-year-old former student who accomplished what many others had tried and failed to do: he finally got enough right-wing groups and oil interests, who were angry at incumbent Bob Eckhardt for his principled environmental stands, to finance a campaign that would overcome Eckhardt's popularity. The chemical industry kicked in handily, to the tune of $28,050, compared with the $3300 it gave Eckhardt.

Margaret Roukema (R-New Jersey), like Fields, defeated an incumbent Democrat with a record of opposing the big oil companies and supporting environmental legislation. Roukema got some $27,746 from chemical PACs, compared with only $300 for her opponent, Andy Maguire.

The biggest political spender among chemical companies appears to be Dow Chemical, which spent some $328,227 through November to influence the 1980 elections. But Dow's contributions have not been widely noted, because Dow uses eight different corporate PACs. Contributions are frequently made to the same candidates by more than one of the Dow PACs.

Like most corporate PACs, Dow's raise money from officials of the firm. A PAC

committee selected by management decides which candidates will get how much money for their campaigns.

"I think you could say that we're out there trying to defend our own interests rather than out there trying to buy anybody," says Rich Long, manager of public affairs for Dow's Washington office. He defended the company's extensive PAC activity, pointing to "extensive involvement [in politics] from organized labor PACs, trade and professional association PACs and a range of other special-interest groups."

C. T. Marck, a Dow Chemical vice-president and the firm's director of government relations, concurred. The Dow PACs "are not used to buy access to any representative or senator or to in any way try to gain favor," Marck said. Asked if the money nonetheless helps the company's lobbying, Marck responded noncommittally, "Oh, I don't know."

Whether or not the money influences congressmen, it clearly influences elections. That's the only legal purpose for which it can be given to a campaign.

During the ABSCAM trials and the publicity brouhaha surrounding them, one of the FBI's videotapes was played over and over. In it, prior to accepting a bribe from an FBI agent posing as an Arab businessman, Representative Michael Meyers was explaining how things are done in Washington. "Money talks," Meyers told the FBI agent and the camera. "That's just how things are done down there."

The 97th may be a rough Congress for environmentalists, who are not likely to be able to stop chemical effluent with rational argument and documentation. Reasoned talk tends to get lost on Capitol Hill if it is not backed up by cash. □

Edward Roeder is a freelance writer in Washington, D.C., who specializes in campaign financing.

The Defendants

IN MANY PARTS of the U.S., private citizens convicted of crimes are denied the right to vote. But the right of corporations to influence elections through money is not taken away when the firm is convicted of crimes.

Allied Chemical Corporation is one example. Allied was caught in 1976 and convicted for poisoning the James River in Virginia. Allied was saving money by pouring tons of toxin from Kepone (a pesticide) into the river instead of paying to have the stuff hauled away to storage.

Kepone, believed to be a carcinogen, was found as far back as 1968 in frozen samples of fish taken from the James. The fishing and shellfishing industries were shut down from the site of Allied's plant at Hopewell to the mouth of the river at Chesapeake Bay, 84 miles downstream.

Indicted on 1097 criminal counts, Allied pleaded no contest to most of them and was fined $13.2 million (later reduced to $5 million when Allied agreed to contribute $8 million to the Virginia Environmental Endowment).

Allied Chemical continued to influence Virginia's elections. Through its PAC, Allied contributed to Virginia's junior senator, Republican John Warner, to congressmen elected from both sides of the James River at Hopewell, to Republicans Robert Daniel and Thomas Bliley and to Republican William Wampler on the other side of the state.

Allied seems to have mended its ways; EPA officials now consider some of the firm's precautionary and safety programs to be models for the industry. But throughout its criminal and civil trials and travails at Hopewell, Allied never lost its right or its inclination to influence elections in Hopewell or in other communities across the country.

Like many PAC officials, Allied's Director of Corporate Affairs Alan Painter seems to view turning money over to a corporate PAC as a suitable substitute for personal involvement in political campaigns. "We feel that it's important for people to participate in the political process, and that's what we're trying to achieve with our PAC. We recognize that there's a certain commonality of interests between a certain employee's livelihood, how he makes his livelihood, and the interests of the corporation," Painter said in a phone interview.

Chemical Companies with PACs

Convicted of federal crimes related to pollution:

Firm	PAC Expenditures Through November 1980
Occidental Petroleum (owner of Hooker and Occidental Chemical)	$87,750
FMC	78,535
Allied Chemical	28,352
Scott Paper	20,250
Olin	42,606
TOTAL, convicted corporations	$257,493

Sued by the U.S. in federal court for endangerment to health or environment through hazardous wastes:

Firm	PAC Expenditures Through November 1980
Dow Chemical (total for 8 PACs)	$328,227
Uniroyal	2,400
Ethyl Corporation	16,094
W. R. Grace	5,500
Diamond Shamrock	73,158
Cities Service	49,600
Shell	51,075
Occidental (Hooker and Occidental Chemical)	87,750
Allied Chemical	28,352
TOTAL, hazardous waste defendants	$642,156
TOTAL, all defendants	$783,547

"We don't look upon it as influencing an election," Painter says, "but a means of involving employees in the political process and helping to finance elections so that candidates can get their views across. . . . Consideration is also given to incumbents who chair or sit on committees which have a bearing on the interests of the company or its employees."

Another major chemical manufacturer recently convicted of federal crimes relating to pollution is FMC Corporation, which pleaded guilty in November to charges of concealing information from EPA and of obstructing proceedings before EPA in 1975, 1976 and 1977. In plea bargaining, the Justice Department dropped other charges against FMC employees and conspiracy charges against the company. FMC agreed to pay a $35,000 fine and to put $1 million into an escrow account to be used for research into water pollution and its effect upon public health.

In the first year of a new enforcement program aimed at improper disposal of hazardous wastes, the Justice Department filed 51 civil actions. The defendants include ten chemical manufacturing firms that used PACs to influence last year's elections.

"We hold that they are responsible for, and must therefore clean up, a toxic hazardous waste which we think is a substantial endangerment to health or the environment," Assistant Attorney General James W. Moorman said of the cases.

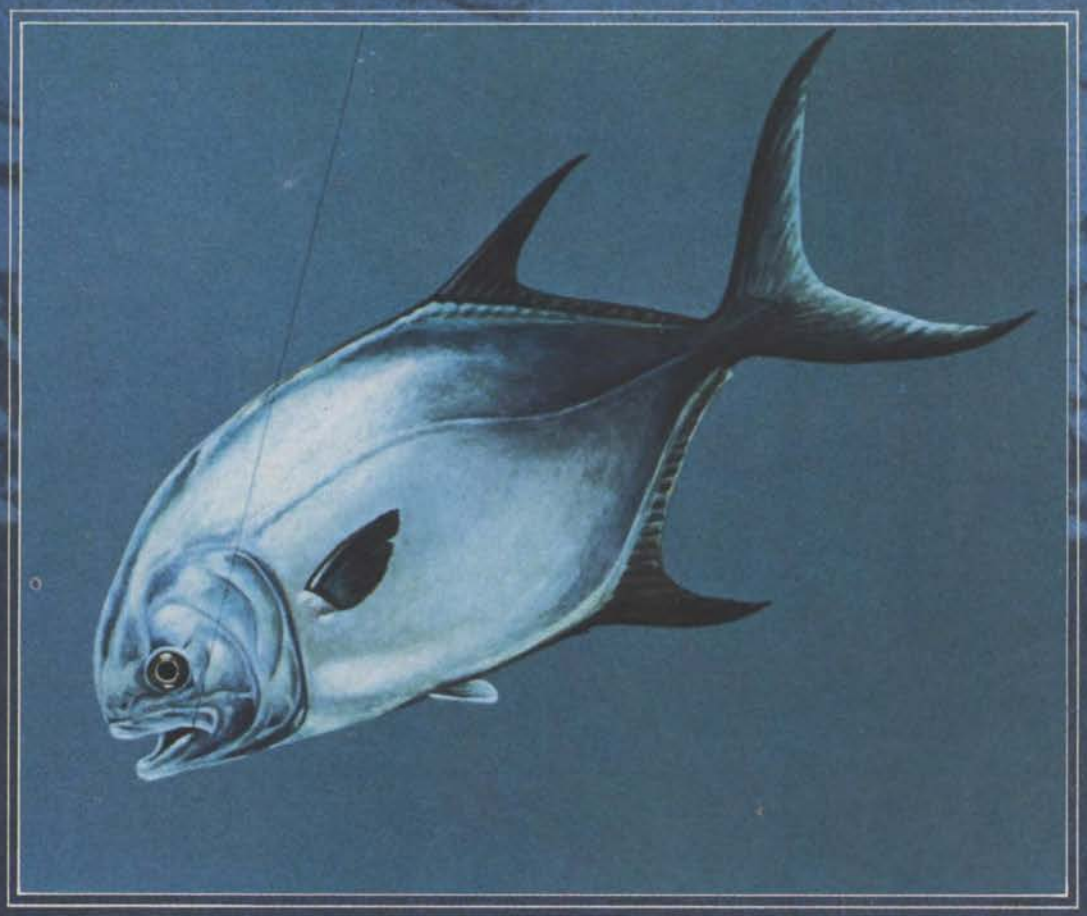
As the Carter administration's head of the Justice Department's Land and Natural Resources Division, which brought the cases, Moorman observed that "most of our cases . . . are brought over things which do not immediately impact upon the public health. This is the only litigation being brought to abate essential nuisances which are harmful and potentially harmful to people."

RICHARD ELLIS

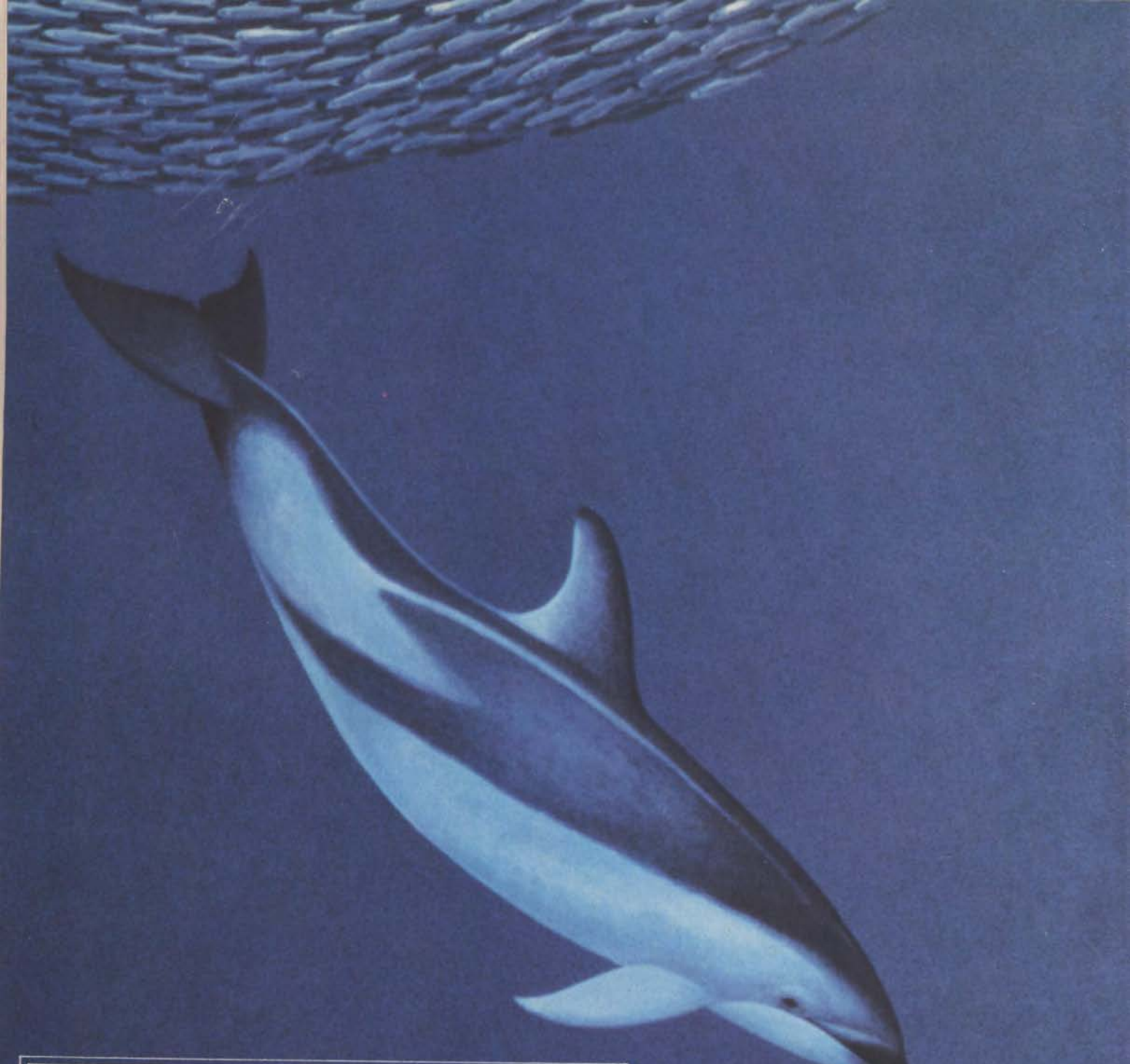

T. A. Ellis

PROMINENT painter of undersea life Richard Ellis has swum with whales and done extensive original research to paint accurately. He has worked with many of the nation's most distinguished museums and marine institutions. He told *American Artist*, "I think our most important responsibility is to the conservation of our planet and the animals we share it with." He says that his favorite mammal used to be the sperm whale, but now it's *Orcinus orca*, the killer whale.

THE RIGHT WHALE reaches 60 feet and has baleen plates that strain small creatures from surface water for food. Whalers called this the "right" species to hunt because it was slow, floated when dead and yielded plentiful oil and bone.



THE PERMIT (above), a gamefish related to pompano and found off southern Florida, usually reaches about 18 inches but can grow to three feet. The sperm whale (right) can reach 60 feet. These whales are hunted because their heads contain large reservoirs of oil whose natural purpose is still unknown; it is used to lubricate machines and make smokeless candles. In earlier times, people thought this oil was the whale's seminal fluid. Large male sperm whales approach the whalers' rule-of-thumb weight of a ton per foot.



ELLIS SWAM WITH the dusky dolphins (above), cousins of the famous bottlenose dolphins, and the anchovies they lunched on in the waters off the Valdez Peninsula in Argentina. The triggerfish (left) sometimes eats sharkmeat, and some species are poisonous to humans. □

Environmental Protection Is Good Business

MICHAEL McCLOSKEY

AT A TIME when inflation is on everyone's mind, many people wonder how heavy a toll the economic troubles ahead will take on the environmental movement. Is there a basic incompatibility between economic functions and environmental goals?

Environmentalists have been accused of being radicals who seek a condition of "no growth" and a return to a primitive style of life. Of course, none of this is true. Environmentalists seek responsible behavior by business people, behavior that does not degrade the environment others must share, or impoverish the future. We seek constructive growth that improves general conditions at reasonable costs. We are against the brand of progress that means that only a few gain and most lose.

As environmentalists, we spend most of our time advocating positive changes in public policy to improve the environment. We are *for* mass transit, *for* solar power, *for* recycling, *for* reclaiming wastewater, *for* water and energy conservation, *for* reforestation and *for* true sustained yield, *for* integrated pest management, *for* irrigation with nutrient-rich wastes, *for* reclamation of derelict lands, *for* renovation of urban housing and infilling, *for* clean air and water, *for* open space and parks and *for* better public health programs.

Unfortunately, most of these positive projects compete with proposals counter to them, and in dealing with our competition we are often tagged as negative. While it may seem to be no more than a matter of semantics, this negative side of the coin seems to draw more publicity.

But many businesses live well with the programs we advocate, and the record is getting better all the time. Of all businesses and industries that produce pollution, 80% now comply with federal pollution laws. More industries than municipalities met the 1977 water-pollution cleanup standards. Only 600 of some 4000 industrial dischargers are not yet in compliance.

Pollution-control programs, far from being a burden on the economy, have produced one of the fastest-growing industries in America. There are now more than 600 companies manufacturing control equipment. Others make cooling towers, scrubbers, precipitators, catalytic converters, pyrolitic processors and mufflers. Firms producing air- and water-pollution control equipment had sales of $1.8 billion in 1977. Their sales are growing at a rate twice as fast as the rest of U.S. industry and are expected to triple by 1985, reaching $5 billion.

All together, more than $47 billion is now spent annually in the United States to prevent environmental abuse; about $27 billion of this is spent in response to environmental legislation. The total environmentally related spending amounts to 1.3% of the Gross National Product. By 1986, nearly $710 billion may have been spent on environmental programs, with $477 billion of it triggered by federal programs. Most of this money will be routed through the accounts of businesses that make or maintain pollution-control equipment.

As many as a million workers may soon be employed in this work. Each additional billion dollars spent on pollution control creates 40,000 new jobs; annually, 160,000 new jobs are created in the pollution-control field. The bulk of these jobs will be in industry and local government, with skilled operators constituting the largest category. In addition, 1.5 million new jobs could be created through transportation reforms alone with measures that environmentalists advocate.

And these figures do not tell the whole story. Other environmentalist-supported programs also provide business opportunities: processing recycled materials, manufacturing buses and trains for mass transit, building and selling solar collectors, rehabilitating older homes and installing insulation and energy-conserving equipment. Public incentive programs supported by environmentalists help foster all these businesses.

As firms find that older plants do not justify further investment in controls, they often choose new locations to build plants that are usually more profitable. So far some 118 old plants have been closed, with some 22,000 workers affected. But in most cases, the businesses that closed relocated to better advantage. Of the plants that closed ostensibly for environmental reasons, 60% were shown in one survey to be old or obsolete.

Environmental programs are designed to improve living conditions for everyone, and business shares in these benefits. Property values as a whole are protected by good environmental-control programs. Residen-

Pollution-control programs: some attractive figures

POLLUTION-CONTROL programs have produced tangible benefits. The public is getting a good return on its investment. Here are some examples:

- In nine large cities, the number of unhealthful days because of air pollution has declined by 35% since 1974. For 25 major cities, the number of very unhealthy days has declined by 32%.
- Carbon monoxide levels have been dropping by 7% a year, and particulate levels by 4% a year.
- Nationally, violations of primary air-quality standards for sulfur dioxide are down by 54% over a recent four-year period. For carbon monoxide, the violations are down by 43%, and for ozone, down by 24%.
- Overall sulfur-dioxide levels in the atmosphere are down by 17% since 1972.
- Industrial discharges of key pollutants have been reduced by 50% to 80% from 1972 to 1979.
- Half of all municipalities now have secondary treatment of wastewater, and most treatment facilities receiving federal aid are still under construction.
- Bacteria levels in rivers near 24 major cities were down in 18 cases, according to a recent study, and in a study of 44 cities, there was improvement of water quality in almost half the cases.
- Water quality has clearly improved in more than 70 rivers across the country, often with dramatic results in terms of returning fish. Harbor seals have returned to San Francisco Bay; trout can be caught in the Detroit River; Lake Erie is returning to health.

tial values are protected by good planning and by strong zoning standards. Strong air-quality controls prevent damage to structures from corrosion; paint jobs last longer; sensitive crops and yard plants suffer less. Current damage from uncontrolled air pollution in these categories may approach $3 billion annually. Strong water-pollution controls improve the safety of drinking water and the quality of the water required for some sensitive industrial processes. Such controls, as well as those on toxic substances and pesticides, help assure the health of commercial fisheries. Mass transit improves the mobility of the work force, and energy and water conservation help reduce operating costs.

