

park practice

Trends



APRIL 1970 ● VOLUME 6 ● NUMBER 2

TRENDS

A PUBLICATION OF THE PARK PRACTICE PROGRAM

The National Conference on State Parks
 Lawrence Stuart, President Conrad L. Wirth, Chairman, Board of Directors
 1700 Pennsylvania Avenue, N.W., Washington, D.C. 20006

United States Department of the Interior, National Park Service
 Walter J. Hickel, Secretary George B. Hartzog, Jr., Director
 Washington, D.C. 20240

The National Recreation and Park Association
 Dr. Sal J. Prezioso, President James H. Evans, Chairman, Executive Committee
 Endicott P. Davison, Chairman, Board of Trustees
 1700 Pennsylvania Avenue, N.W., Washington, D.C. 20006

James A. Burnett, Acting Chief, Div. of Park Practice, NPS, Editor
 Patricia K. Conner, Associate Editor
 Glenn O. Snyder, Graphics
 James E. Yeo, Circulation Manager

Printed by District Creative Printing Inc., Washington, D.C.
 Not printed or distributed at Government expense.

The views and opinions expressed in TRENDS are those of the authors and not necessarily those of this publication, the Park Practice Program, its sponsoring and cooperating organizations, agencies or the officers thereof.

Articles concerned with studies, concepts, philosophies and projections related to the many aspects of parks and recreation are invited. Illustrative graphic materials, where necessary or desirable, and a brief biographical sketch of the author should accompany text intended for publication. Send all material intended for publication to: Editor, TRENDS in Parks and Recreation, National Park Service, 1100 Ohio Drive, SW, Washington, D.C. 20242

The Park Practice Program, which publishes TRENDS in Parks and Recreation, also publishes DESIGN, GUIDELINE, GRIST and PLOWBACK. Membership in the Program is open to all persons or organizations concerned with every type of recreation or park planning, development and operation. Application for membership should be made to: The Park Practice Program, National Conference on State Parks, 1700 Penn. Ave., NW Washington, D.C. 20006.

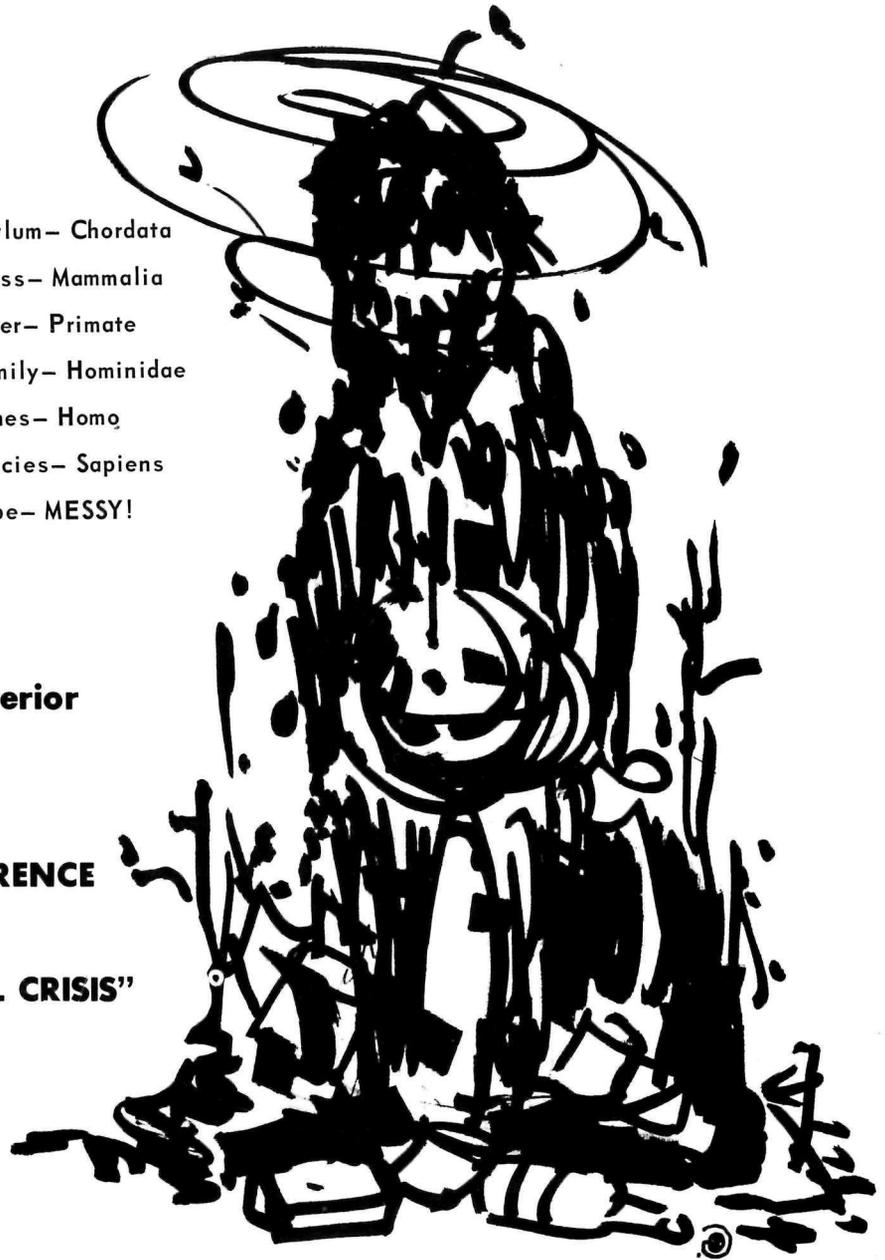
Initial membership fee, \$50., provides a complete and up-to-date library of all published material, as listed above, with binders and indices, and all issues of such published items for the remainder of the calendar year. Annual renewal fee thereafter, \$15.

TRENDS subscriptions; \$10. initial, \$3.50 renewal.

CONTENTS

	Page
Walter J. Hickel on "Ecology and Politics in America's Environmental Crisis"	3
Carl E. Bagge "Multiple Use of Rights-of-Way"	7
Dr. Aaron J. Teller "Should All of Our Environmental Waste be Economic Waste" . . .	12
Malcom F. Baldwin "The Snowmobile and Environmental Quality"	15
Howard Ennes "People Problems, People Solution"	18
Michio Oi "Carrying Capacity of National Parks in Japan"	20
Hugh B. Montgomery "Environmental Analysis in Land Development Planning"	21

Phylum— Chordata
Class— Mammalia
Order— Primate
Family— Hominidae
Genes— Homo
Species— Sapiens
Type— MESSY!



**Remarks of Secretary of the Interior
Walter J. Hickel
to the
PRINCETON UNIVERSITY CONFERENCE
ON "ECOLOGY AND POLITICS
IN AMERICA'S ENVIRONMENTAL CRISIS"**

"I know of no other animal on earth which is as messy."

Secretary

Walter J. Hickel



At the southernmost tip of the Florida peninsula are the Everglades—a magical other-world—a place where silences say as much as sounds—a place teeming with life—but without the signs of life.

Cries of rare creatures float through the tangled jungle. Spoon-bills rise with pink wings flashing. Here live the alligator and the crocodile. The latter so shy it is rarely seen even by professionals. And all around you, always with you, is the distinctive scent of nature. The Everglades, the only one in the world—a refuge for literally hundreds of species of fish, of reptiles, and of birds. Among them are some already threatened with extinction—

the Florida great white heron, the wood stork, the southern bald eagle.

The land, lying almost pool-table flat, causes a sheet of water from the north to flow across it at the rate of just a quarter of a mile a day. The result is a unique ecological system, with each link of nature's chain delicately preserved—and all dependent on that slow but steady flow of water.

Back in the ecological dark ages—around 1967—the commissioners of Dade County launched a program to build the largest airport in the world. You all know the woeful tale. They chose a site just six miles north of the Everglades Park. A huge city would arise adjacent to the jetport. A highway and accompanying pipe—

lines, powerlines and commercial development would cut right across the water flow.

Last May, when I visited the Everglades to crack down on the poaching of alligators, I flew over the site of the jetport. Immediately I recognized how fragile the area is. With the first of the six proposed runways under construction, the environmental devastation was already obvious.

With the cooperation of Secretary of Transportation John Volpe, a crash study was made. The report confirmed our fears. The situation was too grave to wait for legislation or court action. Direct negotiations were begun. Agreement was reached. No commercial jetport would be established on that site.

The Everglades were saved...and even more important, a precedent was set. No longer can a vast development project in this country be launched without full consideration of its impact on the needs of the environment.