Most of these programs, moreover, help produce a healthier and happier work force that spends more time on the job. Air pollution, for example, is more than an annoyance. It limits lifespan, curtails vigor and reduces resistance to disease. It raises both morbidity and mortality rates. Achieving national air-quality standards for industry would reduce mortality losses to the economy by $36 billion annually. Toxic substances in air, water, foods and other products can produce cancer; between 60% and 90% of all cancers are induced by the environment, and the incidence of such cancer is growing at a rate of 2% a year. Cancer is twice as prevalent in polluted central cities as it is in suburbs.

But the key question remains: do the investments required for these programs stifle business? Studies in recent years suggest that pollution-control investments now amount to 4.7% of new investments in plants and equipment. This percentage has been falling in recent years, although it may rise a little to meet deadlines coming due in 1983. For a few industries, such as steel and nonferrous metal smelters, pulp processors and electric utilities, the investment rates are much higher. In the next few years, the steel industry may have to invest about 20% of its capital outlays in pollution controls.

Some steel plants and copper smelters have been notorious foot draggers, and have not been making scheduled investments to cure their conspicuous problems within a reasonable time. Now, suddenly, time has run out on them, and the whole bill is coming due. One study found that it costs three times more to install pollution controls all at once than to phase in the installations over a period of time.

But in general, the amounts being invested by industry are only a small share of new capital being invested. Capital costs for control equipment have been overestimated both by the Environmental Protection Agency and by industry, a recent study found; EPA's cost projections were closer to the actual figures than industry's.

Whatever the projections have said, a recent study for the Council on Environmental Quality confirms earlier findings that pollution-control investments displaced little productive new investment. In fact, a survey by the Bureau of Economic Analysis a few years ago showed that only 2% of the firms affected were postponing other investments because of the squeeze for capital. One should also bear in mind that these are largely one-time increases in outlay. Once a plant has been upgraded to meet control standards, the investment does not have to be repeated. Annual growth in the GNP is probably only 1% lower because of these outlays; over a ten- to fifteen-year period, the growth might be only 1% to 2% lower than it would have been with no pollution-control investment.

One reason for the small negative effect on GNP is that pollution-control investments are often made by making industrial processes more efficient. One division of Dow Chemical found that new investments in pollution control cut operating costs by the $2 million that the control equipment cost. Alcoa cut energy consumption in its plants by 30 percent when it introduced new technology to reduce fluoride and tar emissions. The 3M Company changed its pro-

cesses to reduce air and water pollution and saved $11 million in costs. The Great Lakes Paper Company found a water-pollution treatment system that reduced annual operating costs by $14 million a year. A National Science Foundation study of five other nations also found the environmental investments stimulated technological innovation generally.

Of course, most businesses will try to pass on any added costs to consumers. Still, these increases are dwarfed by the general rates of inflation. Over the past decade, the Consumer Price Index has probably risen by only 1.5% because of spending on pollution control. The rate of inflation may be increased by 3.6% by 1985 because of these one-time expenditures, but this does not represent an erosion of purchasing power; it is a small part of the runaway rates of inflation that have been compounding from year to year. Besides, with pollution-control investments, the public is getting more for its money—better water and air, better health, more productive crops and longer-lasting buildings and homes. In 1977, estimated economic benefits from air-pollution controls exceeded their costs.

Other objectives of environmental programs are basically anti-inflationary. Environmentalists believe in husbanding natural resources to prevent waste and premature depletion. As resources are depleted, scarcity ensues and prices inflate. Environmentalists want to ration nonrenewable resources, to limit their depletion and extend their availability. Policies of planned obsolescence, conspicuous consumption, throwaway goods, depletion allowances and maximum growth have caused us to exhaust our high-grade resources. We have used up the bulk of our easily extracted oil and gas and must now look for them in remote and difficult places. A lack of sound conservation policies in the past is adding to the inflation we must now bear.

We should rethink all government policies that encourage depletion, waste and sprawl. Sprawl stands as an instructive example of waste. It has been encouraged by various federal policies: tax deductions, mortgage insurance and freeway aid. Lessening sprawl with policies that encourage multifamily low-rise housing would provide both environmental and economic benefits. A study done for the Council on Environmental Quality showed that such housing costs 44% less per occupant to construct than does single-family housing, and it also produces 45% less pollution, consumes 35% less water, uses 44% less energy and does not preempt as much land. This example shows that environmentally backed programs often help keep costs down.

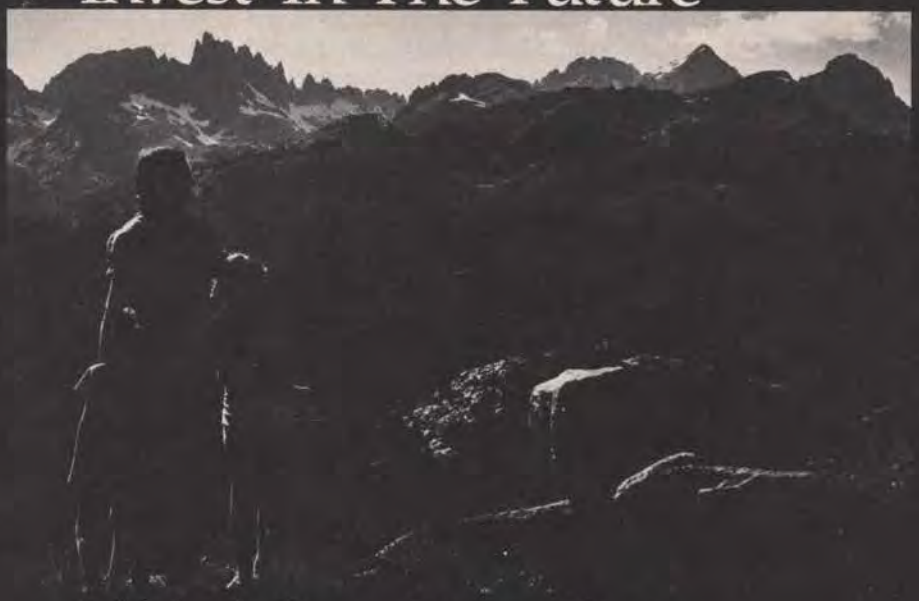
Environmentalists have also been trying to keep costs down in energy. They advocate relying on the energy sources that cost the least. For example, energy conservation averages about $4 billion, ranging down to as little as $1.5 billion, in capital costs per quadrillion BTUs. In contrast, nuclear power may cost between $70 billion and $90 billion per quad.

If the country chooses high-cost forms of energy, the capital requirements could be prodigious. Over the next decade, investments from these energy industries could range from $800 billion to $1 trillion or more, tying up anywhere from half to two thirds of all capital available to all industry.

Clearly, capital-intensive energy technologies will cause severe competition for capital and inflate its cost. In contrast, energy plans geared primarily to conservation might require only a third as much capital, perhaps less. The $430-billion difference between the two forecasts is nearly as great as the total amount required over the same period for pollution-control programs.

The conclusion we can draw from these numbers and contrasts is that, taken as a whole, environmental programs will do more to help our economy than to burden it. The conserver society we advocate is probably the only pattern for the future of our economy that can work. □

Invest In The Future



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The environmental challenge in the coming decades requires the same financial planning that you use in your own life. You invest your assets, insure your future, and sometimes set up trusts to protect the value of your estate.

We are just like you. The best insurance policy we have is the continuing support of our donors.

Our long-term strength as an advocate for environmental preservation depends on another kind of investment—a Sierra Living Trust. You can help protect the nation's forests, deserts, waters, and wildlife by setting up a trust with either the Sierra Club Legal Defense Fund, Inc., or The Sierra Club Foundation.

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For more information, contact Peter Wilkinson or Leslie Fox, The Sierra Club Foundation, 530 Bush Street, San Francisco, CA 94108, (415) 981-8634.

Stewart M. Green

The Wilderness Legacy of the 96th Congress

The Maroon Bells-Snowmass Wilderness in Colorado is one of the most heavily used in the National Wilderness Preservation System. It was expanded by 103,000 acres. Above, columbines, Colorado's state flower. Below, the Willow Creek Basin.

AMONG THE ENDURING achievements of the 96th Congress will surely be the designation of new wilderness areas and the expansion of existing ones. In the first part of its two-year session, the 96th protected more than 2 million acres in wilderness; in the lame-duck period, Congress boosted the total by more

Wilson Goodrich

J. T. Brock

than 60 million more acres, including Alaskan wilderness. Now the wilderness system contains a total of 80,086,902 acres. A complete listing of the additions during the 96th Congress can be found on page 39; below are some of the highlights.

Stewart M. Green

The largest new wilderness—the largest ever established—is Idaho's River of No Return, 2,239,000 acres. Left: Trail Flat Hot Spring on the Middle Fork of the Salmon River.

New Mexico's Wheeler Peak Wilderness was expanded by a modest 14,700 acres. Below: hiking the ridge toward Wheeler Peak. Across the gap of Hondo Canyon are the ridges of Lake Fork Peak.

Ken Gallard

A meadow of wildflowers in the recently expanded Maroon Bells-Snowmass Wilderness. Bear Creek is in the distance.

Wilson Goodrich

Greg Hirtz

Four new wilderness areas were designated in Missouri. Above, the barrens on Bell Mountain, part of the 8530-acre Bell Mountain Wilderness.

Colorado's popular Holy Cross Wilderness is named for an unusual natural formation. Pictured is glacier slickrock within the new 126,000-acre area.

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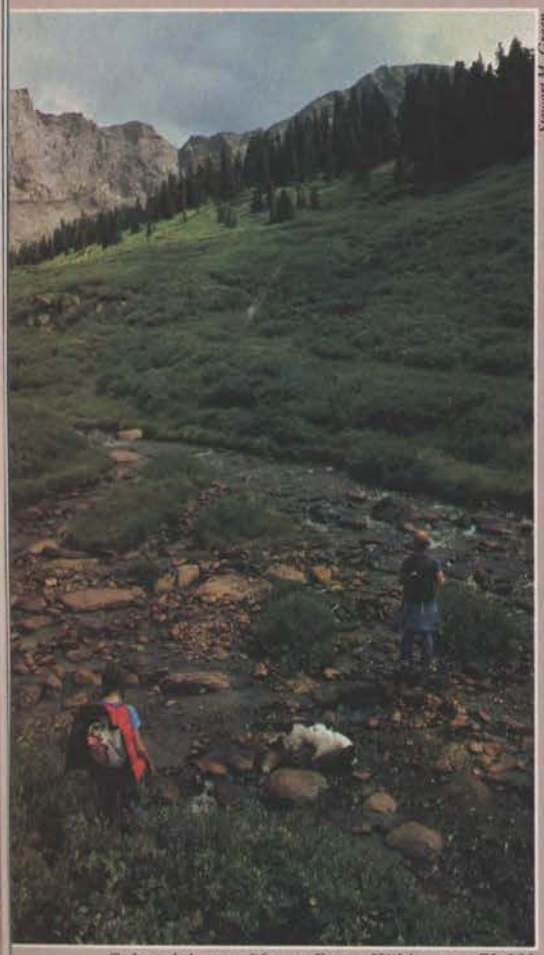


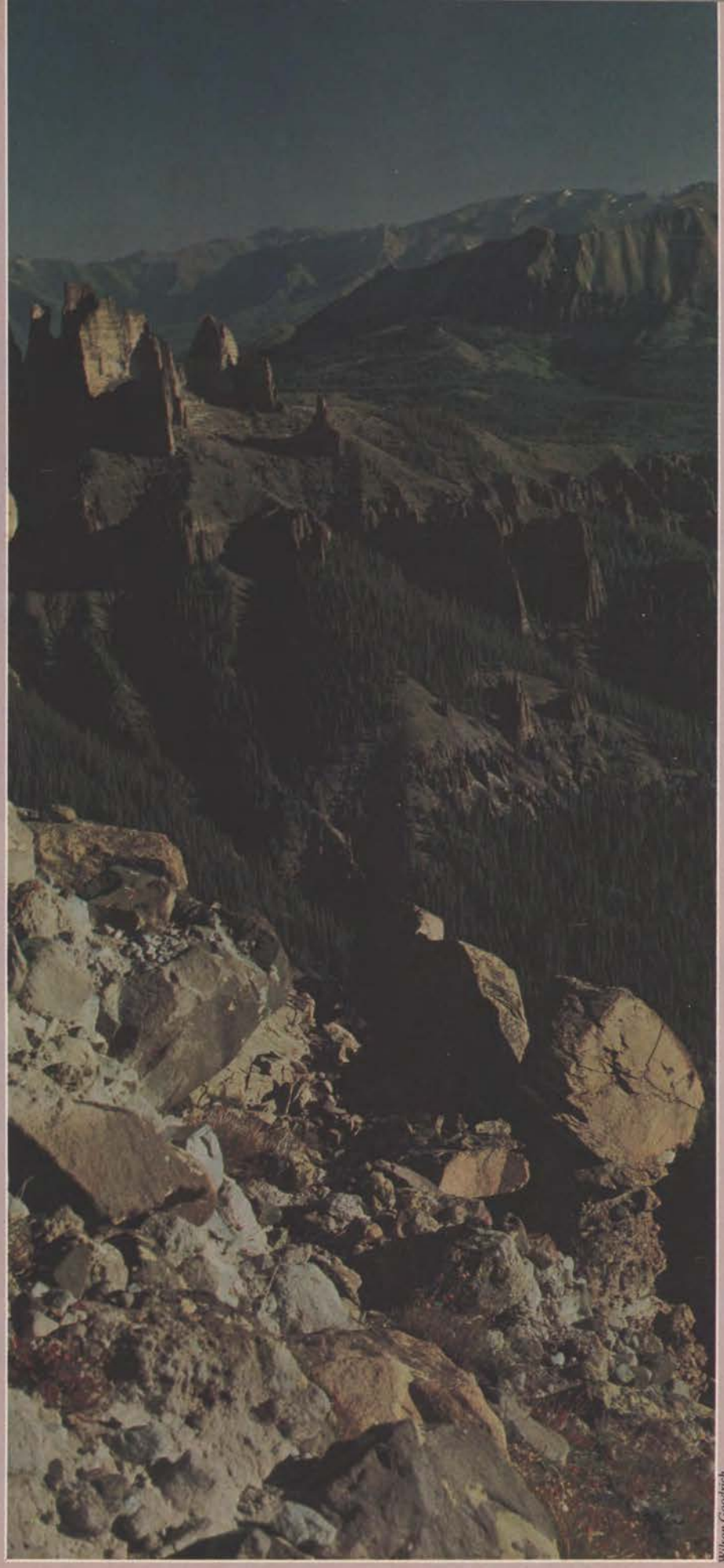
Stewart M. Green

Colorado's new Mount Evans Wilderness, 73,000 acres in size.

Colorado's West Elk Wilderness was expanded by 133,000 acres; at right, the area's formations look like castles.

Diane Ensign-Caughey

New Mexico's Gila Wilderness grew by 140,000 acres. Above: a man and friend go backpacking. (The Gila Wilderness is managed by the Forest Service, and dogs are allowed.)



Wilson Goodrich

Complete List of Wilderness Areas Protected by the 96th Congress

AREA	AGENCY	STATE	ACREAGE
Sandia Addition	USFS	NM	6,423
River of No Return	USFS	ID	2,239,000
Selway Bitterroot Addition	USFS	ID	105,000
Rattlesnake	USFS	MT	30,000
Denali	NPS	AK	1,900,000
Gates of the Arctic	NPS	AK	7,052,000
Glacier Bay	NPS	AK	2,770,000
Katmai	NPS	AK	3,473,000
Kobuk Valley	NPS	AK	190,000
Lake Clark	NPS	AK	2,470,000
Noatak	NPS	AK	5,800,000
Wrangell-Saint Elias	NPS	AK	8,700,000
Aleutian Islands	FWS	AK	1,300,000
Andreafsky	FWS	AK	1,300,000
Arctic Wildlife Refuge	FWS	AK	8,000,000
Becharof	FWS	AK	400,000
Innoko	FWS	AK	1,240,000
Izembek	FWS	AK	300,000
Kenai	FWS	AK	1,350,000
Koyukuk	FWS	AK	400,000
Nunivak	FWS	AK	600,000
Togiak	FWS	AK	2,270,000
Semiki	FWS	AK	250,000
Selawik	FWS	AK	240,000
Unimak	FWS	AK	910,000
Admiralty Island National Monument	USFS	AK	900,000
Coronation Islands	USFS	AK	19,122
Endicott River	USFS	AK	94,000
Maurille Islands	USFS	AK	4,424
Misty Fjords National Monument	USFS	AK	2,136,000
Petersburg Creek—Duncan Salt Chuck	USFS	AK	50,000
Russell Fjord	USFS	AK	307,000
South Baranof	USFS	AK	314,000
South Prince of Wales	USFS	AK	97,000
Stikine—LeConte	USFS	AK	443,000
Tebenkof Bay	USFS	AK	65,000
Tracy Arm—Ford's Terror	USFS	AK	656,000
Warren Island	USFS	AK	11,353
West Chichagof—Yakobi	USFS	AK	265,000
Aldo Leopold	USFS	NM	211,300
Apache Kid	USFS	NM	45,000
Blue Range	USFS	NM	30,000
Capitan Mountains	USFS	NM	34,000
Cruces Basin	USFS	NM	18,000
Dome	USFS	NM	5,200
Gila Additions	USFS	NM	140,000
Latir Peak	USFS	NM	20,000
Pecos Additions	USFS	NM	55,000
Wheeler Peak Additions	USFS	NM	14,700
White Mountain Additions	USFS	NM	16,860
Withington	USFS	NM	19,000
Big Blue	USFS	CO	97,000
Cache La Poudre	USFS	CO	9,400
Collegiate Peaks	USFS	CO	159,900
Comanche Peak	USFS	CO	67,500
Holy Cross	USFS	CO	126,000
Indian Peaks Boundary Adjustment Additions	USFS	CO	1,300
La Garita Additions	USFS	CO	60,000
Lizard Head	USFS	CO	40,000
Lost Creek	USFS	CO	106,000
Maroon Bells—Snowmass Addition	USFS	CO	103,000
Mount Evans	USFS	CO	73,000
Mount Massive	USFS	CO	26,000
Mount Sneffels	USFS	CO	16,200
Mount Zirkel Additions	USFS	CO	68,500
Neota	USFS	CO	9,900
Never Summer	USFS	CO	14,100
Raggeds	USFS	CO	68,000
Rawah Additions	USFS	CO	48,930
South San Juan	USFS	CO	130,000
Weminuche Additions	USFS	CO	66,000
West Elk Additions	USFS	CO	133,000
Black Elk	USFS	SD	10,700
Bell Mountain	USFS	MO	8,500
Rockpile Mountain	USFS	MO	3,900
Piney Creek	USFS	MO	8,400
Devil's Backbone	USFS	MO	6,800
Wambaw Swamp	USFS	SC	5,100
Hell Hole Bay	USFS	SC	1,980
Little Wambaw Swamp	USFS	SC	5,000
Wambaw Creek	USFS	SC	1,640
Kisatchie Hills	USFS	LA	8,700
Fire Island	NPS	NY	1,363

AGENCY KEY:
USFS—United States Forest Service
NPS—National Park Service
FWS—Fish and Wildlife Service

Beyond Conflict–The Art of Environmental Mediation

LARRY E. MOSS

Courtesy of RESOLVE

A series of discussions at RESOLVE on nuclear waste management policy produced a report for policy makers. RESOLVE's president, John Busterud (third from left in back), moderated.