Yes, an entirely new element is penetrating into the thinking and the planning of the American people. We have an uprising on our hands in this country. It leaps all political barriers. It hurdles the divisions of race, geography and age. Its motor nerve is as fundamental as the survival instinct. Its implications reach as deep as the meaning of life. We as a nation have been asleep in a room filling with poisonous gas. Thank God, we have finally awakened.

Now let's take a brief look at four of the many needs in the mixture of ecology and politics with which I wrestle. They are:

- The need for public participation, especially by students and youth in general.
- The need for a balanced perspective.
- The need for long-range planning.
- The need for increased enforcement of our anti-pollution laws.

First, then, let's discuss the overriding issue—public participation. On the lips of nearly everyone today is the question. "What can I do?" I'll focus on student and youth participation in particular. The "Earth Day" on April 22 was an excellent example of how youth can mobilize the attention of the world.

One day in February, my office was swarming with students from all corners of the country. They were representing thousands more who are ready to put their shoulders to the wheel.

"It is an act of political courage for some of us to come here," admit-

ted one student. "Many of our friends refuse to have anything to do with the government." But these students came to me to say they were ready to work with anyone—government, business, old or young—because their concern for the future is so deep.

We talked for hours. They expressed their ideas for cleaning up the nation. They spoke about the need to change the minds of people who refuse to care for our wildlife, our lands and our waterways. This situation will not be altered by disciples of an "instant society." It will take a generation of men and women who commit their lives to see it through.

What is needed is a new profession. People who will study in depth both ecology and economics—biology and philosophy—who are broad enough in their exposure to have a balanced judgment. These must be people who are ready to do exhaustive research and wide field work—who are fascinated by nature—and the needs of man. Men and women are wanted who can literally redesign the country so that it is people-oriented—who have the gift of communication and leadership



Roseate spoonbills at Everglades National Park.

and are able to reach young and old and win them over to new ways of doing things.

How can such a new breed of professionals be produced? Let me throw out one or two ideas for your consideration.

First, what if universities were to set the pace and make ecology a priority? After all—if feminists are now in their ranks, why not ecologists?

Second, perhaps we should initiate an environmental task force along the lines of the Peace Corps. It might be called "ECO"—Environmental Control Organization. It could be a program backed by federal funding which would place young leaders with their energy and enthusiasm in those areas of the nation needing study and help.

What are these areas? Many of the jobs in the environment era haven't even been defined. This group could do that. One of the most urgent priorities in this country is an inventory of all publicly owned lands—which constitute over one-third of the gross area of our nation. Many of these lands are not providing their maximum service, whether it be recreational or resource producing—or just plain scenic.

ECO task forces could move into these areas, make thorough studies of the peculiar characteristics of a mountain range, a prairie or a stretch of beach—document the needs of the nearby population, and make recommendations as to their highest use. Such a survey makes common sense. It is part of the obligation of ownership.

Let's face it; man is a messy animal. I know of no other animal on earth which is as messy. This is the obvious root of the criminal disregard for our beautiful streams and lakes and air.

We need to counterbalance this with an alert public. We must mobilize our friends and communities to clean up the debris left by others. We must acquire a watchful mentality. We must be just as aware of what pollution does to the ecological balance as we are of what fire does to our forests and parks. The second "need" is for a balanced perspective. You can't give the right leadership in this area without such a balance.

The effective response in the area of the environment is to begin to look at the earth as a whole—to put all of man's needs ahead of any one benefit. Up till now our efforts have been piecemeal. And anything short range is hopeless. One could start by renaming the Department of the Interior

NPS Photo by M. Woodbridge Williams

as the Department of Natural Resources and the Environment. This would reflect a substantial change—a recognition that environmental concerns must be prominent in resource development. This is absolutely essential. You cannot separate natural resource development from the environment and do the job right. Whether you cut a tree or plant a tree, you change the environment. The time to protect the ecology of an area is before you start developing the natural resources.

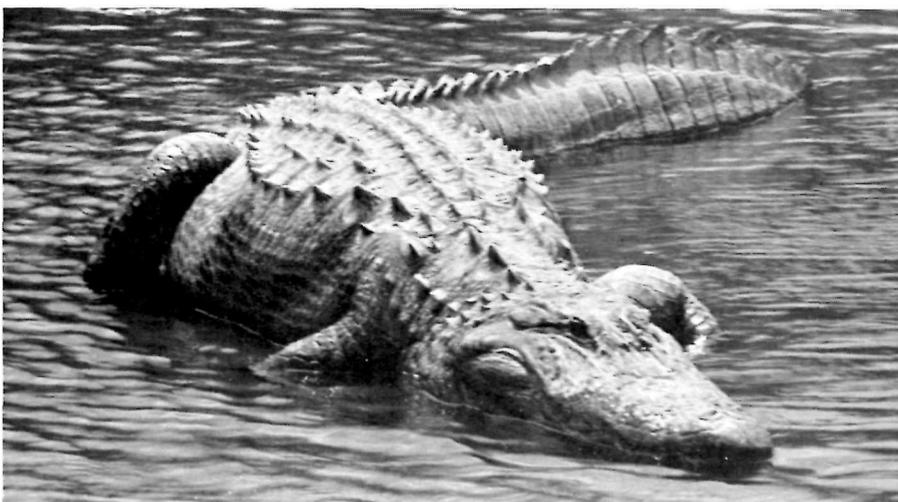
The third major issue we must confront is the need for long range planning. The challenge before us is to look as far down the road as our technology and imaginations permit.

This is why President Nixon's Environmental Message to Congress was a turning point. His emphasis was on action—yet he stressed long range approaches. His program has teeth. Fourteen of the 37 points in his program were concerned with one of my major areas of responsibility—water pollution.

A key proposal is for a national \$10 billion program to modernize and make more effective the municipal waste treatment systems throughout the nation. For the first time, communities will be able to plan ahead with assurance of continuity in the program, and assurance of a definite federal commitment.

In addition we are proposing that comprehensive river basin plans be submitted by the states as a condition for receiving federal funds for water pollution control. These plans would include an inventory of all significant municipal and industrial discharges—an essential requirement if we are to have an effective clean water effort. It's useless to try to clean up part of a river.

Everglades National Park



NPS Photo by Jack E. Boucher

NPS Photo by George Grant



Cabbage Palm Hammocks along Tamiami Trail, Everglades National Park.

The fourth and last major need is for increased enforcement of our antiwater-pollution laws. Our amendments, sent to the Congress last month, are admittedly tough, but they are essential.

There is no question in my mind where the general public stands on this question. In January of this year we received more "environmental mail" at the Department of the Interior than in the twelve months of 1968. The public wants strong leadership, and we intend to give it. The President has called for court imposed fines up to \$10,000 a day for each day of non-compliance with water quality standards. We believe that enforcement must be swift, tough and fair. It must be one for all—and all alike.

Only last month I asked the Justice Department to bring a suit against the Florida Power and Light Company which is building a canal to pump hot effluent into Biscayne Bay. We have abundant evidence that the ecology in this beautiful bay has already suffered from thermal pollution from this particular power plant.

One of our substantial efforts in the enforcement area came during the Santa Barbara catastrophe. At that time I demanded that industry accept absolute liability for oil-pollution clean-up operations. They did.

I promise you that the Department of the Interior will live up to my statement that we shall vigorously prosecute those who pollute. And that means anyone who pollutes, whether it be individuals, political entities or industries. The President has urged the Congress to give us the ability to make such prosecution rapid and strong.

So let it be known—the full weight of a committed federal government will be thrown against those who contribute to the pollution of our waterways and air—who ignore the incentives offered by government, who are deaf to the pleas of the public—who are blind to the havoc which is desecrating our country's natural beauty. They are going to find just how tough we can be.

Let me now share with you some of my personal philosophy.

Perhaps because of my Alaskan heritage, I think a great deal about the need for a personal kind of ecology—call it the ecology of the mind and spirit of man. Most of us are aware of

WALTER J. HICKEL (Continued)

what a walk in the hills does for us. There is a mystery attached to the variety and perfection of nature—a mystery which stirs the wonder in a child and gives a grown man perspective.

We are learning about ecology as the balance in nature which keeps the body of a man or an animal healthy. There is also a balance that has to do with the mind and the soul. Many young writers and poets are reaching towards this truth. If we helped re-fresh the inner man we would begin to answer such real problems as those of the inner city.

Yes, at stake is man's very habitat—and also man's mind and soul. We

are awakening to an entirely new set of values.