THE SISKIYOU MOUNTAINS, parallel to the coast in far-northern California and inland from Redwood National Park, rise from lushly forested canyons to provide spectacular views of the Pacific Ocean and the distant volcanic peaks of the Cascade range. For more than a decade conservationists have argued for statutory protection of those wild mountains, which are part of the Six Rivers and Klamath national forests. Lawsuits over timber practices and roadbuilding, appeals of proposed timber sales and continuing controversy among timber interests, environmentalists, state government, native Americans, local government and the Forest Service have been the order of the day.

In a vain attempt to settle the issue, the Forest Service recommended establishing a 100,000-acre Siskiyou Wilderness and announced that the agency intended to develop the surrounding wild land. This decision was years in the making. Was it a carefully structured compromise that had the grudging acceptance of the timber industry, native Americans, local residents and conservationists? Unfortunately, no. In fact, the sketchiness of the Forest Service's analysis of the issue provided the basis for a successful lawsuit by the state of California, and the court decided to set aside the federal agency's recommendation.

The Siskiyou controversy is not unique. Many environmental disputes have become intractable legends. The adversaries fight on while government institutions grind slowly and develop few decisions that can be implemented.

Is there a better way to settle such disputes? In many instances, no. When principle is at stake and the prospect of compromise is as disheartening as losing altogether, nothing will substitute for maintaining a firm adversarial position.

But not all disagreement on environmental issues is absolute. Often the parties misapprehend each other's objectives; or they mistake the nature of the industrial or environmental theology; or they lack imagination; or they let animosity and bitterness stand between them and a solution they can accept. In those cases an evenhanded facilitator, or even the disputants themselves, negotiating directly, can produce a settlement. An advantage to this route is that people are more willing to abide by an agreement they have made than one mandated by a government agency or a court.

Negotiation is as old as controversy, and mediation has been used to resolve conflicts ranging from labor-management disputes to marital disagreements. Until recently, however, such techniques have not been used formally to resolve environmental disputes.

Negotiation and mediation traditionally have been used to settle disagreements between two parties—labor and management,

husband and wife, school administration and students. Such disagreements can be complex, acrimonious and unyielding, but usually they are not complicated by having to reconcile the passions of more than two antagonists.

In contrast, environmental disputes sometimes touch many interest groups, each with a different understanding of the problem. Sometimes it is difficult even to identify who should be seated at the bargaining table. A solution that reconciles the interests of a local government, several environmental groups, a corporation, the state government, the Army Corps of Engineers, the Chamber of Commerce, building and construction trade unions and the town crank seems beyond the wisdom of Solomon. Despite the difficulties, however, mediation and direct negotiation have been used increasingly and with some modest success during the past five years.

Several organizations have even developed environmental mediation as a service and profession. The Office of Environmental Mediation, now affiliated with the Institute of Environmental Studies at the University of Washington in Seattle, has been a pioneer in the field. Funded primarily by the Ford and Rockefeller foundations, the office was established in 1975. It has helped produce an agreement on flood control, land-use planning and recreational and conservation measures in the Snoqualmie-Snohomish River basin in Washington, as well as an agreement for the design of the I-90 freeway from the east side of Lake Washington to downtown Seattle.

Another organization is RESOLVE. John Busterud, formerly a member of the President's Council on Environmental Quality, established the nonprofit organization near Stanford University in the San Francisco Bay area. RESOLVE's board of directors includes prominent environmentalists, labor leaders, industrialists and other public figures; the organization is billed as a "Center for Environmental Conflict Resolution through fact-finding, conciliation and mediation techniques." So far RESOLVE's work has been primarily educational.

Other professional organizations include the American Arbitration Association in New York City, Environmental Mediation International in the District of Columbia, Jane McCarthy in New York City, ROMCOE in Boulder, Colorado, and the Environmental Mediation Project at the Wisconsin Center for Public Policy in Madison, Wisconsin.

The idea of mediation that these groups generally share has been summed up as a definition by Gerald W. Cormick, director

of the Office of Environmental Mediation in Seattle. He says environmental mediation is "a voluntary process in which those involved in a dispute jointly explore and reconcile their differences. The mediator has no authority to impose a settlement. His or her strength lies in the ability to assist the parties in resolving their own differences. The negotiated dispute is settled when the parties themselves reach what they consider to be a workable solution."

Mediation will produce a settlement, however, only if five conditions exist:

- Contenders have reached an impasse, and the interested parties who can influence the outcome are clearly identified and involved.
- None of the interested parties is confident of prevailing on his constituents' terms.
- Compromise is possible that will let all parties achieve part or all of their goals.
- The parties' constituents will support negotiators in reaching an agreement.
- There is a reasonable assurance that whatever agreement is reached will be implemented.

Two other ways to resolve a controversy voluntarily are to anticipate the conflict and to negotiate directly. In theory, anticipation is preferable because it stimulates people to analyze a problem before they have become rigid or have developed intense distrust of their opposition, or before social and economic disruption have occurred. But people usually do not respond to a complex problem unless their lives will soon be affected significantly, so anticipation of conflict as a means of settling environmental disputes may be more valuable to people who live in an ideal world than it is to the rest of us.

The most promising way to settle controversies may be direct negotiation by contending parties. It forces the interested parties to define what they want in terms of their adversary's goals as well as their own, and to separate what is important from what is not so important. In contrast, a structured mediation process can obscure rather than clarify crucial points. Generally, however, direct negotiation works best in situations that may also respond to mediation; it doesn't work well for complex problems of great interest to more than two or three groups.

The Sierra Club has resolved several issues satisfactorily through negotiation. Several years ago, Columbia Natural Gas Company proposed building a terminal on Chesapeake Bay to receive liquefied natural gas. The site was on land proposed as an expansion of an adjoining state park. The Sierra Club supported the park expansion. Late in the terminal's permit process, both parties discovered the conflict and negotiated an agreement whereby Columbia put most of the LNG facilities below ground, placed the

Turtle and duck 178

California sea otter 177

Barberries after ice storm 176

Moon and volcanic crag 175

Canada lynx 174

Bald eagle 173

Ajo mountains 172

Lightning over Grand Canyon 179

Leaves in a pool 180

SIERRA CLUB NOTECARDS

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Sea lions on beach 181

Tree frog in a rose 182

Storm clouds over Yosemite 183

Cobble mosaic in creek 184

Swans at Dobbs Ferry 185

Alaskan brown bear 186

North Canyon, Colorado River 187

storage area at the far corner of the site and donated the areas of greatest ecological interest to the park.

Discussions between environmentalists and timber interests in Washington state produced agreement on legislation for the Alpine Lakes wilderness area east of Seattle. Congress enacted this legislation, and an old controversy was resolved. Similar discussions between environmentalists and local community interests in the Gospel Hump region of Idaho resulted in a proposal to designate some areas as wilderness and to release some national forest land for resource production. This proposal was also enacted by Congress.

Sometimes negotiation and mediation work because the parties involved cannot find enough support without help from the other side. In 1976, while I was executive director of the Planning and Conservation League (PCL), a California conservation organization, the California legislature was considering a bill to control development on the coastline. Both PCL and the Sierra Club supported the bill, but several port authorities that managed ports in the coastal zone were opposed. We supporters were not sure the bill would pass unless some of the opposition were muted. Port authorities, however, were not sure they could defeat the bill. The two sides negotiated an agreement that provided for the development oversight that PCL and the Sierra Club wanted, but it also simplified the permit and planning process for the port authorities. The bill—with its negotiated terms—became law.

Sometimes, however, negotiation and mediation fail. Some time after the coastal settlement, the state Secretary for Resources retained me as a mediator in a dispute over timber production and wilderness designation on national forest land in northwestern California that included the Siskiyou Mountains. Participants were the timber industry, organized labor, environmentalists and the U.S. Forest Service. Unfortunately, the Forest Service dropped out early, and the mediation faded away when the timber industry and environmental groups proposed competing comprehensive plans that were unbridgeable. In my opinion, the mediation failed for the following reasons:

1) Both the timber industry and the environmental groups thought they might do better elsewhere, so circumstances didn't force them to bargain seriously.

2) The Forest Service data on timber and geology were not specific enough to allow a detailed analysis, which could have brought the adversaries closer together.

3) The Forest Service was ambivalent toward the mediation and preferred to devise a

solution itself rather than accept proposals from the interest groups.

Cooperation from concerned government agencies is important, since they will usually have to implement whatever settlement is reached. Negotiated agreements are usually substitutes for an agency's own decisions. Bureaucrats are sometimes hard-working and dedicated, sometimes lethargic and captive, but they are always jealous of their prerogatives. Generally they don't like to implement decisions made by others; some will even hinder implementation. Gaining the agency's early cooperation is a good idea.

Another factor to consider is the nature of the conflict. Negotiation and mediation are particularly well-suited to situations in which there is disagreement over fact.

Despite the techniques' limitations, environmentalists could profit by using mediation and negotiation more regularly, when the situation is right. Protracted disagreements are often a poor use of time, money and people, particularly when the issues are not of paramount importance. Stalemate and inaction build up pressure for quick and sometimes thoughtless decisions.

Some environmental disputes, therefore, can be solved more satisfactorily and more quickly by using negotiation and mediation than by conflict. But not all issues lend themselves well to the process; settling prematurely or avoiding conflict may well obscure important issues. If the substance of an issue is extremely diluted or is lost along the way, the peaceful resolution is of little value. Protracted, bitter and divisive controversy can result in the most complete and lasting accomplishments.

In addition, environmentalism is an important force for reform both in this country and abroad. It clearly challenges the ethic of consumption and materialism that has become the base of our society. Passions are strong on both sides of the issues; the basic confrontation of values cannot be papered over with such terms as "voluntary conflict resolution." Still, negotiation and mediation can help alleviate this tension; they can be forums for exchanging views and developing new levels of understanding.

If avenues of tentative cooperation are explored, if their limits are respected, and if expectations don't surpass possibilities, then mediation and negotiation can be the means of making well-grounded decisions—and perhaps of helping to develop a bit more understanding. □

Larry Moss, former associate conservation director for the Sierra Club and former executive director of the Planning and Conservation League, is now the California-Nevada representative for the Wilderness Society.

Sierra Club Financial Report

To Members of the Sierra Club

Fiscal 1980 ended with a surplus of $215,300 compared to a surplus of $397,000 in 1979. Fund balances (commonly called net worth) reached an historic high for the second successive year and now stand at $1,346,300, up 19% from 1979.

Revenues rose $1,193,000 to $9,724,400 in fiscal 1980. Contributions and grants were up $521,500, sales up $234,300 and advertising, interest and other income up $169,200. The number of members in the Sierra Club increased 2.3% to 181,773. Membership revenue was up $360,600 to $3,245,500.

Expenses rose $1,374,700, to a total of $9,509,100. Expenses in 1980 for studying and influencing public policy were up $453,700 and for information and education up $469,500. Chapter dues allocations were $616,100, an increase of 21% over 1979. Expenses for support services of $1,646,300 represented 17% of total expenses, the same percentage as in 1979.

Improvement in the fund balances reflects the determination of the Board of Directors and the staff to budget and attain a yearly surplus to increase the Club's net worth. It is that net worth that provides the collateral for loans that are necessary to prevent interruptions of Sierra Club programs during periods of seasonal income fluctuations. Inflation and the continued growth of Sierra Club programs indicate the necessity of that policy.

Pursuant to the provisions of sections 8321 and 8322 of the California Corporation Code, the following information is furnished as an annual report:

The Club's financial statements for the fiscal years ended September 30, 1980, and September 30, 1979, together with the report of Touche Ross & Co., independent accountants, are presented herein;

The membership list of the Sierra Club is on file at the Club's headquarters at 530 Bush Street, San Francisco, California 94108;

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

The books of account and minutes of meetings of the Board of Directors are available for inspection by members on written request at the Club's headquarters at 530 Bush Street, San Francisco, California 94108.

Denny Shaffer, Treasurer

Report of Independent Accountants

Board of Directors
Sierra Club
San Francisco, California

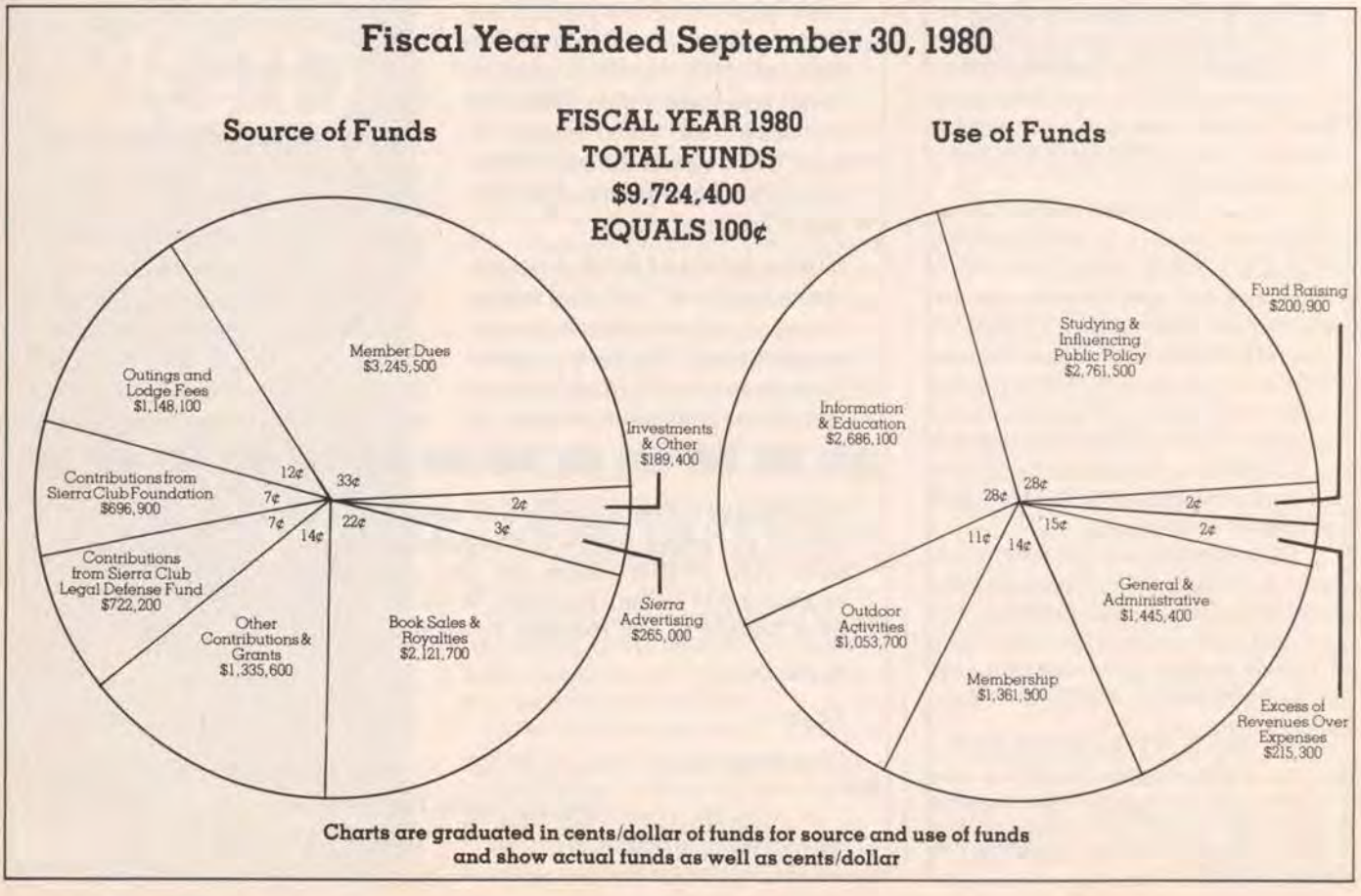
December 12, 1980

We have examined the balance sheet of the Sierra Club as of September 30, 1980, and the related statement of revenues, expenses and changes in fund balances, statement of changes in financial position and statement of functional expenses for the year then ended. Our examination was made in accordance with generally accepted auditing standards and, accordingly, included such tests of the accounting records and other auditing procedures as we considered necessary in the circumstances. The financial statements of the Sierra Club for the year ended September 30, 1979, were examined by other auditors whose report dated December 13, 1979, expressed an unqualified opinion on these statements.

In our opinion, the 1980 financial statements referred to above present fairly the financial position of the Sierra Club at September 30, 1980, and its revenues, expenses, changes in fund balances, changes in financial position and functional expenses for the year then ended, in conformity with generally accepted accounting principles applied on a basis consistent with that of the preceding year.

TOUCHE ROSS & COMPANY
Certified Public Accountants

Fiscal Year Ended September 30, 1980



Charts are graduated in cents/dollar of funds for source and use of funds and show actual funds as well as cents/dollar

Sierra Club
Balance Sheets

ASSETS

	September 30 1980	September 30 1979
CURRENT ASSETS:		
Cash	$ 8,200	$ 6,200
Investments (Notes B and D)	416,200	369,600
Trade accounts receivable, less allowances for returns of $75,000 in 1980 and 1979 (Note A)	825,400	738,300
Other receivables, less allowances for doubtful accounts of $10,000 in 1980 and $15,000 in 1979	209,000	145,800
Federal grants receivable	232,100	139,800
Inventories (Note A)	717,600	449,000
Advances, less allowances of $41,800 in 1980 and 1979 (Note A)	352,000	254,300
Prepaid expenses	247,300	186,600
TOTAL CURRENT ASSETS	3,007,800	2,289,600
Investments (Notes B and D)	444,100	415,200
Property and equipment, less accumulated depreciation and amortization (Notes A and C)	809,900	582,400
TOTAL ASSETS	$4,261,800	$3,287,200

LIABILITIES AND FUND BALANCES

	September 30 1980	September 30 1979
CURRENT LIABILITIES:		
Bank overdraft	$ 206,300	$ 328,700
Notes payable to bank (Note D)	500,000	255,000
Other notes payable (Note D)	100,000	101,000
Accounts payable	1,035,800	686,000
Obligations under capital leases (Note G)	44,300	55,300
Accrued expenses	325,100	301,000
Deferred revenue (Note A)	524,200	205,100
TOTAL CURRENT LIABILITIES	2,735,700	1,932,100
Obligations under capital leases (Note G)	179,800	224,100
Fund balances (Note I):		
Restricted	64,400	64,000
Unrestricted	1,281,900	1,067,000
	1,346,300	1,131,000
TOTAL LIABILITIES AND FUND BALANCES	$4,261,800	$3,287,200

See notes to financial statements.

Sierra Club
Statements of Changes in Financial Position
Years ended September 30, 1980 and 1979

	1980 Total	1979 Total
Financial resources were provided by:		
Excess of revenues over expenses	$215,300	$397,000
Add items not requiring working capital:		
Depreciation and amortization	115,000	81,700
Loss on disposal of equipment	4,400	—0—
TOTAL RESOURCES PROVIDED FROM OPERATIONS	334,700	478,700
Proceeds from sale of noncurrent investments		90,400
TOTAL RESOURCES PROVIDED	334,700	569,100
Financial resources were used for:		
Acquisition of property and equipment	347,000	65,600
Reduction of capital lease obligations	44,200	81,200
Purchase of noncurrent investments	28,900	—0—
Return of funds to donor	—0—	6,000
TOTAL RESOURCES USED	420,100	152,800
INCREASE (DECREASE) IN WORKING CAPITAL	$(85,400)	$416,300
Analysis of changes in working capital		
Increase (decrease) in current assets:		
Cash	$ 2,000	$(94,100)
Investments	46,600	145,400
Trade accounts receivable	87,100	274,200
Federal grants receivable	92,300	51,800
Other receivables	63,200	(145,700)
Inventories	268,600	154,200
Advances	97,700	9,100
Prepaid expenses	60,700	(1,300)
	718,200	393,600
Decrease (increase) in current liabilities:		
Bank overdraft	122,400	(328,700)
Notes payable to bank	(245,000)	345,000
Other notes payable	1,000	(1,000)
Accounts payable	(349,800)	19,800
Obligations under capital leases	11,000	(30,200)
Accrued expenses	(24,100)	(89,000)
Deferred revenue	(319,100)	106,800
	(803,600)	22,700
	$(85,400)	$416,300

See notes to financial statements.

Sierra Club
Statement of Functional Expenses
Year ended September 30, 1980 and 1979

	Program services					Support Services				
	Studying and Influencing Public Policy	Information and Education	Outdoor Activities	Membership	Total	General and Administrative	Fund Raising	Total	Total Expenses 1980	Total Expenses 1979
Salaries and employee benefits	$1,052,600	$ 484,600	$ 154,500	$ 222,200	$1,913,900	$ 726,600	$ 30,500	$ 757,100	$2,671,000	$2,298,600
Outside services	196,700	352,300	5,400	193,100	747,500	201,600	39,500	241,100	988,600	846,100
SCLDF legal services (Note H)	722,200				722,200				722,200	634,100
Lodge and outings field expenses			607,300		607,300				607,300	659,400
Copying and printing	98,100	21,800	7,200	105,700	232,800	(400)	9,800	9,400	242,200	159,100
Cost of sales, principally of publications	800	626,400			627,200				627,200	457,300
Bulletin production		258,600	20,100	11,300	290,000				290,000	270,400
Mailing and office supplies	134,200	249,800	80,900	225,900	690,800	82,800	72,500	155,300	846,100	749,400
Travel and meetings	216,400	80,200	40,800	4,100	341,500	106,600	3,100	109,700	451,200	306,600
Royalties		226,000			226,000				226,000	174,500
Rent and occupancy	91,500	72,500	31,000	17,200	212,200	101,700	2,800	104,500	316,700	278,900
Advertising and promotion	9,000	221,000	23,700	100	253,800	6,000	100	6,100	259,900	207,300
Chapter dues allocations				575,600	575,600		40,500	40,500	616,100	507,400
Telephone	164,100	27,600	13,500	5,600	210,800	34,900	1,500	36,400	247,200	159,600
Insurance		4,500	59,800		64,300	24,600		24,600	88,900	115,700
Interest		19,700			19,700	43,500		43,500	63,200	66,600
Other	75,900	41,100	9,500	700	127,200	117,500	600	118,100	245,300	243,400
	$2,761,500	$2,686,100	$1,053,700	$1,361,500	$7,862,800	$1,445,400	$200,900	$1,646,300	$9,509,100	$8,134,400

See notes to financial statements.

Sierra Club
Statements of Revenues, Expenses and Changes in Fund Balances
Years ended September 30, 1980 and 1979

	1980			1979
	Unrestricted	Restricted	Total	Total
Revenues:				
Member dues	$3,245,500		$3,245,500	$2,884,900
Contributions and grants	1,490,200	1,264,500	2,754,700	2,233,200
Outings and lodge reservations and fees	1,148,100		1,148,100	1,166,000
Sales, principally publications	1,453,500		1,453,500	1,219,200
Royalties on publications	668,200		668,200	742,900
Advertising, investment and other income	453,600	800	454,400	285,200
	8,459,100	1,265,300	9,724,400	8,531,400
Expenses:				
Program services:				
Studying and influencing public policy	1,818,200	943,300	2,761,500	2,307,800
Information and education	2,364,900	321,200	2,686,100	2,216,600
Outdoor activities	1,053,300	400	1,053,700	1,099,800
Membership	1,361,500		1,361,500	1,127,300
	6,597,900	1,264,900	7,862,800	6,751,500
Support services:				
General and administrative	1,445,400		1,445,400	1,245,400
Fund raising	200,900		200,900	137,500
	1,646,300		1,646,300	1,382,900
	8,244,200	1,264,900	9,509,100	8,134,400
Excess of revenues over expenses	214,900	400	215,300	397,000
Other changes in fund balances				(6,000)
Fund balances at beginning of year	1,067,000	64,000	1,131,000	740,000
Fund balances at end of year	$1,281,900	$ 64,400	$1,346,300	$1,131,000

See notes to financial statements.

Sierra Club

Notes to Financial Statements

Years ended September 30, 1980 and 1979

NOTE A—*Organization and Summary of Significant Accounting Policies*

Organization

The Sierra Club is a nonprofit voluntary membership organization established to restore the quality of the natural environment and to maintain the integrity of its ecosystems. The Club operates many public interest programs covering a broad range of environmental issues. The studying and influencing public policy program consists of staff and volunteers engaged in legislative and nonlegislative activities including lobbying, research, legal and policy development. Information and education includes the literary programs of Sierra Club Books and *Sierra*, the Club's bulletin. Outdoor activities include national and international outing programs consisting of over 250 trips annually. The membership program includes support and funding of 53 volunteer chapters and over 280 groups, and the development of a broad-based volunteer membership.

Basis of Accounting

The financial statements of the Club do not include the financial activities of the Club's various self-directed chapter and group organizations.

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

Summary of Significant Accounting Policies

The financial statements of the Club have been prepared on the accrual basis.

Estimated losses resulting from expected returns of publications are recorded at the time of their sale.

Inventories of publications are stated at the lower of cost or market. Unit costs for new books are based on paper, printing and binding charges only (manufacturing costs). Plant costs are amortized over unit sales for the first printing, or over the first twelve months of sales.

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

Property and equipment are stated at cost at date of acquisition or fair value at date of gift or bequest. Depreciation expense is provided on a straight-line basis over the estimated useful lives (5 to 30 years) of the related assets.

The Club defers outings and grant revenues so that they are recognized as income in the period the trip is completed or the grant requirements met.

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

All contributions are considered available for unrestricted use unless specifically restricted by the donor.

Certain reclassifications have been made in the 1979 balance sheet to conform to the classifications used in 1980.

NOTE B—*Investments*

Investments are stated at cost. It is the Club's intention to hold investments to maturity. No allowance for the decline of market value below cost is established unless there is a permanent impairment of value.

Cost and market values at September 30, 1980 and 1979, were:

	1980	
	Cost	Market Value
U.S. Government and Federal Agency bonds	$859,300	$829,700
Cash in savings account held for reinvestment	1,000	1,000
	860,300	830,700
Less current maturities	416,200	408,100
	$444,100	$422,600

	1979	
	Cost	Market Value
U.S. Government and Federal Agency bonds	$778,500	$760,800
Cash in savings account held for reinvestment	6,300	6,300
	784,800	767,100
Less current maturities	369,600	367,200
	$415,200	$399,900

Investment income amounted to $83,000 in 1980 and $59,300 in 1979.

NOTE C—*Property and Equipment*

	September 30	
	1980	1979
Land	$ 51,100	$ 51,100
Buildings and leasehold improvements	280,100	193,600
Furniture and equipment	407,800	155,500
Leased equipment	381,600	381,600
	1,120,600	781,800
Less accumulated depreciation and amortization	310,700	199,400
	$ 809,900	$582,400

NOTE D—*Notes Payable*

Notes payable to bank represent borrowings under a revolving line of credit of $750,000 and $650,000 respectively, at September 30, 1980 and 1979. Borrowings are at the bank's prime interest rate and are collateralized by investments (see Note B).

The other note payable is unsecured and bears an interest rate of 6.25% at September 30, 1980, and 6% at September 30, 1979.

NOTE E—*Income Tax Status*

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

NOTE F—*Pension Plan*

The Club has a noncontributory defined benefit pension plan covering substantially all full-time employees who meet minimum age and service criteria. Voluntary employee contributions are permitted. Pension expense, which is funded currently, was $32,500 in 1980 and $38,200 in 1979.

NOTE G—*Leases*

Substantially all leases are for office facilities and equipment. The San Francisco office lease contains two five-year renewal options and an option to purchase the office building and land at fair market value. The Club's leases for computer hardware, system software, and other equipment, contain options to purchase the leased assets at nominal amounts at the end of the lease. Accordingly, these leases are accounted for as capital leases.

Future minimum payments under all noncancellable leases with terms greater than one year at September 30, 1980, are as follows:

	Capital Leases	Operating Leases
1981	$ 70,800	$ 235,300
1982	55,700	228,500
1983	55,700	223,400
1984	55,700	210,900
1985	55,700	208,400
Thereafter	14,000	34,700
Total lease payments	$307,600	$1,141,200
Less amount representing interest	83,500	
Present value of lease payments	224,100	
Less current portion of obligations under capital leases	44,300	
Long-term obligations under capital leases	$179,800	

Rent expense recorded under operating leases was $241,100 in 1980 and $201,800 in 1979.

NOTE H—*Contributions from the Sierra Club Foundation and Sierra Club Legal Defense Fund*

Contributions from the Sierra Club Foundation representing direct grants to the Club in support of programs that are nonlegislative in nature totalled $696,900 in 1980 and $783,000 in 1979. In addition, in 1980 the Sierra Club Foundation granted the Club $149,400 of proceeds from the sale of the Flora and Azalea Lakes property to support its publication program.

Contributions from the Sierra Club Legal Defense Fund representing legal services performed on behalf of the Club totalled $722,200 in 1980, and $634,100 in 1979.

NOTE I—*Funds*

The following is a summary of fund balances:

	September 30	
	1980	1979
Restricted funds:		
Expendable	$ 14,900	$ 14,500
Nonexpendable	49,500	49,500
	64,400	64,000
Unrestricted funds:		
Designated by Club bylaws for permanent investment	696,500	645,000
Designated by Board for Clair Tappaan Lodge reserve	82,500	82,500
Invested in property and equipment	585,800	302,900
	1,364,800	1,030,400
Accumulated excess (deficit) from general operations	(82,900)	36,600
	1,281,900	1,067,000
	$1,346,300	$1,131,000

BICYCLE TOURING

RAYMOND BRIDGE

A BICYCLE IS the ideal vehicle from which to see the country. It allows you to travel fast enough to move from one place to another at a reasonable rate, but slow enough to permit you to enjoy the scenery along the way. It is quiet, so you can hear the songs of the birds and the wind in the trees. The touring cyclist isn't cut off from his or her surroundings by walls of glass, metal and noise. Other means of transportation are sometimes more efficient to get from one place to another or to negotiate rugged wilderness, but for *touring*—traveling along the back roads and seeing what a region is like—the bicycle is unsurpassed. The interstate highway system enables automobile passengers to travel from the Atlantic to the Pacific without seeing much except gas stations and motels. It is impossible to do that on a bike.

The bicycle is suited for a wide variety in styles of travel. You can go first class or steerage, eat beans or filet mignon, putter along at your leisure or ride at a pace that would challenge a trained athlete, stay in luxury hotels or make do with improvised campgrounds. You can carry huge quantities of gear and supplies (none of it superfluous), as those who tour primitive roads do, or take only your water bottle, repair kit and a mid-morning snack. Aside from costs, there are many logistical and aesthetic differences among the various approaches to cycling.

Day Trips

Going out for rides ranging from a few hours to a full day naturally is the most common sort of touring because it is fun, convenient, and the best training for longer trips. Even with a busy schedule, it nearly always is possible to get up early one morning each weekend to go out and ride. Expert riders who push hard can put in 50 or 100 miles this way and be home by ten in the morning with practically a full day ahead of them.

Some people prefer to cycle alone, at least on many of their day trips, but the great majority tour with a few friends or with a regular group of riders. Group touring enjoys great popularity because riding with others is a pleasant social activity and because it is easier. Much of the energy expended by a cyclist is used to overcome wind resistance, particularly in fast riding, and several riders sharing the effort of breaking the wind can move a lot faster than one person riding alone. If you do not have friends who ride, try to find a bike club in your community with some riders near your level of experience and interest. Local bike shops are a good place to ask about clubs. If you can't find a club, try putting up notices at the bike shops, describe the kinds of rides you like to take, and indicate that you'd like company.

The prescription for conditioning for the novice is simple—get out and ride. The more day trips you take, the more accustomed your body will become to riding and the more you will learn about the sport. As your physical condition and ability improve, your speed will pick up and you will gain in endurance.

One important rule to observe at the beginning is to start your trip back at a reasonable point. Clearly, if you ride down the nearest road until you are sore and tired, the return journey is likely to turn into an experience you will not soon want to repeat, particularly if a head wind comes up that you have to fight all the way home. Physical discomfort is likely to be more acute for the beginning cyclist than for the novice in almost any other sport because of the unaccustomed and unnatural pressure between the bicycle's seat and your own. Work up to longer distances gradually.

The variety of day trips is astonishing; there is something for every taste and every ability. Try a morning ride to a nearby town, starting early and arriving at a pleasant cafe in time for breakfast. Hedonists who haven't yet experienced the joys of early-morning riding can go for brunch instead. Spartan types can strive to emulate riders who take early morning trips to the mountains covering 75 miles, including thousands of feet of climbing, and then return home in time for breakfast.

The key to enjoying bicycle touring from the beginning is to find your own mood, pace and pleasure. Don't let someone else convince you of what you should like. If you start out with a group that is far more experienced or stronger than you are, you are likely to learn to hate cycling, unless you are quite athletically inclined. The difference between highly conditioned riders and neophytes is incredible. Start at your own level and have a good time, even if your long-term goal is to ride much more extensively. Couples should be wary of riding together all the time if they have widely disparate abilities. It is a good idea to ride with people at your own

Reprinted from Bike Touring: The Sierra Club Guide to Outings on Wheels *by Raymond Bridge, ©1979 by Raymond Bridge; $6.95 ($5.55 for members) from Sierra Club Books.*

Bruce Burgess/Bicycle Touring Group of America

level of competence at least some of the time, so that you feel neither held back nor pushed too much by your companions. One positive aspect of riding with a larger group is that it can split into smaller groups of roughly equal ability, with the better riders moving faster on a longer circuit, perhaps with the groups getting together at a predetermined spot along the way.

Longer Tours

Any tour lasting several days or longer is bound to entail logistical problems that don't exist on day trips. You have to have a place to sleep and a way to secure your bike while doing so, and you need to plan both the overall tour and the distance you intend to cover each day. The day tourist simply rides in one direction for a time and then turns around and comes back. On a long trip, you should consider the consequences of mechanical breakdown or bad weather more carefully. Getting soaking wet in an afternoon rainstorm may be of no real importance when you are out on a ride near home and can simply take a hot shower, change and put a pan of soup on the stove. If you are camping outdoors, however, it may be a lot harder to warm up and dry your clothes.

There are several basic approaches to making longer tours, each with many variations. The most important distinction is the way you plan to spend your nights. You can stay in conventional public accommodations—hotels and motels if you're traveling in the United States. This style of touring requires the least extra equipment, so you can travel very lightly burdened. The investment required is fairly low unless you buy special clothing to meet the sometimes contradictory requirements of bicycling and dining in hotel restaurants. The daily cost of this type of touring can be quite high, however, so it generally is the most expensive style of long-distance cycling.