If our vigorous culture is leaving behind it a devastated trail of barren lakes, mutilated forests, polluted skies, inhuman inner cities—then, perhaps, our value system needs a fresh look. The values of a consumer society which have been sacred for generations ring hollow to many in 1970. Some would go to extremes. They would throw out the baby to save the bath water. We cannot subscribe to such foolishness.

But let's welcome this reevaluation going on in the soul and the spirit of the nation. Let's participate in it, and let's learn from it.

“There is a tide in the affairs of men which, taken at the flood, leads on to fortune.”

The tide of public involvement is indeed flooding. The imperiled environment has unloosed the gates.

If we heed Shakespeare's advice and provide leadership and action—now—at all levels—the nation will reap the fortune of a richer and deeper quality of national life. It is a privilege to participate in that great undertaking.



Jetport, Everglades

USDI Photo by Cecil W. Stoughton

Multiple Use of Rights of Way



...exercise of responsible jurisdiction over the routing of public service facilities is an essential step in development of comprehensive planning procedures...

a Challenge to the Past

by CARL E. BAGGE ●

A keynote address before the Conference on Joint Utilization of Rights-of-way, Deerfield, Massachusetts, July 28, 1969

In the past, multiple use of utility and transportation rights-of-way has been the subject of engineering and economic debate. The questions were—could it be done technically and could it be done inexpensively? If the answers were no, the subject was taken no further. If the answers were yes, there was still no assurance that multiple use would come about.

Today, however, there is a new dimension to the multiple use concept—a dimension which has emerged from an environmental ethic sensitive to the potential contribution of multiple use in preserving and enhancing the

quality of our environment. Precisely because of this newly emergent ethic, multiple use no longer can legitimately be viewed through only its engineering and economic dimensions.

Recently we have seen flourish an unprecedented commitment by the public to aesthetic and other environmental values. A maturing, more sensitive, and vocal American public today is prepared to pay the price for air and water pollution control, for improved appearance resulting from underground utility service, and for the efficiency of mass transit surface

transportation systems and high speed trains. The list is endless.

And industry and government have generally demonstrated that they are prepared to respond. Air and water pollution control devices are perfected daily. Metroliners and turboliners speed between major population centers. Statutes, ordinances, and grant-in-aid programs spring forth regularly from legislative bodies throughout the Nation to meet the challenge. Indeed, the public is becoming increasingly aware of the fact that as man shapes his environment he shapes himself as well.

● Carl E. Bagge received his B.A. degree from Augustana College in Rock Island, Illinois, in 1949, and his Juris Doctor degree from Northwestern School of Law in 1952. He did further academic work at Uppsala University in Sweden, Northwestern University School of Commerce, and the Institute of Business Economics at the University of Southern California.

Commissioner Bagge was with the Atchison, Topeka and Santa Fe Railroad from 1952 until he took office on the Federal Power Commission. He has



been a member of the Federal Power Commission since May 27, 1965, also serving as the Commission's vice chairman from March 1966 through 1969.

He is a member of the Chicago, Illinois, American and Federal Bar Association; Legal Club of Chicago; the Association of Interstate Commerce Commission Partitioners; the Board of Directors, Augustana College, Rock Island, Illinois; and the Executive Committee, National Association of Regulatory Utility Commissioners.

MULTIPLE USE (Continued)

More and more people today are insisting on a halt to construction of electric power facilities. Bills are introduced in Congress to impose moratoria on construction of electric generating plants. We have repeatedly observed confrontation between the public's concern for protection of the integrity of our environment and the utilities' efforts to provide additional service—at times with harsh consequences. Woodside, Cornwall, and the so-called second battle of Antietam stand as contemporary tributes that technology has been called upon to pay to environmental quality.

Just recently the Hudson River Valley Commission withheld approval of an electric transmission line proposed to be constructed by Orange & Rockland Utilities. Earlier, in testimony before the House Subcommittee on Communications and Power, the Federal Power Commission had called this transmission line vital. The HRVC explicitly recognized the reliability benefits of this transmission line, but it nevertheless concluded that the permanent adverse impact on the scenic and natural resources of the Hudson River Valley required that approval be withheld.

Not long ago this regulatory action would have been challenged by some as outrageous. But today it is not, because most people believe that exercise of responsible jurisdiction over the routing of public service facilities is an essential step in development of comprehensive planning procedures which will benefit not only the public, but the utilities as well. If the Nation is to benefit from the Woodsides and Antietams, it is clear that procedures must be developed to bridge the chasm that now exists between system planning and environmental planning. And with establishment of these procedures, I believe that many rights-of-way difficulties of the past will be swept aside.

MORE THAN QUANTITY ALONE

Utilities and other public service companies could benefit the Nation by taking a critical look at their past practices and evaluating them in the context of the new environmental ethic. It is no longer sufficient for management to look with deserved pride at charts and graphs which illustrate impressive increases in quantity of service. Management must now focus on how it has moved ahead. Has it been sensitive to the public's increasing concern for the quality of environment? Has it been responsive to changing values? Has it been pre-

pared to enter into constructive dialogue with those who seek a departure from past practices?

Today's public concern for environmental values co-exists with an unprecedented public demand for participation in nearly all facets of utility decision-making. Today, it is not uncommon for bills to be introduced in Congress to establish statutory consumers' counsel to intervene be-

continuing problems of highway planners will soon be those of utility and other rights-of-way planners.

In Nashville, Boston, Washington, D.C., New Orleans, and elsewhere, public opposition to construction of major highways runs deep. One need look only to San Francisco to see the potential muscle that public opinion could flex against public service companies. Who would have believed fif-



Unightly power line cut through a wooded area in Fairfax County Va.

fore administrative agencies. Bus boycotts are no longer considered extraordinary, and bulldozers frozen before chains of angry, vocal residents opposing the routing of utility lines through their neighborhood are no surprise.

At the Federal Power Commission, we receive more protests opposing proposed power and natural gas line routes than at any previous time. It may well be that the hindsight of historians at some future time will reveal that the American public is beginning to see utility facilities as it saw highways a decade ago. And the

teen years ago that the double-deck Embarcadero Freeway would come to an abrupt halt in mid-air? And who can imagine today that the future may see newly constructed power or pipelines resting unused in the middle of a prairie? Your thoughts should be attuned to include that staggering possibility, for you can be certain that many of your potential adversaries before regulatory and judicial forums have not dismissed it.

The moderate, yet significant, success which highway planners at the Department of Transportation have begun to achieve, in my opinion, can be

traced to the emergence of policy-makers with a broad perspective of the appropriate role of highway planning in contemporary society. The Department of Transportation today relies on the counsel not only of engineers, but of landscape architects, regional planners, sociologists, ecologists, and a variety of related disciplines whose relevance to highway planning cannot be overemphasized.

but I do believe that many progressive highway planners have taken the first essential step and have recognized the inevitable—that the public will not stand for the uncoordinated case-by-case planning of the past, and that new means of acquiring and planning rights-of-way must be devised. This is a challenge which is a burden not only of the embattled highway engineers but of all in-

land. And given the fact of aroused public concern, if current trends continue, many of the efforts of public service companies to acquire additional land will become embroiled in regulatory or court proceedings, or both. Delay caused by these proceedings, as well as other potential detriment, will harm both the public service companies and the public at large. Yet unless adherence to past practices is ended, there is little chance that this can be averted.

So, multiple use of rights-of-way becomes even more desirable. Use of a single parcel of land for two or more public service purposes obviously requires less land and concentrates the burden of these land uses on a single geographic area. The public is thus given a natural corridor for future public service facilities to occupy at minimal cost to environmental values.

PAST DETERRENTS TO MULTIPLE USE

Knowing these benefits of multiple use, why has it not been more widely practiced by public service companies? First, there have been technical reasons, such as the terrain of railroad rights-of-way, which often precludes use by other facilities, and the tendency of high voltage power lines to impair the efficiency of communications cables. Second, there have been safety reasons, such as the danger of pipeline explosions from certain multiple uses and inductive interference with signal systems by high voltage power lines. Third, there have been legal and regulatory reasons, such as joint liability problems and cost allocation difficulties. Fourth, there have been institutional reasons, such as the hard-and-fast policies of certain companies to maintain the physical integrity of their facilities on independent rights-of-way.

Fifth, there has been an absence of coordinated planning among public service companies. The desire of each company to preserve its internal decision-making process in large part contributes to this. Although most companies plan their growth for several years into the future, competitive instincts sometimes deter them from making these plans public. The result is often parallel action by several companies planning to construct new facilities to a common location, but by different routes.

Sixth, there has been an antipathy between technician and conservationist. Historically the conservationist has opposed efforts of the technician



NPS Photo by Jack Rottier.