The bicycle tourist who relies on public accommodations also is dependent on their location, schedules and routines. There may not be any motels along the road you want to ride. Automobile drivers, to whom such establishments cater, tend to stay up late and sleep late; so, if you are trying to get to bed early and start riding early in the day, you may find that noise levels make early sleep impossible and that the restaurant doesn't start to serve breakfast nor the desk open until two hours after you want to leave. You may need to make advance reservations that lock you into a particular schedule. Finally, depending on your own tastes and ingenuity,

Bruce Burgess/Bicycle Touring Group of America

*Common bicycle accessories that make touring more comfortable are, clockwise from top left: **A**—mudguard; **B**—rack; **C**—air pump; **D**—water-bottles with cages for attachment; **E**—lugs (socket-like pieces that join structural tubes; this structural element provides resiliency); **F**—bell; **G**—padded handlebars; **H**—light; **I**—fuel bottle cage (for camp stove fuel); **J**—toe clips; **K**—rear light (on far side of wheel).*

Checklist for Bicycle Tours

Asterisks indicate items most likely to be carried by the lightweight tourist. *Take only what you need.*

Special items
*panniers and other packs
*stuff sacks or plastic bags
*water bottles
*map(s)
compass
guidebook
map measurer
*first-aid kit
*money
*travelers' checks
credit cards
locking device
*leg light or Belt Beacon
spare bulb and batteries
*passport or other identification
*watch

To Wear While Riding
*helmet
*sunglasses
*rearview mirror
*cycling jersey or other shirt
*cycling gloves
*cycling shorts
*socks
*cycling shoes with cleats
underwear

Clothing for Changing Weather
*arm warmers
*leg warmers
cycling tights or warm-up pants
long-sleeved jersey
*sweater, vest or pile jacket
windbreaker (if rain suit does not double)
*wool hat
sun hat
warm mittens
*rain suit
*booties for rain or cold

Clothing to Wear Off the Bike
*shoes for walking
*long pants
skirt
sport jacket
dressy shirt or blouse
down jacket
*underwear
*bathing suit

Spare Clothing
*cycling shorts
*jersey or tee-shirt
*underwear
*socks

Miscellaneous Personal Gear
glasses or contact lenses and spares
*pocketknife (with can opener, corkscrew, awl, bottle opener and screwdrivers)
*toilet paper
*sunscreen
*handcleaner
*all-purpose, biodegradable liquid soap
*small towel
bandana
*toothbrush
*tooth powder
*dental floss
*comb or brush
*nail clippers
razor
mirror
feminine napkins or tampons
other toilet and grooming items
*petroleum jelly
*book

Camping Gear
*tent or other shelter
ground cloth or bivouac sack
*sleeping bag
*pad or air mattress
*stove
*fuel
*pots
frying pan
*utensils
*cup
*bowl
*headlamp or flashlight
spare batteries
*spare bulb
butane lighter or matches in waterproof case
*water carrier, one-gallon collapsible
water purification tablets or solution
*pot scrubber in film can
*insect repellent
*condiments and beverage mixes
extra food

Repair Items and Spares
*repair kit
*pump
*tape
*parachute cord
spare tire(s)
spare tube
*sewing kit
pedal strap
*spokes

Hobby Items
camera, film, film mailers, photographic gear
binoculars
nature or culture guides
fishing gear
writing materials

you may find yourself taking enough dress clothing to make up for the weight you hoped to save by not camping.

At the other extreme is the bicycle camper, who carries all the necessities on the bike except for food and water, which can be picked up at stores along the way. Bicycle camping typically requires the highest initial investment, since camping supplies and appropriate packs for carrying them have to be purchased or made; however, daily expenses are minimal or nonexistent, so that over the long run this is the cheapest sort of touring. The camper has to carry more weight on the bike than any other tourist, but he or she is the most free from external constraints. Except in cities and a few areas with severe restrictions, like Hawaii, it is nearly always possible to find a place to camp, so reservations do not have to be made and daily schedules can be revised at will. The camper also is free to spend an occasional night at a motel or hotel during a spell of nasty weather or because the mood strikes, while the cyclist without any camping equipment along cannot suddenly decide to camp for a couple of nights.

In between the extremes of conventional lodging and camping is the possibility of staying at the inexpensive accommodations operated by American Youth Hostels or one of its worldwide affiliates. Hostels originated in Europe to provide places to stay for self-propelled travelers. They usually were dormitory-style accommodations, often in people's homes or barns, with lots of camaraderie and a minimum of frills. Guests were expected to do their share of the chores and to bring their own sheet-type sleeping bags to go between the mattresses and blankets provided. The lodging was very inexpensive, meals often were available, and no one

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Cycling quietly near Mt. McKinley before Alaska Route 3 was paved, this tourist headed toward the southern slopes of the Alaska Range a little while after passing a sign saying there would be no gas for a hundred miles.

was allowed to use the hostels who did not arrive under his or her own power. Things have changed in some hostels, but these conditions generally still apply. Except in a couple of European countries, there are no age limits for staying in hostels.

Hostelers need to carry only an uninsulated sleeping bag made from old sheets or nylon fabric, along with personal clothing and toilet items, so they travel with virtually the same weight as those using public accommodations but stay more cheaply. Planning details may be much more cumbersome and the itinerary more limited, however. There are a lot fewer hostels than hotels, especially in the United States. Space at a hostel often has to be reserved well in advance and the hours are limited, so that you may arrive in a city with plans to leave your bike and equipment in the hostel only to find it closed until five in the evening. Hours and locations change, too, and it is not always possible to keep track of the changes.

Obviously, it is quite possible to stay at hostels part of the time to add a little convenience to a camping trip or to reduce the overall expenses of a tour that relies mainly on hotels and motels. You can work out many other variations in lodging to meet your needs.

Large groups of bicycle tourists, whether camping or using public accommodations, sometimes arrange to have a car, known as the "sag-wagon," follow the group at a distance. The sag-wagon carries the group's luggage, provides assistance in case of mechanical breakdowns, and aids riders having physical problems. The sag-wagon may be driven by a non-rider willing to follow at the slow pace set by the bicyclists, or the task of driving may be shared by members of the group. With a large number of riders, each person needs to spend only a short time driving. The sag-wagon enables the cyclists to ride at a faster pace by reducing the weight carried and to enjoy the pleasantly responsive feel of their bikes that comes with light loads. Riding is more pleasant this way, although many cyclists find the technique less aesthetically pleasing and more complicated logistically.

The Importance of Weight

The real key to freedom on the open road is light weight—both in your bike and in the gear you carry. You can have a good time pedaling around on a heavy three-speed or even on an old balloon-tire monster, but you won't be able to go nearly as far. Your range is more limited and so is the length of time that you can comfortably pedal. Those wide mattress seats that look so comfortable don't feel that way after ten or twenty miles. The reduction of weight, therefore, is probably

Hemistour Photo

Luggage and How to Carry It

WEARING A BACKPACK is a terrible way to carry touring gear on a bicycle. The center of gravity of the bike, rider and load is dangerously high. A better way is to fasten luggage to the bike.

The lower the load is attached to the bicycle, the more stable you and the bike are going to be. Skids are less likely with a low center of gravity, and braking is far more reliable. Braking a bicycle that is loaded high causes the weight to try to pivot over the front wheel, so that the rear wheel loses traction and skids out as soon as it is even slightly out of line. Stability on curves and other handling characteristics are similarly affected. It also takes more work to pedal a bike that is loaded high since slight shifts in angle require greater corrective action with either the steering or upper body lean, necessitating a constant series of small extra efforts. For these reasons, the bulk of the load carried on a bike normally is packed in panniers attached on either side of the rear wheel. This results in a much lower center of gravity than if most of the load is carried in a bag attached to the back of the saddle or tied onto the top of a carrier.

Naturally, any luggage on a bike should be balanced fairly carefully so that the weight is distributed evenly on both sides of the machine; otherwise the rider must lean to one particular side all day long to redress the balance. What is less obvious is that the load also should be balanced fore and aft. As a rule, it is a good idea to have about two thirds of the load on the rear wheel and about one third on the front. Thus, if your panniers and gear weigh 30 pounds, the ideal arrangement is to have 20 pounds on the back of the bike and 10 in front.

The standard luggage arrangement used by experienced tourists is to mount a set of panniers on the rear carrier and a handlebar bag to carry things that may be needed during the day, including snack food, camera, raingear and the like. This is a practical system, though the racks available for handlebar bags leave something to be desired. It is not a good idea to carry too much weight in a handlebar bag, since it is mounted high and is positioned in front of the axis on which the wheel is turned when you steer the bike, making the cycle less responsive.

Front panniers, which are smaller than most rear panniers, make a good alternative to the handlebar bag. A combination of front and rear panniers provides plenty of space for everything needed on most tours, distributes the weight easily on each side and between the front and rear wheels, and makes the bike handle well. With good carriers, the arrangement is very rigid and stable. Carrying excessive loads in front panniers makes steering sluggish, but you can load far more in front panniers and retain quick steering than you can with a handlebar bag. The reason is that the panniers are placed closer to the axis of the headset so that they exert less rotational leverage and therefore resist steering changes less. A larger capacity than that provided by two sets of panniers rarely is needed, but for very large loads a handlebar bag can be used as well, concentrating the lightweight equipment in the front panniers and bag and placing heavier items in the rear panniers.

The major advantages of the front and rear pannier system are larger capacity, better load distribution and increased stability. The rear pannier and handlebar bag system offers easier access to one bag while riding, so it is simpler to get at your camera, snack food, sunglasses and raingear. □

the most important art in long-distance bicycle touring. If you are a casual cyclist, it means that the weight of the bike will be low enough to permit enjoyable riding for moderate distances. If you are a serious rider, it will enable you to cover many miles each day for as long and as far as you want to tour.

Oddly, quite a few experienced cyclists who realize the importance of a lightweight bicycle don't apply the same logic to the gear they take with them while touring. It is common to see someone spend $100 to shave a few ounces off a bike and then carry along a ten-pound sleeping bag designed for car camping. Your equipment and touring style always should be thought out to keep weight to a minimum. Riding will be far more enjoyable and you will see much more if you plan your gear carefully, whether you are visiting museums in Italy or camping in national parks.

Even without sag-wagons, it is quite possible to make extended tours with your bike and still avoid heavy loads. By choosing your equipment carefully, you can reduce your luggage to 25 pounds or less, even on a camping trip. A good touring bike with traveling and camping gear thus can be set up to weigh between 40 and 60 pounds. On a tour where you are staying at houses, hotels, or hostels, the load can be reduced still further. With this sort of weight you can travel quickly and with reasonable effort, touring the continent or the world. Your bike will be lively and responsive, and you won't feel as though you are pedaling a Mack truck.

Lightweight equipment does not have to be less comfortable or less effective, just as a lightweight bicycle is rarely inferior in performance to a heavier one. The cyclist simply has to put a premium on efficiency, whether in sleeping bags or dress clothes.

The reward for this attention to equipment and weight is comfortable, relaxed cycling and the freedom of the roads that goes with it. You can take off on your bike and ride for a week or a month without polluting the air or draining your pocketbook too quickly. The bicycle can become an incomparable instrument of freedom for the footloose traveler. With it you can cross North America or tour Europe, climb over mountain passes or meander through New England woods, ride highways or explore back roads. You can pack your trusty bike in a carton, take a bus or a plane to the start of your ride, and be an hour into your tour while your fellow passengers are still getting to their cars. □

Raymond Bridge is a seasoned cycle tourist from Boulder, Colorado. He has written ten books on outdoor sports, camping and travel.

Environmental Games

LINDA BOSSON

Solutions on page 75.

H	T	H	T	L	B	I	S	H	T	B	S	B	W	O	N	T
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1 FIND THE QUOTE

Each letter in the top half of the diagram should be placed somewhere in the same column in the bottom half of the diagram. When you have arranged them correctly, you will be able to read a quotation. The black squares stand for spaces between words.

2 PYRAMID

When you have guessed the answer to one definition, add a letter, rearrange, and you will have the answer to the next definition.

1. Me —
2. Not out — —
3. Black cuckoo — — —
4. Human claw — — — —
5. Flat terrain — — — — —
6. Related to mountains — — — — — —
7. Bird with large bill — — — — — — —
8. Loosely branched flower clusters — — — — — — — —

3 HONEYCOMB

The answer to each definition is a six-letter word. Write the first word in the six spaces around the figure 1, in a clockwise direction. (The word may start in any one of the six spaces.) Then write the second word around the figure 2, the third word around the figure 3, and so on. The words overlap each other, so the more you guess correctly, the easier it will be to solve the ones that are left.

1. Young eagle
2. Game fish
3. Bees help disperse it
4. Refuse that detracts from scenery
5. _____ Club
6. Famous TV dog
7. Remove impurities from water
8. Brook
9. Volcanic national park in California

4 HIDDEN TREES

Can you find the names of 16 trees hidden here? To spell out a word, keep moving in any direction. You may go in several different directions for each word, but no letter is used more than once in any word.

L	I	B	L	D
A	R	E	E	P
M	D	C	A	P
A	H	L	N	I
S	P	E	M	O

Linda Bosson is a freelance writer and puzzle constructor from New York.

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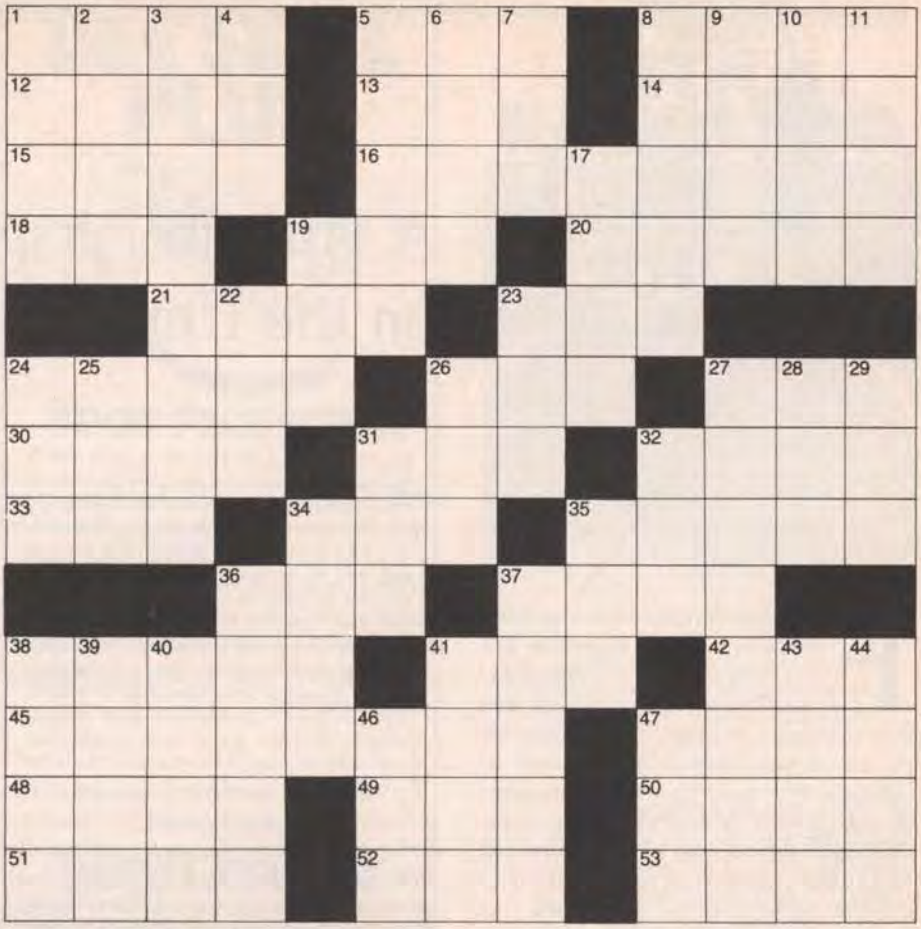


5 CROSSWORD

ACROSS

1. Climber's equipment
5. *Call of ___ Wild*
8. Summit
12. Rowing implements
13. Male sheep
14. Singer ___ Fitzgerald
15. Alternate spelling of "ski"
16. Violent change in volcano
18. Letter S
19. Buzzing insect
20. Fertile spots in desert
21. Young hawk
23. Pass in mountain range
24. Heron
26. Fuel that sometimes pollutes oceans
27. Strike lightly
30. Molten rock from volcano
31. Not happy
32. Marsh bird
33. Madame (abbr.)
34. Hard-shelled fruit
35. Tree with papery bark
36. Animal's lair
37. Camper's shelter
38. Insect that sucks plant juices
41. Seed container
42. Over (poetic)
45. Enormous hill
47. Rise and fall of ocean
48. Large floating mass of ice
49. Social insect
50. Continent
51. Film director ___ Preminger
52. August zodiac sign
53. Tall grass

DOWN

1. New York's state flower
2. Acorn producers
3. Area for protection of natural resources
4. East-southeast (abbr.)
5. Large woody plants
6. Long-eared animal
7. Australian bird
8. Part of flower
9. Mr. Wallach and his namesakes
10. African lily
11. Sunflower State (abbr.)
17. Small body of water
19. Nocturnal mammal
22. Yes
23. El ___ (11th century Spanish hero)
24. Shady tree
25. School of whales
26. Cereal grass
27. Reptile with a shell
28. Curved line
29. Contemptuous exclamation
31. Source of solar energy
32. Misdeed
34. Where birds are hatched
35. Oysters' domicile
36. Australian wild dog
37. National forest in Arizona
38. Type of pulpit
39. Writer of verse
40. Injure
41. Cone-bearing tree
43. Singer-comedienne ___ Adams
44. Peruse a book
46. East Indian shrub
47. River in North Carolina

A Human Perspective on the Universe

FRANCES GENDLIN

Entropy: A New World View, by Jeremy Rifkin with Ted Howard. Viking, New York. 1980, $10.95.

ENVIRONMENTALISTS have long been trying to persuade the public that our nonrenewable natural resources are running out and that something must be done to slow down this process. Society itself has been slow to agree, partly because of a prevailing assumption that there is plenty of everything on this planet, and there always will be. It turns out that both views are true, and that the concern of conservationists is justified. As Jeremy Rifkin explains clearly in his latest book, although there will always be the same amount of matter in the universe, we may not be able to use it. Nature will always have its same allotment, but people will not.

In this interesting yet often disturbingly simplistic discussion of the Second Law of Thermodynamics and its effect on world history, Rifkin explains that the world really is running down, and that people are helping it happen too quickly. "To say that the world is running out of time," says Rifkin, "is to say that the world is running out of usable energy."

The First Law of Thermodynamics should be familiar to all: The amount of energy in the universe is assumed to be fixed since the beginning of time and to remain so until the end. Energy can be neither created nor destroyed; it can only be changed from one form to another. It is this transformation that concerns the Second Law, called Entropy.

The Second Law states that any transformation of energy "exacts a certain penalty," changing forms and sources of energy from concentrated to diffuse, from order to disorder. (Concentrated energy is more useable than diffuse energy.) Entropy means that things tend to run down, wear out, become exhausted. Entropy means that energy, once used, cannot be used again in the same form. When a piece of coal is burned, the heat while spreading out into space is useable for a time, but it cannot be turned back into coal. A piece of wood can be burned only once, and the heat, smoke and by-products will never be wood again. In human terms, then, entropy is a measure of the amount of energy no longer capable of conversion into work. In effect, entropy is a measure of waste.