Bulldozers and concrete were once considered the only essentials to highway planning; today we know that transportation must be integrated into comprehensive regional plans, that natural beauty must be preserved, and that intelligent application of ecological criteria is indispensable to effective planning. Scholars today devise theoretical and practical means of routing highways with minimal intrusion and maximum benefit to the natural environment. And some people speak even of the potential intrinsic beauty of well-designed highways.

Perfection has not been reached,

terests which employ land as rights-of-way.

NEW LOOK AT PRACTICES NEEDED

Dramatic accounts have been published of the serious consequences of meeting the enormous future land requirements for utilities, pipelines, and transportation without a re-examination of the pell-mell land use criteria used over the past fifty years. Every man shares a substantial interest with all others in the sensible use of our limited, precious commodity—

to plan and construct utility facilities according to engineering and economic standards alone. In turn, the technician has sought to avoid confrontations with the conservationist. This, as well as fear of skyrocketing land costs, has caused certain companies to conceal their right-of-way acquisition plans, which has not only prevented early opposition of conservationists but has precluded disclosure of right-of-way acquisition plans to potential multiple users as well.

FEASIBILITY EXPLORATIONS

Benefits of multiple use by public service companies are so great that commitment of financial and human resources necessary to resolve technical and safety problems must be made immediately. Several meaningful research projects are under way. The National Task Force on High Voltage Direct Current is examining corrosive effects of overhead direct current power transmission on natural gas pipelines and other buried metallic facilities. The Electric Research Council is supporting research on the feasibility of undergrounding high voltage transmission lines for long distances. And the American Public Works Association has proposed a project to determine feasibility of utilidor to house facilities of various utilities.

Commitment by industry and government to elimination of technical and safety problems of multiple use has been inadequate to date. Now would be the propitious time for industry and government to join in an effort to promote the kind of research and development necessary to resolve technical and safety problems of multiple use. Specifically, I urge the various trade associations as well as individual companies and organizations to join with appropriate planning agencies and departments of government to undertake projects aimed at eliminating technical and safety barriers to multiple use.

JOINT EFFORTS AT THE TOP

Now is also the appropriate time for industry, government, and citizens groups to join in an effort to develop and promote policies which will encourage multiple use of rights-of-way by public service companies generally. Complementary efforts of the President's Council on Environmental Quality, the Citizens Advisory Committee on Environmental Quality, and the affected public service industries would provide the most effective level at which to meet the

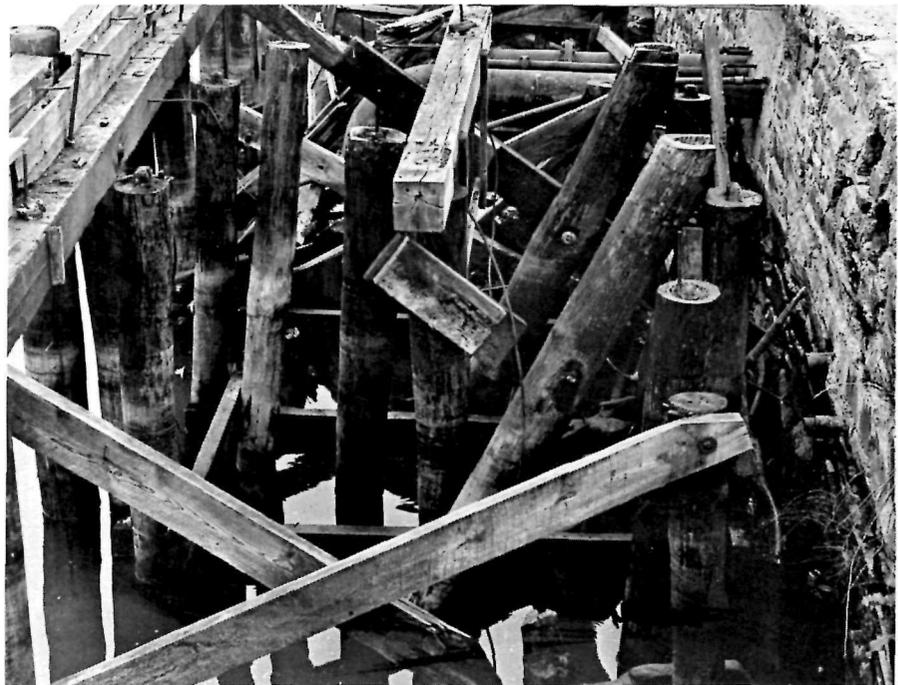
challenges of multiple use. The Nation would indeed benefit from such a comprehensive study of multiple use planning policies and procedures, and the President's Council would be in a unique position to coordinate such an undertaking.

SOME BEGINNINGS

Multiple use concepts have not gone entirely without attention. Many public service companies share rights-of-way, and recently multiple use has been emphasized by government, industry, and citizens groups as a promising means of minimizing intrusion of utility rights-of-way on the quality of our environment. Examples can be cited of low voltage power lines and telecommunications lines sharing

THE MEANS TO ACCOMPLISHMENT

Reports of the Committee on the Underground Installation of Utilities of the White House Conference on Natural Beauty, the President's Council on Recreation and Natural Beauty and its Working Committee on Utilities, and the Electric Utility Task Force on Environment have expressly honored the value of multiple use of rights-of-way, but none sets forth specifically the means by which the objective of multiple use should be accomplished. And it is just this problem—the specific procedures to encourage multiple use—which must be tackled forthrightly if the worthy objective of multiple use is to become more than a hollow platitude.



Pilings and debris left by a company on the Potomac River.

NPS Photo

rights-of-way with each other, as well as with railroads and pipelines. Along the edges of a 260-mile portion of the Sunshine State Parkway in Florida are two high pressure pipelines, and in the median strip is a communications coaxial cable. Baltimore, Montreal, and Quebec today have beneath their streets utilidors shared by various utilities. The Department of Defense uses utilidors in areas of extreme cold to reduce operating and maintenance problems. But, other than the recent coordinated efforts of electric and telephone utilities to share joint trenches for underground distribution conductors, simultaneous and deliberate joint planning programs by public service companies have been unusual.

Comprehensive Regional Planning

I would hope that the information gathered here would impress upon each of you, as well as on public service companies generally, that traditional right-of-way acquisition and planning practices are outmoded, that there must be a broadening of perspective, and that much of the answer lies in multiple use of rights-of-way.

The overriding issue which should be addressed is how to put multiple use of rights-of-way into practice as a relevant ingredient of comprehensive land use planning for the future. How, specifically, can a philosophical commitment to multiple use planning be inspired? How, specifically, can this philoso-

phical commitment be implemented by practical and effective means?

We have recently seen an excellent example of the coalescence of philosophical commitment and practical implementation in the efforts of many electric and telephone utilities to plan jointly the underground installation of distribution facilities to new residential subdivisions. Obvious cost benefits, as well as public and regulatory pressures, were catalysts in overcoming a variety of difficult barriers to multiple use. Successful efforts of these distribution utilities at the local level should serve as an example of operating procedures to be emulated by public service companies generally in multiple use planning efforts at the regional level.

We know from experience that as the Nation's population increases, the overflow from metropolitan areas will gravitate to open areas. Sociologists, urbanologists, and others can predict with remarkable accuracy the expected centralization of population over a period of years. With equally remarkable accuracy, ecologists and others can predict the impact of this growth on environmental and ecologic values of these emerging population centers. Given the predicate of intelligent land use planning, transportation, water, sewer, and other essential services can be made available to those who inhabit these areas, with minimal disruption and maximum benefit to ecologic values.

Similar planning provisions should be made for routing power, pipeline, and communications facilities. The very large number of these facilities which will be constructed to meet projected energy and communications requirements of the future no longer permits passivity and tolerance by regional planners and other public policy-makers. Rights-of-way for transmission of energy and communications must be planned simultaneously with development of comprehensive regional plans. And the most prudent acquisition of land for these purposes may well be the establishment of energy corridors, or perhaps even combination energy-transportation corridors, embracing highway and other public service facilities at appropriate distances from each other.

Recreation Can Share, Too

Multiple use of public service facilities within regional plans should mean more than just joint use of rights-of-way by several public service companies. It should mean use of rights-of-way for any of a multiplicity of purposes, such as riding and hiking,

and for bicycle trails, parkland, and other recreational uses.

One instance of multiple use is a proposal submitted to the Department of Housing and Urban Development by the Metropolitan Dade County Planning Department and the Florida Power & Light Company to use an electric power transmission right-of-way as a linear park joining several widely separated neighborhoods. This is an imaginative example of applying inherent resources of rights-of-way to create social values rather than simply to serve them.