In this easily readable—but sometimes seriously flawed—philosophical treatise, Rifkin explains how entropy has increased in direct proportion to what modern societies have called progress. Somehow we assume that the more we manufacture, the more we have, and thus the more energy used, the higher the level of civilization. Recently, however, a growing number of scholars from different fields disagree. Amory Lovins and the late E. F. Schumacher of the "small is beautiful" school stress the need for appropriate-sized technology, for smaller-scale living and for primary reliance on renewable resources. Economist Nicholas Georgescu-Roegen, applying the law of entropy to economics, concludes that increased economic activity does not create more order in the environment, but instead greater natural disorder. "Because of the general growth mania," he writes, "and the economists' unchallenged faith in the price mechanism, some people now crave such utterly absurd gadgetry as the golf cart, while numberless others go through a very short life of sufferings beyond imagination." Rifkin and his coauthor Ted Howard here discuss the world's history and future, saying that the law of entropy "destroys the notion of history as progress." In fact, "our existing world view bears absolutely no relationship to the way the world actually works."

Rifkin explains through an historical narration how we have come to live in a world where ever-increasing use of finite resources is taken as a strategy intended to promote long-term survival. It is an interesting exercise, and Rifkin's analysis of history leads us in the right direction, although many of his particulars seem shallow. An historian would certainly question Rifkin's broad-sweep interpretations, but for environmentalists, the general perspective of how we have come to this high-entropic pass should prove thought-provoking.

The early Greeks of what Hesiod termed the "Golden Age" regarded the world created by the Deity as perfect; the Golden Age came to an end, myth said, when Pandora opened the box containing the evils of life. Later, such Greek philosophers as Plato and Aristotle perceived history as moving not toward perfection, but away from it. It was a process that moved from order to chaos, from perfection to decay. "If history represented the continued chipping away of the original fixed bounty," says Rifkin, "then the ideal state was the one that slowed down the process of decay as much as possible. The Greeks associated greater change and growth with greater decay and chaos. The goal, then, was to hand down to the next generation a world as much preserved from 'change' as possible."

Through the Middle Ages, Christian theology retained the notion of history as a process of decay, a struggle against the forces of evil that sowed chaos and disintegration in the earthly world. The concept of original sin and the fall from grace signified moving away from the perfect state, and this flow could not be changed. God controlled all events, and the purpose of human life was not individual excellence or the attainment of things in this life, it was to work for salvation in the next. Rifkin seems to equate the theology of sin and redemption with the philosophy of conservation of resources; others may find this difficult. Yet it is true that people of many ages, until the seventeenth century, looked back into history to find better times—"the glory that was Greece, the grandeur that was Rome."

These views began visibly to change in the seventeenth century, with the advent of such thinkers as Bacon, Descartes and Newton,

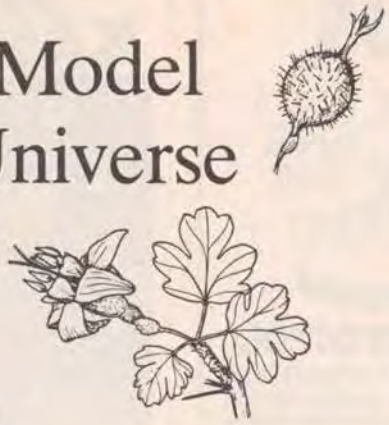
who presented a more mechanistic view of the world, one that persists today. Descartes, especially, applied mathematic principles to the understanding of the world. For Descartes, the world and its processes could be quantified through mathematics and thus understood precisely. This view overrode the Greek and Christian philosophies that saw world history as perfection eroded by chaos. Descartes wrote that the science of mathematics was a more powerful instrument for knowledge than any other "bequeathed to us by human agency." Newton, following Descartes, devised tools for quantifying the world by deducing natural order; his rules dealt with bodies in motion, since that was what could be measured.

Assuming an order to the world, though, the question arose as to why people's activities seemed so chaotic. Rifkin claims the answer was simple, although one wonders whether it is Newton or Rifkin being simplistic, for if there is a natural law, then people, chaotic or not, must be adhering to it. This caveat aside, Rifkin says, "If society was misbehaving then it could only be due to the fact that it was not adhering to the natural laws that govern the universe. . . . Humanity now had a new purpose in life. Gone was the medieval goal of seeking salvation in this world. History was now seen as a progressive journey from the rather disordered and confused state that society found itself in to the well-ordered and wholly predictable state represented by the Newtonian world machine."

Adam Smith extended this philosophy into what remains current economic theory, arguing that if natural laws are obeyed, economic growth will result. Government regulations and controls violate immutable, natural economic laws and stifle growth and productivity. *Laissez-faire*—the concept of allowing people to deal unhindered in the marketplace—removes morality as a consideration in trade, claiming that giving free rein to people's desire to satisfy themselves will, in fact, benefit everyone. Although this has obviously not been the result, the view is still held by many economists who hold to the theory that more is better, and who assume that working toward world perfection through self-interest will benefit everyone.

The current inflationary spiral, however, doesn't allow for the natural law of entropy. Our heavy dependence on nonrenewable resources means that as more energy is demanded, extraction costs more and more. Pollution, too, and other wastes that take

A New Model of the Universe



JOHN RIDLAND

This plan is called the Sierra Gooseberry Model,
Ribes roezlii, spiny and bristly
on berry, ovary, and along the stems,
the berries red to purple, 14 to 16
millimeters in diameter, the fruit
sour but delicious once boiled into jelly,
with a rare wildness fit for venison
or duck, something like cranberry but fiercer;
growing on open slopes in the Sierra,
at higher altitudes clumps sometimes yield
thick fruit crops which attract "squirrels, birds, and people."

The model of the universe begins
along the second level of the process
after the berries have been stripped with leather
gloves and forked sticks from their spiked stems and carried
in buckets to your cabin. There they're rinsed
in yellow plastic dishpans. Their specific
gravity's scarcely more than that of water;
like people, some float free. You swirl the mixture
with a slotted spoon to spin the leaves and stems
up in a whirlpool, where you skim them off,
then stand there stirring water and the red
spiked bristly berries: lift your hand, the swirl
continues, berries orbiting the central
whorl where you pulled your spoon out.

It slows down?
Sure it slows down, so does the universe,
but while it spins it's bright, ripe, shades of red,
in whirling motion, occasionally colliding
(the model falters here: those gooseberries
bump and adhere, like twin stars, thin spikes meshed),
each racing to its corner, in the current
streaming together like the Milky Way
around the North Star, each one purposeful
and proud—we're spiky!—until the general pride
subsides, the spikes droop. And the yellow plastic
like deep space photographed by telescope
brightens the background to the blood-red spheres
during their motion through the space-clear water.

There's no smell yet, not until you add heat
under the water, in a metal pot now,
like the metal pot the Chippewa magicians
nurtured Odjibwa from in their old story
"The Red Swan"—*how* red was that swan? She's red
as blood or sunset or wild gooseberries—
cranberries, rather, in those northern bogs.
Heated, the smell steams through your cabin's roasted-
cashew core of golden varnished fir
and clear pine, a moist haze of rawness bracing
the wooden edges of your civilization.
There in the pot what you are getting's rich,
substantial—all pure substance—and opaque,
muddy as blood and dark as healthy blood,
and sour—nothing like that sweet clarity
it's coming to. What makes it clear is sweetness,
your consort comments, sweetly and clearly, later,
'The boiled juice isn't clear until you add
the sugar.' But the smell's not sweet but savage.
The berries yield their color with their odor,
going pale and mushy as boiled rhubarb stalks;
and then they're squashed with a potato masher
and squeezed to pulp.

What happens to your model
universe if that's the model of it?
Dead stars, dead planets, all the light squeezed out?
All uniformly lifeless, tasteless, flat.

• • •

Now here's your jelly: hold the jar aloft,
the depth of color, like a blood-dark wine
or wine-dark depth of ocean more than blood,
repeats, deep, deep.
Spoon out a teaspoonful
and see it quiver with your grip—the slight
wavering of a sheer-wall in an earthquake—
but look! it holds, it makes clear solidness
out of the dumb liquidity of nature;
something has happened: you have had a plan
and it worked out.
Now taste it. Underneath
the sweetness fallibility demands
of concentration, get the market-free
rasp of the murky, unsweetened wilderness.
Then you remember those sharp spiky spines
along the stems, the dusty sandslope noon,
the bobbing stream, the slotted, sliding spoon.
If you were God you'd dream a better name up
than *Ribes roezlii* for this paradigm
that's given You a model for Your system,
plus one ripe berry of the lot you swirled
to make up words for what You'd call a world.

John Ridland teaches English at the University of California in Santa Barbara. One of his recent volumes of poetry is In the Shadowless Light.

energy and money to clean up are not merely side effects of a manufacturing process, they are a visible measure of energy that is no longer available for use. Depletion of energy resources, increased costs to extract finite resources and the resulting pollution are not accounted for in our market as it currently operates. Further, the overreliance of our economic system on improving technology toward continued growth doesn't take into account that technology is not an answer, but only a transformer of energy from available to unavailable. No matter what the product—how necessary, how useful—energy is used up in its manufacture, energy not to be recaptured.

The current world-view also does not take into account that population growth speeds the processes of entropy. Since the amount of easily useable energy is always decreasing, it is thus becoming ever harder for a growing human population to ensure its own survival. It takes energy to manufacture energy; the more energy demanded, the more is used up to produce it. To retard the move toward chaos, toward the time when all energy is totally diffuse, the use of concentrated energy must be radically slowed.

But how? Rifkin's discussion of solutions is no more realistic than his early historical analyses, but again he is going in essentially the right direction. He first casually dismisses some of the interim goals of conservationists who—while working within the existing social systems—are well aware that solutions will require a mixture of a great many different and segmented approaches.

Of the recycling of minerals, Rifkin argues that recycling efficiency today averages only 30% for most metals. He says that it "requires the expenditure of additional energy in the collection, transporting and processing of used materials at the expense of increasing the overall entropy of the environment." Recycling, he claims, will buy only a small, "almost irrelevant period of extra time." This may be true, yet it is also true that conservationists are willing to accept all avenues that will buy some of this extra time. Even a little time will extend our options.

His discussions of energy conservation take the same tack. "It is undeniably of value," he says, but is only a partial solution. Any current conservation proposals will be extremely limited in scope because they will have to be implemented within the existing high-energy infrastructure. Although he criticizes the current dependence on nonrenewable resources, Rifkin nonetheless

also says that renewables are not the answer. Such reliance, if still in the existing system, can do no more than slow down the process of entropy. This is reminiscent of the recent presidential campaign, when Ronald Reagan said that conservation is good so far as it goes, but it only slows down an inexorable process. This slowing down, of course, is the precise desire of conservationists.

Then what does Rifkin want? The clue is found in his discussion of the "high-energy infrastructure." This is what must radically change. Here Rifkin joins a growing group of futurists, such as Hazel Henderson, who find our present system unmanageable, and who talk of our society as "trial by entropy." Henderson calls for the dissolution of giant "dinosaur" corporations and anticipates the "spontaneous devolution of unsustainable institutions."

For Rifkin, it's time for a solar revolution. His first conclusion is that the forced end of our dependence on nonrenewable resources will presage the end of the Industrial Age; the Solar Age, depending on diffuse rather than concentrated stock, will make our current industrial structure inoperable. First will necessarily come a redistribution of wealth, denying to the top 20% of our nation's society much of its current 40% of society's total income. Sierra Club members will be astounded to note that "ecologists" (Rifkin uses the wrong word here) are lumped in with that wealthy 20%. "The chic upper-class ecologists, with their hot-tubs, their quarter-million-dollar homes, their designer clothes and their Mercedes Benzes, had best realize that their calls for clean air must be accompanied by meaningful actions that will lead to a redistribution of their own unwarranted economic abundance." In this patently absurd statement, Rifkin seems to think that because environmentalists used to be called elitists, they must also be the elite.

One would hope that with his easy rejection of conventional conservationist wisdom, Rifkin would have a more specific, dramatic solution and program for achievement of the ideal state. But he doesn't. His familiar discussions of decentralized organic farming, hard work and sacrifice, living with necessities but not luxuries, fulfillment through vocation, and love—these are ideas put forward by many current well-meaning and intelligent writers, who talk of solutions but rarely of process. An ideal state is easy to imagine but hard to achieve.

Wouldn't it be nice not to read any more books that talk about obvious solutions, but instead to find suggestions that are real,

suggestions that take into account—instead of dismissing as not viable—the death-grip of the megacorporations, or narcissism, or society locked into the vile systems it has created?

And if there are no such realistic guidelines and practical steps, and if we are condemned to fail, perhaps what Rifkin says is right after all—the small steps we try to take for earth and humanity may be too few and too late. What then?

This question is the reason Rifkin's book, despite the author's vagaries and mistakes, should be understood. Despite his mistakes, Rifkin is right in what he concludes, and he understands how we have come to this destructive, high-entropic pass. Our further formulations of how to proceed into the future should be more thoughtful for his work. □

A Look into a Smaller Future

WALT ANDERSON

Human Scale, by Kirkpatrick Sale. Coward, McCann & Geohegan, New York, 1980. Cloth, $15.95.

THIS IS AN important book for several reasons. One is its position that a thinking environmentalist in the 1980s must go beyond the specific issues first identified with the movement and begin to deal with larger issues of politics and the world's future. The energy crisis and its literature have been taking us in that direction: Amory Lovins' hard and soft paths, for example, are not only antithetical energy strategies but also fundamentally different images of progress. As categories of political thought, they are more useful and timely in many ways than the more traditional right and left.

One big difference between the hard and the soft paths in Lovins' writings is not the fuel source: it is the mode of organization that the technology calls into being—one a large centralized organization, the other a decentralized system of smaller units. *Human Scale* picks up this idea and applies it across a wide range of policy matters, from health to industrial productivity.

The book's front cover announces that it

"examines a nation in the grips of growth-mania and presents the ways to shape a more efficient and livable society." The terms "efficient" and "livable" sum up the key arguments, which are (1) that smaller systems do a better job of producing whatever social or economic outputs they were intended for, and (2) that they are more humane, providing richer satisfactions for those involved in them.

So this is in part a refutation of the "economies of scale" argument that is trotted out wherever large-vs.-small issues become politicized—as, for example, in the celebrated controversy over the 160-acre limit on farms that may irrigate with water from federal reclamation projects. It is also a welcome introduction of real and important *human* questions that are all too often left out of economic debates. Sale argues that smaller farms are generally more productive—a position he supports with a mountain of evidence—and also that they are more energy-efficient, less ecologically destructive and more conducive to community interaction. Regions with smaller farms are found to be economically healthier and to have local political and social institutions that are much more vigorous than the ones in comparable regions dominated by large agribusiness holdings.

The two prospective futures Sale envisions involve choices between bigness and smallness. One is a future of "large-scale institutions, multinational corporations, centralized governments, high-technology machinery, large cities, high-rise buildings, luxury cars, and all that is implied in the American ethic of unimpeded growth." The other is a move toward "the decentralization of institutions and the devolution of power, with the slow dismantling of all the large-scale systems that one way or another have created or perpetuated the current crises, and their replacement by smaller, more controllable, more efficiently people-sized units, rooted in local circumstances and guided by local citizens."

This may sound like too much emphasis on the single factor of size, but Sale argues persuasively that the size of any system is a central variable affecting such characteristics as its degree of authoritarianism, the personal rewards it provides to the people engaged in it, its capacity for socially responsible behavior, its flexibility and its ecological impacts. This thesis is a challenge to rethink some of the ideas behind the major political and economic decisions that have been made since the concept of "manifest

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destiny" first assumed that a bigger nation would inevitably be a better and happier one. Sale believes, in fact, that a major scaling-down—and eventual phasing-out—of the nation-state as a political institution is in order.

One weakness of the book is a certain ambiguity about whether it is an argument for a small-scale future or a program for how to get there. Sometimes it seems to be one, sometimes the other. As a program it is pretty feeble, especially since it fails entirely to confront the issue of population growth, which is carrying us headlong toward an urbanized, angry, hungry and crowded world that will have little room or patience for the amiable ecotopias Sale envisions.

Another weakness is that *Human Scale* has a case of the very disease it seeks to stamp out—this is a large book (558 pages). Also, some of its deficiencies—especially its lapses into hurried argumentation in which a large conclusion is drawn from one piece of evidence, and an occasional tendency to hit the reader over the head with the point—are, I suspect, concessions to current ideas of commercial appeal.

But although *Human Scale* is neither as small nor as beautiful as *Small Is Beautiful*, it is an equally important book, and it is an environmental book. It challenges us to raise our vision once in a while from the current necessary preoccupation with trying to inject a little environmental protection into an environmentally malignant system, and to think about how to make political and economic systems that would be environmentally sound without depending on the protection of huge bureaucracies and without being eternally vulnerable to shifts in the political wind.

Getting there will not be easy. But we cannot function without models of progress, and that is what *Human Scale* is—a well-reasoned reassessment of ideas about what a desirable future world might be like. It offers an image of an economically and ecologically stable global society composed of many diverse, self-governing and relatively independent subsystems. This is a concept that should be examined thoroughly and kept at the very center of political discussion. Kirkpatrick Sale deserves our gratitude for having produced a work that fleshes out the small-scale argument so fully and provides a useful resource with which to explore one of the important issues of our time. □

Walt Anderson is author of several books on politics and social change and is an editor of the environmental quarterly Cry California.

The Sierra Club and Toxic Substances

STAFF REPORT

THE SIERRA CLUB has been concerned for a long time about the impact of toxic substances on the environment. On its national, international and local levels, the Club has worked for more than 20 years to stop abuse of toxic substances, to protect major environmental systems, to protect people, to encourage research into toxicity and to prevent weakening of good legislation related to the problem.

Decades of involvement with the protection of parks and wilderness areas led the Club to become aware early of the dangers of using pesticides on public lands. In 1958, four years before the publication of Rachel Carson's *Silent Spring*, the Club took an official stand opposing indiscriminate application of chemical insecticides and urged federal research into their effects.

By 1965, after the Club had worked for years for stricter control of pesticides, the Board of Directors adopted a policy challenging the use of pesticides on public lands. One section of the policy opposed the application of chlorinated hydrocarbons (a group of chemical compounds that includes DDT) to any lands or water, public or private. By 1969, the Club was recommending an outright ban on manufacturing pesticides containing chlorinated hydrocarbons, and took administrative and legal actions to ban the use of DDT. Finally, in 1972, a lawsuit filed jointly by the Sierra Club and the Environmental Defense Fund was successful; most uses of DDT were banned in the United States.

The Club also worked on other pesticide problems, opposing the use of Mirex (another chlorinated hydrocarbon used to control fire ants in the South) and the export to developing countries of pesticides banned within the U.S.