Lead, Not Merely Follow

Effective planning of public service rights-of-way should not simply follow progress as in the past, but should stimulate it. Comprehensive planning which seeks to place these facilities in the most propitious locations for development of population centers could indeed be a major step toward coalescing a multitude of social and environmental values to the collective betterment of burgeoning urban areas. And the role that regulatory and other governmental agencies could play in inducing private investment to follow well-planned comprehensive regional development could go far toward eliminating many of today's planning problems.

New Values Demand New Practices

Underlying the efficacy of comprehensive regional planning, which must embrace multiple use of public service rights-of-way, is the need to replace practices which no longer satisfy today's standards and values. The central theme of one aspect of effective regional planning must be the early acquisition and withdrawal of land for electric generating plants and public service rights-of-way. This is a matter of urgency in congested areas and a means of preventing serious problems in less populated areas. Such early acquisition of land could be done by private consortia, public bodies, or quasi-public bodies. The form of acquisition could be easily determined once philosophical commitment is made.

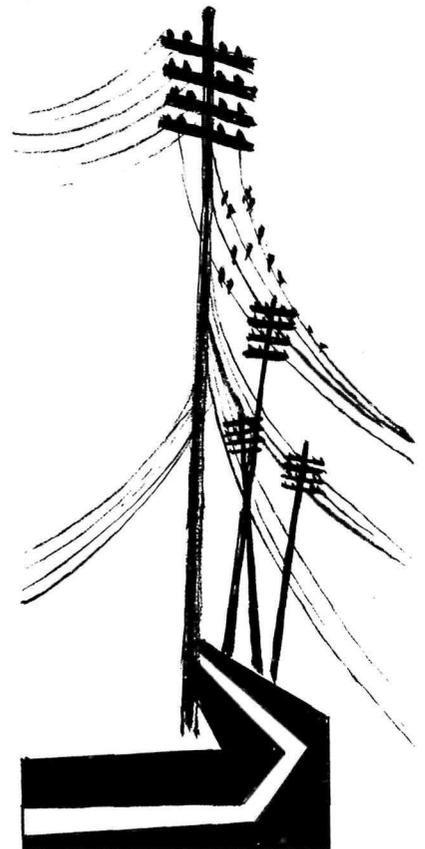
Sophisticated concepts and methods which could be applied in determining advantageous routes and sites for public service facilities have been and are continuing to be developed. These methods could serve as the bases upon which corridors for public service facilities are planned and reserved. One method might be adapted from Ian L. McHarg's, Design With Nature, which seeks to apply ecology to actual environments and to pinpoint areas of

minimal offensiveness to ecologic values. McHarg speaks of a principle of "maximum social utility," a concept well worth the attention of rights-of-way planners.

But valuable contributions such as Professor McHarg's can be of benefit only if they are studied and tested objectively. The time is past when public service management could dismiss such works as "intellectual" or "professional". Today, these qualities may well provide the means for the Nation to extricate itself from the growing crisis in environment. A combination of both the intellectual and the practical is required if a solution is soon to be found.

COOPERATION IS THE KEY

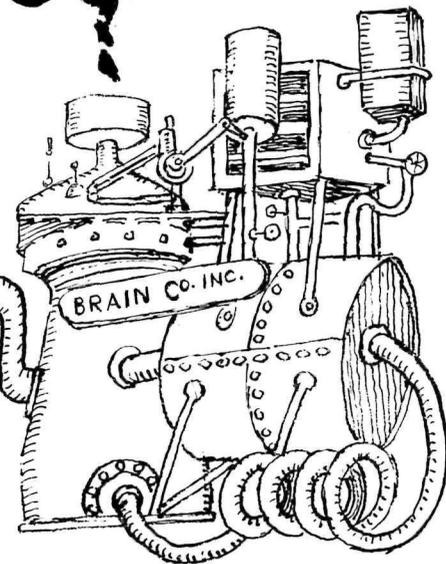
The burden of making multiple use of rights-of-way a common practice is widely distributed. Management, technicians, conservationists, and government each share the onus of re-examining unrewarding past practices. An open exchange of rights-of-way plans is essential. A forum for public participation in comprehensive planning is required. What has been planned covertly must be planned overtly. New techniques must be forged. A new perspective must be born. Natural antipathies among competing disciplines must be stifled. The robust challenge of cooperation must take hold.



SHOULD ALL OF OUR ENVIRONMENTAL

BE ECONOMIC WASTE?

waste



Morality must be bound to the technology via economics if we are to solve the problem of environmental pollution, claims this educator. Unless and until the concept of social economics is accepted by society, the reduction of our urban blight will be obscured by legal delays and public apathy.

● Dr. Aaron J. Teller, President of Teller Environmental Systems, Inc., has been active in innovative engineering design for the abatement and recovery of pollutants. In the last 10 years over 100 million dollars of his systems have been installed by American and foreign industry.

Dr. Teller formerly served as the dean of The Cooper Union School of Engineering and Science and was active in innovating programs of education directed toward individual stimulation and social responsibility.



Dr. Teller has published approximately 30 fundamental papers and holds 15 patents internationally. He has been active in professional activities and was instrumental in founding the Metropolitan Engineers Council on Air Resources and the National Council on Air Resources. He is known for his concept of looping the system; the welding of pollution control with the preservation and effective utilization of natural resources, both from the aspect of social philosophy and engineering design.

Dr. Teller serves as a director of 3 corporations and the National Pollution Control Foundation. He is also a consulting editor to McGraw Hill.

Prepared for the Conference on the Destruction of the Environment sponsored by the Fund for New Priorities in America. Reprinted from Professional Engineer Magazine, February 1970.

by DR. AARON J. TELLER •

That pollution is a critical problem in our society is firmly established. More statistics, more pictures of the devastation of nature, more documentation of its effects on health and farm productivity, and more economic losses can only confirm what is now understood.

The waste of our society is destroying the environment. Pollution is waste—the unused materials of a society. It is the evaporated gasoline, incompletely combusted fuel, sulfur that is not easily recovered, phenol that is in low concentrations, and fluorine that cannot be economically used at the site where it was formed. Pollution consists of the marginal materials of our culture.

Why are they marginal? Because we have established them so. This, obviously, does not make sense from a superficial analysis, but it is the basis for our behavior. For example, the world is experiencing a sulfur shortage, and sulfur is one of the most important resources of our economy. Its importance in the petroleum and fertilizer industries makes its consumption a health indicator of both industry and farming. We consume approximately 16 million tons of sulfur a year in this country, and the price rose from \$20 to \$35-\$40 per ton during the recent shortage. Yet, at the same time, we waste twelve million tons of sulfur to the atmosphere and streams, causing great damage. Why? Because the sulfur we discharge

is marginal. Why? Because we say so.

This obscure reasoning comes from a nomadic origin that established a provincial value system. In the early days of social man, a piece of land was farmed until it was fallow, and man moved on; a piece of land was grazed until the grass was gone, and man and his animals moved on because there was always more elsewhere. We still maintain this pattern in most of our activities. Only where economic incentive exists do we change our behavior. For example, the lumber and paper industries decimated our forests in the 19th Century because there was always more. But, when the costs of hauling became excessive, the industries learned that this was uneconomical. Now, planned reforestation has brought greater profits to the industry, and our forest resources flourish.

The United States has enormous reserves of phosphate rock, but our fertilizer companies in processing the rock recover only 90 percent of the phosphorous value. It is cheaper to mine more than to recover the lost ten percent. This is the marginal degree of use. However, German companies that have to import by transporting the rock across the ocean recover 96 percent of the phosphorous value. Shipping costs pushed upward the marginal degree of use.

We use resources only to the degree beyond which it is cheaper to get more. This is the value criterion

of our productive economic system. Little or no concern is shown for the effect of this value system on the preservation of resources for those who will inhabit our land in the future, or for the effect of this waste on our present living.

The cause has been neglected in the structuring of legislation. The only result has been the abatement of a specific type of pollution where the law has been effectively enforced. The preservation of natural resources has not been considered in the abatement process. As a result, the pollutant may have been removed from the atmosphere, but it has been converted to either water pollution or solid wastes. In any case, its value has not been returned to the people to whom it belongs.

Typical of these abatement procedures is one process that removes sulfur oxides from power plant stacks and converts them to a new waste—four pounds of waste for every pound of sulfur removed. A typical power plant will build a mound of 150,000 tons of solid waste every year. Another example of the abatement philosophy is the attempt to establish afterburners for automobiles which waste enough fuel to provide all the power and heating needs of two cities the size of Philadelphia. What we do in the afterburner is to make the effluent less toxic, but we permanently lose the resource for future generations.

Is it not more socially realistic to recover the sulfur in a usable form so that we save twelve million tons of this material per year for future generations, and should we not use the gasoline for productive consumption so that every year we preserve twelve billion gallons of gasoline for the future?

What is significant is that pollution and preservation of natural resources are inexorably intertwined by nature, and the ultimate solution of either problem must result in the simultaneous solution of both. Such a solution must be based on the reality of the ecological system and not merely by policing a fragment. We must loop the system. We must recover, recycle, or sell the effluent. We must fully utilize the resources of the earth, not merely to preserve our environment but to preserve the rights of future generations to the resources of the earth.

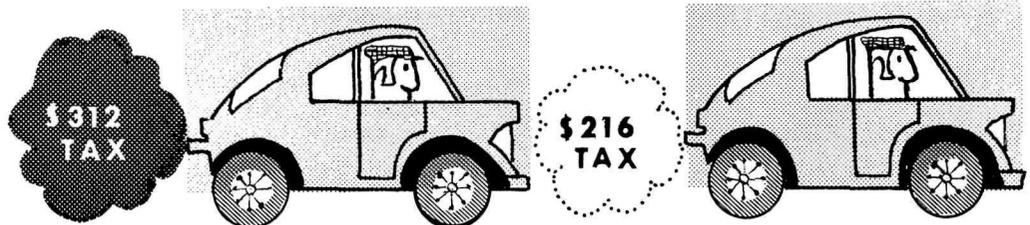
The implementation of this principle will not be accepted voluntarily in its abstract form. It must be legally

imposed by the establishment of a new value system, and, hopefully, it will become established within the framework of our economic system. We must look toward social value rather than nomadic value. What is proposed is that we consider the establishment of a preservation of resources tax. The magnitude of the tax would be determined by the value of the unused or wasted resource or, alternatively, by the damage to society caused by the emission of the resource. The only refuge from this tax would be to loop the system—the reuse or complete use of the resource.

We have legal precedent for the preservation of natural resources and for assessment of unavoidable trespass and damage, so the major objection to such a tax would be that it would place the industry of the nation in a poor competitive position in international trade. Two responses are available; one, that the alternative would be the imposition of police

	Gals. per yr.
Unburnt hydrocarbons in exhaust	30
Equivalent power value of carbon monoxide in exhaust	150
Crankcase loss	15
Carburetor loss	20
Total	215

The value of this waste to future generations of \$39 per year (at 18 cents/gal) or \$312 over the life of a car (eight years). A tax of \$312 should thus be placed on this car at the time of purchase. This is the value of the natural resource that we are defrauding future generations by waste.



power to stop emissions — a procedure that would probably be more costly; and two, the argument that was used to oppose state laws with the result that antipollution laws are now quite consistent throughout the nation. If a precedent were established by the United States, it is most probable that all other nations would follow the same pattern, since the problems that plague us (the depletion of natural resources and the destruction of the environment) also plague all other nations of the world.

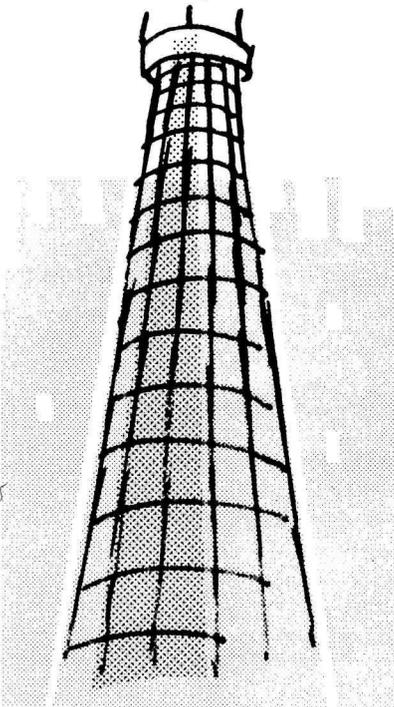
Perhaps three examples of this type of tax can constitute a reasonable description of the process.

1) Tax on automobiles

A typical American automobile wastes 20 percent of the gasoline pumped into its tank. A car driven 10,000 miles per year with consumption of 900 gallons of gas loses fuel or fuel equivalent as follows:

If, however, the manufacturer were to improve the engine design or provide for recovery systems that result in the decrease of waste, the tax would be decreased commensurate with savings in gasoline consumption. Three advantages would be gained: 1) preservation of natural resources; 2) better competitive position for the manufacturer who improves consumption efficiency because a lower tax means a lower purchase price; and 3) reduction in operating cost to the owner when improvements are made because of reduced consumption of gasoline.

For example, the recent improvements in blow-by devices and improved engine combustion performance if adopted by any single manufacturer would reduce the waste by 80 gallons per year. This would decrease the tax to \$216, providing a competitive advantage to the manufacturer of approximately \$100 in selling price, save the purchaser \$28 per year in operating cost, and reduce the noxious



emissions to the atmosphere by one-third. No tax benefit would accrue to the car that has an afterburner for, although it may reduce pollution, it still represents waste of the gasoline.

The justification for the tax is the preservation of natural resources; the incentive of the tax is to reduce the cost of purchase and operation by using natural resources efficiently; the result of the tax should be preservation of not only petroleum reserves but also the improvement of our environment.

2) Tax on sulfur oxides emissions

Sulfur oxides are emitted to the atmosphere from power production, space heating, and metallurgical industries. The twelve million tons per year of the equivalent sulfur wasted is worth approximately one-half billion dollars. The tax on emissions could be based on the quantity wasted (at the rate of \$15 per ton, thus providing for \$20 per ton for recovery processing) and also on recovery of costs of damage. A power plant could be taxed on the basis of stack emis-

sions; an apartment house could be taxed on the basis of the sulfur content of the fuel it uses.

Thus, a power plant (1000 mw) using a two percent sulfur fuel would be taxed at the rate of approximately \$3000 per day. The alternative of using low sulfur fuel or stack gas control systems becomes obvious. The tax rate on the power plant would be approximately \$1,000,000 annually. The tax "saved" by installation of a stack control system would justify a breakeven investment in many of the sulfur recovery processes now available. Thus, the tax serves not only to repay society for its loss, but also is a significant incentive to invest in sulfur recovery. The end result would be to provide a new source of sulfur, to significantly reduce the rate of depletion of naturally occurring sulfur, and to improve the quality of our atmosphere.

Building space heating systems in an urban community in the temperate zone waste as much of the sulfur value as power plants do. Such emissions occur at low levels and velocities, thus causing greater direct damage to the community. These emissions cannot be controlled by stack recovery systems. However, incentive for use of low sulfur fuels can be achieved by taxes on the fuel itself. For example, a tax can be established on the basis of four times the market value of the sulfur that would be wasted—the added fine established because of the greater health and physical damage caused by these emissions. The suggested tax rate is as follows:

Percent Sulfur	Tax—Dollars/Barrel
4	0.96
3	0.72
2	0.45

These taxes would be imposed at the refinery or point of entry. The significance of this tax is that it not only returns to the people the value of the resource that is being wasted, but it also pays for part of the damage to our society created by the emissions. The incentive to purchase low sulfur fuels becomes evident inasmuch as the premium for low sulfur fuels is approximately the same as the tax cost proposed for high sulfur fuels.

3) Tax on incinerator emissions

In this case, the value of the material wasted is questionable. However, the cost to the community as a result of soiling damage is high. The basis for this tax is that of a fine for unavoidable trespass. On the assumption that cleaning costs directly caused by particulate pollution are approximately \$10 per person (Pittsburgh 1952), the emission of one ton of particulate results in the expenditure of \$3600 in cleaning bills. Since one average apartment house emits one ton per year of particulates, the tax would be \$3600 annually. The reluctance to invest in incinerator control systems that now exists would be readily overcome since the capital investment in such a system is estimated to be about \$5000.

Social value tax revenues should not find the "general fund" as their temporary resting place. They should have a more laudatory purpose. I propose that the revenue be used for the direct benefit of this and future generations by being applied to the preservation of the natural resources of this nation. It should be used to conduct research for the recovery and reuse of wasted resources; to establish preserves where the natural ecological functions can flourish; to develop systems, such as mass transportation, that will minimize the potentials for pollution and waste of resources; and to develop urban environments that will not denature our land or dehumanize its dwellers.