But as interests broadened, both in the Club and in the environmental movement generally, it became apparent that the legal and political battles would grow more intricate and difficult. The Club would no longer be able to develop specific policies for individual toxic substances, but would instead endorse procedures and criteria that governmental agencies could safely use. The Club began calling for a change in governmental policy that would encourage prevention of pollution rather than complex, after-the-fact regulation or no regulation.

To help stop existing abuses of toxic substances, the Club worked for regulation of pesticides, for strengthening of the Federal Insecticide, Fungicide and Rodenticide Act (FIFRA), for passage of the Toxic Substances Control Act and for passage of "superfund" cleanup legislation.

In 1978 the Club also filed a lawsuit challenging the adequacy of the U.S. Forest Service's management plan in Arkansas. The subsequent court decision established a precedent that discourages the aerial spraying of herbicides and the use of dioxin-contaminated herbicides.

FIFRA was already federal law, but some of its provisions seemed too weak, so in 1971 and 1972 the Club worked for amendments to strengthen it. They were passed.

At the same time, the Club began leading a coalition of environmental groups in association with labor, consumer, urban and health organizations to pass TSCA, which authorizes the Environmental Protection Agency (EPA) to require the testing of new and existing chemicals that may be toxic. In cases of unreasonable risk to health or the environment, the EPA can restrict production, use and disposal of a substance. After a five-year battle, the act passed.

In 1980, the Club devoted great efforts to the passage of "superfund" legislation; a compromise bill passed in December. The Comprehensive Environmental Response, Compensation and Liability Act establishes a $1.6-billion fund to cover cleanup costs of chemical releases and spills on land and in navigable waters. (Oil spills were not covered, however.) Levies on industry will provide 87.5% of the fund; the remainder will come from general revenues. Part of the fund is earmarked for monitoring operating and closed dumpsites to ensure their safety. The original bill had provided for compensation of victims whose health or property was

damaged by toxic spills or releases, but those provisions were struck in the final bill; they may become an issue in the new Congress.

The Club has also worked recently to protect major environmental systems from further pollution. The Club worked hard for the Clean Air Act, which was passed in 1963 and has been amended several times since. The act sets general standards for air quality and contains measures to prevent deterioration of air quality and to eliminate existing air pollution.

Because clean water is also vital, the Club has worked for both the Clean Water Act and the Safe Drinking Water Act. The latter, passed in 1974, gives the EPA authority to set standards of quality for both surface water and groundwater used for drinking water. Two years later, the Club was instrumental in organizing the National Clean Water Campaign, a coalition of environmental, labor and hunting groups intent on strengthening the Clean Water Act. The act sets standards for emission of pollutants into navigable waters. Intensive lobbying and educational work resulted in amendments that expanded the act's control over toxic substances in wastewater discharged to surface waters by industries and municipalities.

Besides protecting environmental systems, however, the Club has also helped protect people from the effects of toxic substances. The Club worked hard for the landmark Occupational Safety and Health Act (OSHA), passed in 1970, which sets standards for workplace safety, mandates safety and medical inspection procedures and establishes stringent limits for exposure to toxic materials. Clearly, materials that are hazards in the general environment pose even greater threats to the health of the people who work with them routinely.

In addition, the Club supported the Oil, Chemical and Atomic Workers Union's strike against Shell Oil Company in 1973. The union asked for periodic surveys of the workplace by inspectors who would look for health hazards, including exposure to toxic substances; it also asked for periodic physical examinations of employees who work with potentially harmful materials. The Club's supporting statement noted: "This struggle is of historical importance in that it is the first time a labor union has struck on what is fundamentally an environmental issue. It illustrates well the shared concerns of workers and environmentalists about the quality of our environment, whether inside the plant or beyond its gates."

To support these efforts, the Sierra Club also encourages research into the effects of toxic substances. In 1974 the Club organized

a nationwide series of conferences on the subject of solid waste. Participants concluded that the most critical solid-waste problem was the presence of toxic leachates in waste dumps. The Club also encourages thoughtful consideration of the problem of radioactive-waste management. It fears that faulty "solutions" to waste-management problems will be promoted to speed up siting processes for new nuclear plants. The Club advocates state and federal legislation to prevent hasty, ill-considered decisions in this controversial area.

After working for new legislation to correct problems or to protect the environment and people, the Club then devotes energy and attention to making sure the laws stay strong in the face of attack. In 1977 the Sierra Club Legal Defense Fund, in a brief before the U.S. Supreme Court, argued in favor of federal officials' right under OSHA provisions to make surprise inspections of working conditions. Club staff in the District of Columbia as well as volunteer leaders across the country are working closely with labor to protect OSHA from weakening amendments. The Clean Air Act has also been under attack periodically since it was originally passed, and the Club works to keep it strong.

Although the national organization has worked diligently on the issue of toxic substances, the effort might have been much less influential had it not been for the hard work put in by Sierra Club's industrious volunteers across the country. "The Observer" reported on some activities in the May-June 1980 *Sierra*. In addition, Club chapters have also taken the following actions in regard to toxic substances:

New Jersey. Members, invited to testify before a House of Representatives subcommittee, urged federal support for cancer prevention with particular focus on New Jersey, which has the highest rate of cancer-related deaths in the nation.

The chapter's conservation chair served on the Governor's Hazardous Waste Advisory Commission in 1979 and was appointed a member of the joint Department of Environmental Protection/Delaware River Basin Commission Hazardous Waste Advisory Committee.

Members are helping oversee the development of a workplan for environmental assessment of a hazardous-waste facility that has been plagued by operating problems.

The chapter is participating in work on a bill to establish an agency to supervise siting of waste facilities in the state.

New York. The Atlantic Chapter is considering legal action to require strict enforcement

of anti-pollution laws, since the government agencies involved have done little to implement these laws in the past.

Members have also served as technical advisors on an EPA demonstration project on the use of cement-kiln incineration to destroy chlorinated hydrocarbon wastes.

Massachusetts. Members in Acton investigated the waste-disposal area of the W. R. Grace Chemical Company. Their investigations led to the discovery that toxic chemical waste was being dumped into unlined lagoons at the site and apparently leaching into the town's drinking water. A suit brought against the company by the EPA was settled out of court shortly after the Club and the Acton Citizens for Environmental Safety petitioned together to join the suit. The company, in a major environmental victory, acceded to every requirement: proper cleanup, safe disposal of wastes in the future and responsibility for any as yet undiscovered dumpsites on company property in the area. The EPA will monitor the process. Furthermore, Grace signed a separate document with the Sierra Club agreeing to furnish to the Club all reports, plans, studies, test data and other documents to be submitted to the EPA. This agreement gives Club activists and other local citizens the opportunity to do their own monitoring of the cleanup's progress.

North Carolina. The Club is helping clean up the 40,000 cubic yards of soil contaminated with PCBs two years ago in an illegal dumping of waste on roadsides. A Club leader made recommendations for the state to consider in its search for a safe dumping site. The Club is calling for the state to require that the public be allowed to take part in monitoring the site.

Louisiana. Club members took an active role in passage of a landmark hazardous-waste bill. (Louisiana was the first state to enact such legislation.) Members continue to be involved, submitting recommendations, attending hearings on the bill's implementation and serving on the recently created state Toxic Substances Task Force.

Ohio. Chapter activists and its full-time representative in the capital follow legislation now pending for cleaning up and monitoring hazardous wastes.

Michigan. The Club is involved in the Hooker Chemical case and has a representative on the Michigan Environmental Review Board, which will help police the state's settlement with Hooker. At the company's dumpsite, rusting barrels leaked 1000 pounds of toxic substances into White Lake, a source of drinking water.

California. The San Francisco Bay Chapter

joined Friends of the Earth and People for Open Space to file a suit against Dow Chemical Company, which wanted to put a vinyl chloride manufacturing plant on land zoned for agriculture and adjacent to the few remaining wetlands of Suisun Bay. The plant would have created serious air pollution problems. The case was settled before trial when Dow abandoned its plan and agricultural zoning was restored.

The Ventana Chapter, together with the California Native Plant Society, conducted a successful campaign to prevent aerial application of the animal poison 1080, which has wide-ranging secondary effects, to areas in the Fort Ord military complex.

Western Canada. Sierra Club activists submitted recommendations to the Royal Commission on Uranium Mining in British Columbia, which was formed to set safety standards for uranium mining in the region. Information uncovered and presented by a Club member led to a public uproar over mining company activities and to a decision in March 1980 by the Premier of British Columbia to impose a seven-year moratorium on uranium mining in the province.

International. Representatives from the Club's International Earthcare Center participated in toxic-hazard conferences in Zurich and Bonn in 1980.

For More Information

Members who want to do more about toxic substances have the following materials available to them:

"Hunt the Dump," a pamphlet with detailed information on toxic substances and a step-by-step program for investigating local dumpsites; $.25.

"Toxic Substances Resource Guide," a list of publications, organizations and government agencies that deal with toxic substances; $.05.

"Literature List," a list of pamphlets and fact sheets on conservation issues available from the Sierra Club; free.

Training Materials on Toxic Substances: Tools for Effective Action, just completed on contract for the Environmental Protection Agency, 500 pages of training materials for activists who want to become seriously involved with toxics. For further information on this set of materials, write to Judy Kunofsky, Sierra Club, 530 Bush Street, San Francisco, CA 94108.

Copies of the brochure from which this article was taken are available at $.15, along with the brochures mentioned above, from Information Services, Sierra Club, 530 Bush Street, San Francisco, CA 94108. □

BEQUESTS and COMMEMORATIVE GIFTS

During the period from October 1, 1979, through September 30, 1980, the Sierra Club, The Sierra Club Foundation or the Sierra Club Legal Defense Fund received gifts in memory of the following people:

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Donald Witherell
Hugo Wolf
Kim Wright
Howard Zaleniser

During the period from October 1, 1979, through September 30, 1980, the Sierra Club, The Sierra Club Foundation or the Sierra Club Legal Defense Fund received gifts in honor of the following people:

Susu Levy
Olive "Ollie" Mayer
Ed and Karen Osgood
William Morgan Roush
Mr. and Mrs. Paul Sohel
Peter and Rosa Sternberg
Dr. Julian M. Sturtevant
Dara Tuell
Ellen Wetzel
Denny and Ida Wilcher

During the period from October 1, 1979, through September 30, 1980, the Sierra Club and The Sierra Club Foundation received bequests from the estates of the following people:

Harriet Anderson
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Louise M. Crawford
Emily B. Gall
Paula Gordon
Louise Jones Hickman
Hazel M. Jones
Samuel Kalish
Herbert Lamont
Thelma D. Martin
Mary Antonia Menaglia
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Helen T. Parsons
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Helen Weekly
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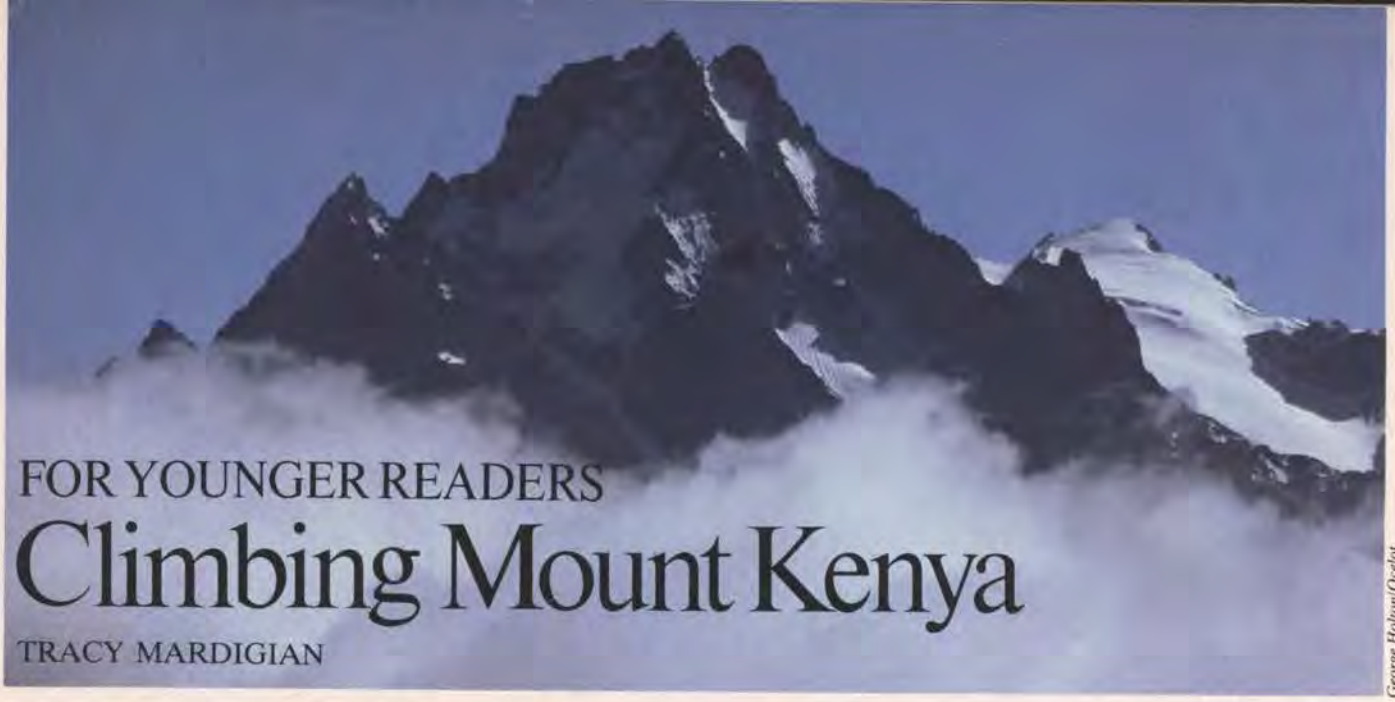

George Holton/Ocelot

FOR YOUNGER READERS

Climbing Mount Kenya

TRACY MARDIGIAN

NARO MORU GAME LODGE is located in Kenya at the southern base of Mount Kenya, 25 miles north of the equator. Most expeditions on the mountain are organized here. Mount Kenya terrain offers a range of climbs, from technical climbing on the high, steep glacial peaks of Batian and Joseph, to pleasant day-hikes through the forest at lower altitudes. The American institute that sent our study group to Kenya had arranged for fourteen of us to do a three-day ascent to Point Lenana, the third-highest peak of Mount Kenya. Although there would be no technical climbing involved, we knew we would encounter difficulties with altitude, temperature and muddy terrain.

At 8:00 a.m. on Friday, July 27, 1979, the fourteen of us—all students except my parents, who were running the study tour for the institute—gathered behind the comfortable lodge to begin a prospective adventure. Landrovers took us up to 10,000 feet, where we met our porters and began our ascent.

I sat huddled next to my mother as we drove into the forests of the mountain. I wondered if she had recuperated enough from being sick a few days earlier to do this climb.

After a half-hour of driving upward through the woods, we stopped at the park gates to sign in. Bwana (Swahili for "chief"), as we called my stepfather, went inside a small building to register our group. The rest of us milled about, quite ready to be on our way.

It was misty at this altitude, and wet. The branches of the trees were covered with droopy moss, and it all looked very eerie.

Again we bounced our way up the muddy and eroded road until at last we reached the starting point of our climb. The majority of the group had little or no mountaineering experience and really didn't know what to expect. Our porters and cooks were there, casually standing around. It was all in a day's work.

My porter's name was Jim; after a few greetings he took my pack, and we began walking up the road into the woods. After 45 minutes or so of steady uphill climbing, we reached Mount Kenya's infamous vertical bog. We were above the timberline, which had given way to very steep slopes of mud. There were rocks and tufts of grass for footing, but it was impossible not to sink into the mud every once in a while.

We started right into the bog without a rest. Surprisingly, it was here that I got my second wind. At this point most of us were in good spirits, and the mud was tiring but also amusing. We struggled through it for ten minutes until Joseph, the porter designated as our guide, stopped. We were all spread out about the bog, but after some minutes we succeeded in congregating where Joseph and the porters had paused. Most of us were still smiling, but two or three of the group were complaining. Time was taken to offer the option of turning back, but everyone decided to go on.

Bwana urged us to pace ourselves behind the slowest hikers. We made an attempt, but it proved impossible in terrain where there was no clear trail, so it remained each person against the mud, with the strongest and the ones who didn't care how muddy they got pulling way ahead. One girl turned back; a porter took her back to the lodge to await our return.

We stopped for lunch at a dry clearing of rocks and grass that was strangely out of place in the bog. The kitchen staff at the lodge had packed sandwiches, cheese biscuits, bananas and chocolate for our lunch. Everyone at this point appreciated this comparatively simple food just as much as the lavish meals served to us all the previous week on safari. I noticed that my mother didn't seem to be eating; I sat down beside her and asked her how she was feeling. She insisted she was fine.

After a brief rest we continued on through the bog, still individually. A few of us pulled way ahead of the others, and we lost sight of each other. After we had climbed for another hour and a half through the mud

and grass we were shouted at to stop, so we sat down and waited for the rest of the group to catch up with us.

When Bwana and the slow climbers reached us, they sat down exhausted. Mom was feeling very weak, and most of the others were beginning to suffer from various forms of altitude sickness—nausea, headaches and shortness of breath.

Many of the group were quite disheartened, but we all continued on, only a bit more solemnly. At last we got through the seemingly endless bog and suddenly had a breathtaking view of our destination. The snowy peaks of Mount Kenya were in sight, and all that lay between us and the summit were the valley and a few ridges. It looked deceptively close.

Every fifteen minutes or so we rested. Half of the group were too sick to speak, and the rest were trying to be cheerful. Our bearings were set on a small hut in the distance because our camp was said to be just a half-hour beyond it.

The tin hut never seemed to get closer, and everyone was becoming more and more irritable. By the time we reached the tin hut, the sun was very low in the sky. Knowing that the camp was just a little farther, our group once again became disorganized, and people set their own pace. Bwana and Mom were lagging way behind. At last, at about 5:30, MacKinder's Camp came into sight.

A few of us waited for Mom and Bwana to catch up before entering camp. As they neared, I ran up to them. Mom was very, very sick. I grabbed Sandy Saeta, a close friend of the family, and we ran into camp to set up the bedding in Mom's tent.

MacKinder's Camp in the Teleki Valley of Mount Kenya—13,500 feet! The campsite consisted of 20 two-person tents, two larger tents for cooking and dining and a tin hut nearby used by porters and rangers.

The only animal life other than climbers were the hyrax, which resemble beavers; they thrive at this altitude on campers' garbage. Just beyond the camp was a ranger station, and beyond that loomed Batian, Joseph and Lenana, the three major peaks of Mount Kenya. Point Lenana was the next day's destination.

While the others straggled into camp, Sandy and I prepared Mom's tent with her blanket and sleeping bag. Sandy is like a member of our family; our parents have been friends for many years. I think she was almost as worried as I was.