Unless and until the concept of social economics is accepted by society, the reduction of our urban blight will be obscured by legal delays and public apathy. We can force industry to comply with air quality requirements. But we cannot place an injunction on 200,000,000 people and force them to stop living. Taxation is accepted by society not merely as a punitive device but also as an incentive to improve performance. The preservation of our natural resources is certainly a justifiable basis for taxation.

We have technology, and we have the capability for developing new technologies to solve our problems. But, at the moment, we have only the incentive of morality and fear to improve our air resources, and the achievement has been minimal. To effectively solve our problem we must view the total system and bind morality to technology via economics.

THE SNOWMOBILE & ENVIRONMENTAL QUALITY

● Mr. Baldwin has been an associate of The Conservation Foundation since 1966. He is a graduate of Haverford College (1962), and the University of Chicago Law School (1965). From 1965 to 1966, he was a management intern with the Office of the Secretary of Defense.

Mr. Baldwin is a member of the bar of the District of Columbia, and a member of the International Union for Conservation of Nature and Natural Resources Commission on Legislation, the International Council of Environmental Law, Public Lands Committee, the American Bar Association, and the Steering Committee of Environmental Law Subcommittee Air and Water Committee.



by MALCOLM F. BALDWIN ●

Reprinted from the "Living Wilderness" magazine published by the Wilderness Society, Washington, D.C.

There are some 600,000 snowmobiles in North America, half of them in the United States; and more than a million can be expected in another five years.

The snowmobile has become an economic boon to manufacturers, to dealers, and to northern communities that used to lie dormant in the winter. Scores of annual snowmobile rallies and races produce a source of off-season revenue. Fostered by intensive manufacturer competition and served by hundreds of increasingly vocal and well-organized snowmobile clubs, the ubiquitous snowmobile is presenting us with wholly new questions of policy toward off-road vehicles.

This rapidly multiplying machine brought along with its super mobility some significant safety problems. Its capacity to transport anyone of nearly any age or shape into wild, lonely, cold spots has left many unprepared and incapable of walking out again if required. Avalanches, ice breaking, vehicle breakdown, weather changes,

and reckless driving are only some of the causes of snowmobile accidents that the National Safety Council is now investigating.

And snowmobiles have opened up new territories and possibilities for vandalism. Once remote back-country cabins are now easily reached by snowmobiles equipped with appropriate trailers for packing out what they did not pack in. The argument has even been made that a really quiet, stealthy vehicle is undesirable because of the absence of any advance warning.

Even though the vehicle has been enjoyed by commercial and other interests in rural areas for the freedom it allows and its public service capability in heavy snow, there is little doubt that the snowmobile is unpopular among large numbers of people in rural areas. Trespass is one of the causes. Damage to hedges, fences, and lawns is generally unappreciated.

As a recreational vehicle, the snow-

mobile has made new demands, both natural and financial, on public resources. Its noise and fumes, and the effect on fish, wildlife, and trails—its very physical presence—threatens traditional recreation pursuits.

Recently, recreation patterns in a few of the national parks have radically changed. The availability of snowmobiles and the larger snow cats in Yellowstone has brought some 10,000 winter tourists this year, as compared to the dozen or so who came a decade back. In one recent weekend 4,000 snowmobiles entered the park to use the unplowed roads and specifically designated snowmobile trails. Throughout the snowbelt this phenomenon is being duplicated.

Some of its effects are less obvious. Unquestionably, the greater use of off-season recreation facilities will require improved park management. But it may also help justify larger investments in public lands—an investment required not only to serve

snowmobile interests but to take into account its indirect effects.

The snowmobile may, in fact, introduce vehicle operators to other outdoor winter activities, such as cross-country skiing. The economist, John Krutilla, has pointed out that the enjoyment of wilderness experiences depends on acquiring certain skills and knowledge. Discussing the rapid rise in popularity of car camping in his article, "Conservation Reconsidered," he suggests that

if this activity will spawn a disproportionate number of future backpackers, canoe cruisers, cross-country skiers, etc., the greater will be the induced demand for wild, primitive, and wilderness-related opportunities for indulging such interest.

The validity of this thesis is untested. But it helps to point out the need for public policies that accommodate snowmobile demands on the one hand but assure the availability of wilderness opportunities on the other.

Several States have attempted to do this. The New York State Conservation Department recently established greater control over the use of snowmobiles on State lands in order to permit less interference with other recreation activities and to provide more protection to the Adirondack and Catskill Forest Preserves (areas required by the State constitution to be "forever kept as wild forest lands"). The Department once allowed snowmobiles on any public trails that were not marked closed. New regulations allow snowmobile operation only on trails marked specifically for them (as well as on frozen lakes and ponds).

The policy of the U.S. Forest Service is to encourage maximum use of its lands for recreation with as few restrictions as possible. Snowmobiles in the national forest, then, have available hundreds of thousands of miles of unplowed roads and trails, in addition to 1,000 specifically designated snowmobile trails in the East. Nevertheless, the incompatibility of unrestricted snowmobile use with other recreational pursuits is recognized by the Forest Service as a growing problem that might be met by zoning certain areas out of bounds. For example, the use of snowmobiles and other motor vehicles is prohibited in Wilderness and Primitive Areas.

It has been suggested that with little extra expense the snowmobile, along with the lawn mower and vacuum cleaner, could be far quieter. Manufacturers even claim that noise is evidence of power people enjoy while

operating a machine.

But anyone who has heard a snowmobile echoing across a valley on a clear winter day will recognize that the machine is incompatible with the important wilderness experience of silence. Its noise is cause for frequent complaint—from awakened sleepers to cross-country skiers—and, in at least one case, in the Adirondacks, snowmobile noise has disturbed court proceedings.

Concern for noise has prompted many towns to restrict snowmobile use to daylight hours, and the States of Vermont, Michigan, Wisconsin, Minnesota, Maine, and New Hampshire require mufflers or some other form of noise control. It is probable, however, that until States require the motors to operate below specific decibel levels—as has been



done with motor vehicles in California and New York—little real progress will be made on the noise front. In the meantime, manufacturers that are members of the International Snowmobile Industry Association have agreed to a standard noise testing procedure among themselves, anticipating the day when specific noise levels are required.

Snowmobile proponents should welcome a quieter vehicle, not merely for the health of their hearing but because effective noise control would reduce the "zone of impact" of the vehicle and could open up new areas and periods for its use.

Noise is only one aspect of the snowmobile's potentially serious effect on fish and wildlife. While more thorough study of this subject is certainly needed, reports are common and widespread enough to indicate that adverse effects not only exist but are likely to increase.

Complaints about snowmobilers harassing game or, specifically, running down coyotes and foxes and other fur-bearing animals have been reported in most of the Canadian Provinces and nearly all of the snowbelt States. From the U.S. Forest Service

come similar reports of game harassment and concern about the possibility of over-fishing lake trout and splake in areas that used to be inaccessible in the winter. Hunters, while they may use snowmobiles, are also disturbed by their unrestricted use. They frequently complain that snowmobiles have "spooked" the game, and in several States sportsmen's clubs favor restrictive snowmobile laws.

Despite the commendable policies of snowmobile manufacturers and associations to improve operator behavior through a code of ethics, it is expected that the snowmobile's adverse effect on fish and wildlife will increase. Policies for the operation of snowmobiles must therefore recognize the enforcement difficulties created by greater and greater numbers of snowmobiles.

Several States have comprehensive legislation that protects wild game from snowmobile harassment. For example, in Vermont snowmobiles may not be operated "in a way to harass deer or other wild game, or in violation of any statute." More regulations of this kind, not limited to hunting, are an obvious necessity.

But what about the unclassified, non-game animals and those classified as predators? Pressures on foxes, coyotes, cougars, and polar bears from snowmobile use may already be severe. Harassment policies ought logically and humanely to include these other animals as well—to ignore them would only lead to an irrational wildlife protection policy.

Physical damage, trail littering, and disruption of snow trails for other uses are other effects of the snowmobile. Seedlings and golf greens are particularly vulnerable to the vehicle. The Minnesota and Michigan snowmobile laws prohibit operation in nursery or other planting areas. Regulations in New York prohibit cross-country snowmobile travel in State game and reforestation areas. The U.S. Forest Service reports that its 1,000 miles of designated snowmobile trails in the East are usually located where soil, watershed, and other resource damage will not result. But the Forest Service reports increasing problems along snowmobile trails with trash and garbage buried temporarily by the snow.

Another trail effect frequently forgotten is that while snowmobiles can be extremely useful in the initial packing of cross-country skiing trails, they can as easily wipe out the two smooth tracks that are desirable for good ski touring.