The sun set, and the temperature dropped 20 degrees. Bwana got Mom bundled up but could not get her warm. Volunteers piled their blankets on her, but still she didn't warm up.

Dinner was a somber affair. Everyone was cold, and many were ill. Mom was bundled up in her tent and had no desire for food. The twelve of us huddled together at a picnic table in the small dining tent, trying to enjoy a surprisingly elegant dinner of oxtail soup, lamb chops, cauliflower and even canned pears.

After eating, most of our group were anxious to get into their sleeping bags to get warm. By this time, Mom's body temperature had gone way down. Worried that it could be hypothermia, Bwana called over some French climbers he hoped would know about mountain first aid. They brought their portable kerosene lamp from their campsite to warm the tent and immediately began rubbing Mom's feet to promote circulation. She couldn't keep food down, and her calorie level was so low she didn't have enough energy to keep warm. They gave her some nausea pills, and finally she managed to keep down some glucose tablets that began to supply her with some much-needed fuel.

Wendy, Sandy and I had been keeping vigil outside the tent. At last the Frenchmen emerged. Then Bwana appeared, assured us that Mom was going to be all right and ordered us to get some rest. We crawled into our freezing bags, huddled together, and tried to sleep.

Finally I heard the noises of a camp coming to life, so I bundled up as best I could and crawled out of the tent.

The night had not gone well for anyone. Although the crisis had passed, my mother was extremely weak, and arrangements had been made for her to be taken down immediately in a stretcher. The rest of the group, except for Bwana, Sandy and me, had been sick and miserable all through the night. Satisfied with what they had already accomplished, they were ready to go down, too. Bwana had been up all night watching over Mom. He was feeling strong enough to go on but wanted to stay with her, as did my sister.

The original goal of the group was to climb to Point Lenana at 16,355 feet on this second day. Point Lenana is the highest point that can be reached on foot without technical rock-climbing. We would then return to the same campsite for one more night and descend the following morning.

Sandy and I talked it over. The danger for Mom was past, and she was on her way to rest and recovery. We knew that the worst part of this for her was being the cause of everyone turning back, especially our family and Sandy. We held a private meeting with Bwana and told him that we would like to stay and carry on.

The entire group held a meeting over another somber meal, and it was decided that Sandy and I would go on and the rest would head back down to the game lodge.

Sandy, at fifteen, was the youngest in her family. She wanted to beat her family's past altitude record of 15,000 feet, attained by her father in Nepal, so she was anxious to continue.

The others slowly packed their gear for the porters to take down. They left us extra sleeping bags and blankets in anticipation of the freezing night in store for us. Joseph, the head porter, would continue to lead us.

At 9:30 a.m. the rangers came with a rescue stretcher, and Mom was strapped in and carried away. Soon

Morgan J. Cowin

Giant grounsels grow on Mt. Kenya at 13,100 feet.

after, the rest of the group followed them down.

By 10:00 a.m. the three of us were off and any soft thoughts were put out of my mind, replaced by the determination that I would complete this climb.

Joseph was young, quiet and a very gentle leader. Ice pick in hand, he calmly led us across a kilometer of grass, mud and rocks until we reached the long, steep ascent of scree that wound its way upward and out of sight. Here he stopped and looked back. Another African was running toward us.

As the figure came nearer, we saw that it was Peter, Sandy's porter. He took over for Joseph, who headed back and would catch up with us later. Unquestioningly, Sandy and I began following our new leader.

The three of us climbed to the top of the first slope and stopped to survey our progress. MacKinder's Camp was out of sight behind a low ridge; the descending group was nowhere in sight. The sun was strong, and the layers of clothing Sandy and I had piled on that morning in a futile attempt to get warm were now unnecessary. Only my toes were still numb.

On we went, veering right toward the sun. The mountain of scree we were just beginning to climb would take us to the start of the final ridge and glacier whose summit was our ultimate goal.

Keeping this encouraging thought in mind, I started out again rather enthusiastically. Sandy had no wind for enthusiasm, and after a while I pulled ahead of her and Peter. On I climbed at a slow but steady pace, concentrating on each step, trying not to waste any energy.

Joseph was quickly trotting up behind us. The three of them caught up with me and we rested for a few minutes, sitting high enough to see the colorful rows of tents below us at MacKinder's Camp.

We hiked on slowly. Our course seemed to be leading us to a ridge not too far ahead. It looked as though we wouldn't have too much farther to go once that point was reached.

It was farther off than we thought, and when we at last reached the elusive ridge, we saw that we still had a long way to go.

After a brief pause and a snack, we trudged on through the scree. I could barely lift my feet, but Peter would not stop for another rest. I obediently followed him until at last, just before I felt I would drop, "Austrian Hut" appeared before us.

Austrian Hut—15,720 feet. This tin hut was the final resting spot before finishing the ascent of Point Lenana. Now all that lay between us and the summit was a half-hour climb up the glacier.

Excited, I waited for Sandy to arrive. She had succeeded in breaking her family's altitude record, and I knew she would be thrilled. But when she straggled in soon after me, she was too exhausted, I think, to realize what she had accomplished. She was too tired to go any further. She had reached her limit and was content.

I rested for ten minutes, summoning all of my energy for the final ascent. Then Joseph started off, ice pick in hand, and I followed him.

Joseph and I climbed over large rocks until we came to the edge of the glacier. It had been clear and sunny until then, but when I turned around to see Sandy and Peter at the hut, they were hidden in mist.

Shivering, I followed Joseph's trail up the glacier. The snow was fairly soft, making it easy to dig my boots into the surface to make steps.

Every 30 feet or so I had to stop and rest. Our progress was tortuously slow, and I began to think I couldn't make it. The final pile of rocks at the top of the glacier didn't seem to get any closer.

A mist blew by a few times, covering the sun and its warmth, and for a few seconds, each time, I felt as though I were caught in a blizzard.

My lungs were bursting, but Joseph gently prodded me on until finally we reached the outer edge of the monstrous glacier. We both cheered, and Joseph scrambled up the pile of rocks, took my hand and hauled me up after him.

We had made it to Point Lenana; we were 16,355 feet above Kenya!

Joseph and I returned to Austrian Hut, where Sandy and Peter were waiting. The four of us descended to the Teleki Valley and camped for the night. On our way down, we stopped at the ranger station where they had a two-way radio, hoping for some news about Mom. We were told that she had been carried down safely to the lodge and was quickly regaining her strength at the lower altitude.

Relieved at this good news, we set up our camp and enjoyed the night, singing Swahili songs and playing African card games in the shadow of Point Lenana. □

Tracy Mardigian is a student at Tufts University. She has spent two summers in Kenya and is fluent in Swahili.

SOLUTIONS

to puzzles on pages 56 and 57

1 FIND THE QUOTE

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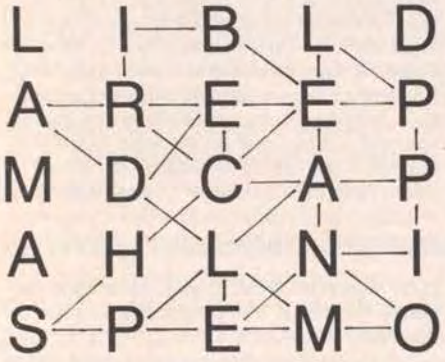

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Photography Contest–Second Notice

Don't forget *Sierra*'s second annual photography contest, now in progress. If you missed our first announcement, look again at page 97 of our January/February issue. And do it soon, for your photos must be postmarked by midnight April 1, 1981, in order to be eligible. Send no more than two black-and-white glossies and two color slides in each of the following categories: national parks and monuments, wildlife, outdoor recreation and designs in nature. Here's your chance to submit your best environmental photographs; all winning entries will be published in the July/August issue of *Sierra*.
Listed below are descriptions of the prizes donated this year. Our thanks to the companies who are encouraging us in this effort.

Minox 35 GL Camera from ***Minox, a division of E. Leitz, Inc.***
The world's smallest and lightest full-frame 35mm camera; easy to take along when a larger system would be impractical. The Minox 35 GL features an f 2.8 lens, an automatic electronic shutter designed to set correct exposure from 1/500 to about 30 seconds with 25 ASA film and a backlight switch.

Minolta Weathermatic-A Camera from ***Minolta Corporation***
The world's first watertight 110 pocket camera protected by a buoyant plastic housing. Designed for rugged outdoor use even underwater to a depth of 15 feet. The Minolta Weathermatic-A is equipped with built-in flash, 3-position exposure control and an all-glass lens.

• *VE 23 Geodesic Tent, by* ***The North Face***
Simple to pitch, the VE 23 is more stable, roomier and stronger for its weight than is possible with any other design. Fits two people plus gear easily. Average weight: 7 lbs. 12 oz.

• *Zeiss Pocket Binoculars from* ***Carl Zeiss, Inc.***
Ultra-compact 8 x 20 binoculars with high-quality optics. The Zeiss pocket binoculars even fold to a smaller size. They come with neckstrap and their own leather carrying pouch.

• *Sierra Designs Cumulus Sleeping Bag from* ***Sierra Designs***
The Cumulus was designed for year-round use. Filled with 26¼ oz.—700 cu. in.—fill powder goose down. The Cumulus is constructed of tightly woven nylsilk with high-count nylon outside bottom shell and 2-way nylon zipper.

• *Sierra Designs Aireflex Tent from* ***Sierra Designs***
Aireflex, a 2-person, 6 lb. A-frame mountain tent constructed of tightly woven, weatherproof-coated nylon. Folds into a compact 6" x 24" size.

• *Nikon Binoculars from* ***Nikon, Inc.***
Compact 6 x 18 binoculars with quality Nikon optics. The Nikon binoculars come with neckstrap and "leatherette" carrying case.

• *Solus II Tent, by* ***Moss***
This simple, warm-weather shelter uses a single shock-cord loaded aluminum pipe that practically pops itself together. Weighing 4 lbs. 2 oz., the tent sleeps two but is light enough to be carried by a single backpacker.

• *Tamrac Camera Packs from* ***Tamrac***
Photographic equipment bags designed for convenient use by active outdoor photographers. Tamrac bags are made of foam-padded, weatherproofed cordura nylon to protect fine photographic equipment. Tamrac packs can be worn on belt, chest or as a shoulder bag.

• *Tamrac Camera Pak 35*
Holds camera with up to 3½ inch lens attached.

• *Tamrac Zoom Pak 35*
Holds camera with up to 5 inch lens attached.

• *Tamrac Tele-Zoom Pak 35*
Holds camera with up to 7½ inch lens attached.

• *Camp Trails Photo Packs from* ***Camp Trails, division of Johnson Camping, Inc.***
Photo packs designed for the weekend or professional photographer to organize and safely transport photographic equipment.

• *Camp Trails Photohiker*
Doubles as a day pack with padded photo pouch removed. Has padded lens pockets, envelope pockets for filters and elastic film bands.

• *Camp Trails Photo Fanny Pack*
Doubles as a fanny pack with the padded photo pouch removed. Photo pouch holds camera, 2 lenses and accessories. Padded lid has elastic bands to hold film.

Outings Errata

The following backpack trips were omitted from the 1981 Outing Catalog in the January/February issue of SIERRA. For more information about these or other outings, write to the Sierra Club Outing Department, 530 Bush St., San Francisco, CA 94108.

(143) Old Trails of the Inyos, California—June 14–20. Leader, Laurie Williams, Box 124, Canyon, CA 94516.

The Inyo Range, rising east of the Sierra, was the site of much mining activity a century ago. It is still possible to follow the hoof-hardened trails through piñon and limber pines on the 10,000-foot crest. One old trail takes us deep into a side canyon to a rarely visited ghost town. We will have excellent views of the Sierra and the mountains of Death Valley National Monument. There will be time to observe wildlife at several large desert springs. (Rated M-S)

(148) Forgotten Canyon Leisure Loop, Golden Trout Wilderness/Sequoia Park, Sierra—June 29–July 10. Leaders, Virgene and Charles Engberg, 6906 Birchton Ave., Canoga Park, CA 91037.

This hike will take you into the new Golden Trout Wilderness Area by little-used Trail Pass before joining the Pacific Crest Trail for excellent views of the southern Sierra Mountains. We plan to visit Rocky Basin, Boreal Plateau, and Siberian Outpost if snow melt permits. Four layover days and a food drop will make this an excellent leisure trip for well-prepared newcomers and veterans. (Rated L)

(152) Rim of Coffee Creek, Trinity Alps, California—July 4–11. Leader, Laurie Williams, Box 124, Canyon, CA 94516.

The quietly beautiful Salmon Mountains are isolated from the better-known areas of the Salmon-Trinity Wilderness by the deep canyon of Coffee Creek. We will hike this 6000- to 7000-foot crest when the flowers are at their peak. Fishing is usually good in early morning and evening, while the lakes at midday are fine for swimming. Chances to see carnivorous plants and a very rare tree are guaranteed, as are photogenic views. Not guaranteed, but theoretically possible in these remote mountains: wolverines and yetis. (Rated L)

(163) Mt. Eolus, San Juan Wilderness, Colorado—July 22–31. Leader, Bob Berges, 974 Post St., Alameda, CA 94501.

Meet at the Denver and Rio Grande narrow-gauge station at 8 A.M. in Durango, Colorado, to board one of the few operating narrow-gauge railroads left in the United States. We will ride to Elk Creek and from there hike east to the Continental Divide. Four layover days will provide chances for peak bagging, fishing, photography or loafing. Attempts will be made on the three 14,000-foot summits in the Needle Mountains. We should be able to reach the tracks below Chicago Basin early enough to get the train north to Silverton, an interesting old Colorado mining town. (Rated M)

(175) Monarch Divide, Kings Canyon Park—August 6–15. Leader, Tom Landis, 29212 Lone Pine Rd., Brownsville, OR 97327.

Are you the type who likes to hike hard getting somewhere, then spend some time to relax and enjoy the countryside? The lakes and granite basins of Monarch Divide lend themselves to such an endeavor. Three of our hiking days will be strenuous, but three layovers and a packer assist out of Kings Canyon put this trip into the moderate category. (Rated M)

Reagan Appointments Signal Battles Ahead

"President Reagan's first round of appointments to key cabinet positions indicates a 'no compromise' attitude toward environmental issues, in spite of the fact that his election was in no way a mandate to weaken the nation's environmental laws and standards," said Michael McCloskey, the Club's executive director.

A case in point is the appointment of James G. Watt as Secretary of the Interior. Watt was confirmed by the Senate on a vote of 83 to 12, one of the largest votes against a Reagan cabinet nominee. Watt was most recently the chief executive of the Mountain States Legal Foundation (MSLF) of Denver, Colorado, a law firm that has specialized in handling public-lands cases on behalf of resource developers. MSLF has represented many clients seeeking access to resources in the public domain, clients such as oil, mining, grazing and power companies. In the Nixon administration, Watt was the director of the Bureau of Outdoor Recreation (now Heritage Conservation and Recreation Service), and in the Ford administration was a commissioner on the Federal Power Commission.

Another important appointment is the Agriculture Department's Assistant Secretary for Conservation, Research and Education, who has jurisdiction over the Forest Service. At press time the leading contender for the spot was John B. Crowell, Jr., general counsel for Louisiana Pacific, a large timber firm. Crowell has made it clear in recent speeches that he favors greatly increasing logging on the national forests and opposes the designation of more wilderness.

Georges Bank Suit Settled

The Sierra Club and other plaintiffs in a lawsuit over oil leases on New England's Georges Bank have settled out of court with the federal government. The agreement stipulates that the government will provide plaintiffs with access to all of its biological studies on the area, will require that oil companies use the "best available technology" to guard against oil spills, will allow plaintiffs to participate in designing an environmental impact statement on the oil development and production, and will formally reconsider its decision not to designate the area a marine sanctuary.

Carter Approves Three Marine Sanctuaries

In the last week of his administration, President Jimmy Carter designated three areas as marine sanctuaries, doubling the previous number of sanctuaries and giving the program a significant boost. There will be pressure to weaken the marine sanctuaries program when it faces reauthorization in the coming session of Congress. The new sanctuaries are:

Point Reyes and the Farallon Islands, California. These areas are known primarily for their large seabird colonies, but they also contain highly productive salt marshes and tidal mud flats. This is one of the most biologically productive areas on the Pacific coast.

Gray's Reef, Georgia. This is a live-bottom reef covering thirteen square miles that harbors fish, turtles and some marine mammals. It is especially vulnerable to habitat damage because it is so close to shore.

Looe Key, Florida. This is a five-square-mile submerged section of the Florida Reef Tract in the lower Florida keys. It's considered an excellent and manageable unit that allows a focus on public education and research.

California Desert Plan Is Final

The Bureau of Land Management has approved and released its final plan for managing the 12.1 million acres in the California Desert Conservation Area. Although there were some improvements between draft and final plan, environmentalists in southern California say the plan is not as good as they wanted.

In the plan, the BLM has recommended that 45 Wilderness Study Areas totalling 2,099,000 acres be designated wilderness. But the plan also opened up new areas to destructive ORV use and designated three ORV race courses despite their never having been discussed in the environmental impact statement. Club leaders in southern California now fear that budget cuts by the new administration might leave BLM unable to implement even what protection of desert resources the plan provides.

Five Rivers Get Last-Minute Protection

Late in the afternoon of the Carter administration's last day, an appellate court voided two temporary restraining orders and cleared the way for then Interior Secretary Cecil Andrus to put five rivers in northern California into the National Wild and Scenic Rivers System. The rivers now protected are the Eel, Trinity, Klamath, Smith and the lower American.

These rivers were already part of the state's Wild and Scenic Rivers System, but the law provides that they may be dammed or their status changed with a simple majority vote in the state legislature. The recently-passed Proposition 8 changed the voting requirements to a two-thirds majority, but state protection is still widely regarded as less secure than federal. Governor Edmund G. Brown Jr. approved the controversial Peripheral Canal as part of a package that asked for Proposition 8 to be put on the ballot and for the state to ask for federal protection, too.

Several timber companies, however, along with the four counties the rivers are in, asked for a restraining order to prevent the protection. Their underlying concern is that they cannot log on the banks of a protected river; they're worried about losing logging areas, jobs and revenues. Now that the restraining order has been voided and the rivers federally protected, the timber companies and the counties are appealing the court's decision. They are basing their case on alleged inadequacies in the environmental impact statement former Secretary Andrus used to take his action and on NEPA procedural questions.

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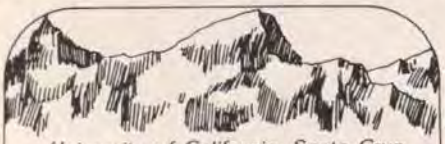

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