Enforcement to contain some of these trail effects is difficult, yet

more can be done to protect soils and seedlings by specifying the weight and width of snowmobiles allowed to use public lands. The trails that many States construct and maintain and the regulations established for their use may not be appropriate for the wider, heavier, more powerful vehicles of the future.

Just as certain safety and air pollution control devices are now re-

road vehicles should be considered while legislation and regulations are being devised for the snowmobile. The following policy recommendations can be appropriate for the snowmobile and future off-road vehicles.

First the States and the Federal land management agencies should establish more areas or zones for exclusive non-vehicular use, based on the projected increase in off-road

wildlife, seedlings, and other natural resources.

Finally, States should establish comprehensive legislation and regulation for off-road vehicles. Necessary elements of such legislation would be (a) vehicle registration and easy identification for revenue and enforcement purposes, (b) operating restrictions for highway use, (c) prohibition of harassment or hunting of



Snowmobiles climbing trail overlooking Frenchman's Bay

Acadia National Park

Photo by Cecil Stoughton

quired on new automobiles, the regulation of snowmobile width and weight may be increasingly necessary to promote and protect other desirable goals.

The snowmobile is the harbinger of a variety of new, versatile recreation vehicles available soon for mass entertainment. Several all-purpose, all-terrain vehicles are now on the market. The entire spectrum of off-

vehicles as well as the increased demand for such areas. The sooner this rationing takes place the easier it will be to accomplish. Areas should be zoned to prohibit noise encroachment and to protect other environment and to protect other environmental, aesthetic and ecological values.

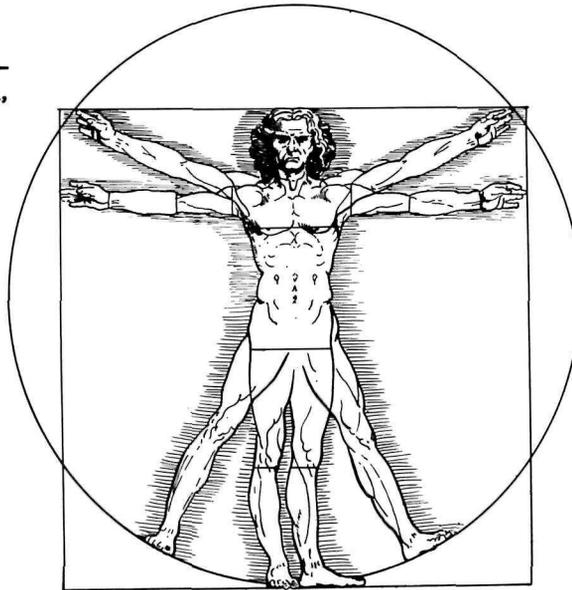
Second, State and Federal research should be devoted to studying the effects of off-road vehicles on fish and

any wildlife from the vehicle, (d) safety equipment specifications, (e) specific noise and air pollution control requirements.

Barring a nuclear disaster, the snowmobile and its relations are here to stay. It is essential, then that we recognize in a National way that our automotive problems are no longer confined to the highways.

Reprinted from the American Association of University Women Journal, May 1969.

PEOPLE PROBLEM



PEOPLE SOLUTION

by HOWARD ENNES •

"... a sense of the interdependence and wholeness and humanness of man."

The ultimate responsibility for improved environment rests with the citizen-consumer.

Thomas Carlyle told an American friend about a century ago: "You won't have any trouble in your country as long as you have few people and much land, but when you have many people and little land, your trials will begin."

Certainly we do have a "people problem" in the United States today. People, their work, their play and in their living, create environments which threaten to destroy us all.

What to do? Get rid of people? Ad-

mittedly people are harder to deal with than things, but people-removal hardly commends itself to a democracy—even though we have toyed with the technique in our urban renewal efforts, with consequences that are nothing short of disastrous.

Of course, there remains the all-too-likely possibility the environment can be removed. Our young people, at least, are acutely aware that there is the bomb and that there are fools and ill people and paranoid political forces still at large. Nevertheless, mass

destruction not only is undesirable but the outcome would be even more of an environmental and ecological problem than we have today—as difficult as that may be to conceive!

What to do? An accommodation? We've been trying that—asking people to accommodate, to adjust, to move over. Somehow we've got our values mixed up and our responsibilities misdirected. We and our technology seem to be doing our best to make the world increasingly dehumanized.

●Howard Ennes second vice president, Corporate Relations of the Equitable Life Assurance Society of the United States, received his professional training in public health at Yale School of Medicine (Department of Public Health) in 1949 after a decade of experience with local and national voluntary and governmental health organizations. He was executive editor of "Public Health Reports" and served in the Office of the Surgeon General of the U.S. Public Health Service from 1949 to 1954.

Mr. Ennes became associated with the Medical Department of the Equitable in 1954. In 1965 he was elected assistant vice president and director of Community Service, on the staff of the chairman and chief executive officer of The Equitable. In February,



1968 he was elected second vice president.

Mr. Ennes is a Fellow of the American Public Health Association and an Honorary Fellow of the Royal Society of Health of Great Britain. Since 1963 he has been a member of the Board of Directors of the National Health Council.

Mr. Ennes is a member of the Public Affairs Research Council of the National Industrial Conference Board. He also serves on several insurance industry groups. At present he is a member of the Community Health Planning Committee of the Health Insurance Council and Chairman of Subcommittee on Health Promotion of the Committee on Medical Economics of the Health Insurance Association of America.



Professionals and scientists and public service administrators must recognize the chasm separating science, technology and public policy from the citizen-consumer. The "professionals" must actively seek to bring forth an effective partnership with the citizenry, simply for the sake of survival—particularly in the field of environment and health, the field of human ecology.



PEOPLE PROBLEM (Continued)

A recent "Congressional White Paper on A National Policy for the Environment" begins, at least, to get at this issue. One of its policy proposals reads: "Public awareness of environmental quality relationship to human welfare must be increased. Education at all levels should include an appreciation of mankind's harmony with the environment. The ultimate responsibility for improved maintenance and control of environment rests with the individual citizen."

This line of thinking points directly to issues of citizen planning and participation—ecological citizenship—as part of a dynamic equation which also embraces affirmative educational action. We need to intensify our energies toward development of more viable processes of cooperative planning for equality in health care and for a responsible approach to human ecology—and this direction of equality must be upward, not toward a low common denominator.

Regrettably, the degree of authentic citizen-consumer involvement as yet is not great, nor are environmental considerations adequately encompassed. For these and other reasons, relocation of the federal responsibility from a somewhat narrow line operation, heavily influenced by grantsmanship, to a broader base in the Department of Health, Education and Welfare is needed. Citizen involvement and participation hinge on the issue of control—control of values, of direction and of implementation. This thrust for involvement and participation and control is becoming what quite correctly, I think, the sociologist Herbert Gans calls the "equality revolution." The social protests of the day—to which health and environmental interests will not remain immune much longer—are taking many forms.

If control is crucial, then one must necessarily confront the issue of money. And I think it will be this issue, specifically the issue of block grants, which will bring the true test of our national compassion and integrity, and of our local-state-federal

partnership concept. There is reason for concern if the efforts to allow "self-determination" in disposition of federal monies via the states means merely more of the same in special interest control. This will surely mean more despair and defeat among the poor of our inner cities. But the block grant concept could signal a rebirth of the hope that our states and our cities can cope with the human condition. It could mean that we might try to tackle the issues of state and local governmental reform. Combining the block grant idea with cooperative citizen planning just might help to renew the genius of democracy. We must stop planning for people and begin to plan with them, as Robert Theobald states it.

We must work with all who are concerned and affected. We must involve democracy in exploring the needs and resources, the setting of goals and priorities and the determination of timing. This is perhaps a clumsy and slow approach for it presupposes the creation of understanding among and participation of a large proportion of those concerned. If this seems time-consuming look around, if you can see through the smog; sniff the atmosphere, if you dare. We really haven't done so well handing down "solutions" and "planning for." There is urgent need for action which can inform and educate and dynamically involve the total citizenry in the life and death issues of human ecology.

We've spent virtually nothing to help citizen-consumers prepare themselves for their emerging roles. The time has come to seriously consider the feasibility of facilitating a nation-wide effort to create a concept of "ecological citizenship." This effort would necessitate active participation by governmental, private and

voluntary sectors, by professional and lay groups, by individual citizen-consumers in some sort of working cooperative or partnership, with national and perhaps regional laboratories for the development of models and techniques for testing and replication throughout the nation. Perhaps this group might also serve a consultative role to the proposed advisory group on human ecology and to such other units as may emerge as we proceed toward rationalizing federal health policy development and effectively facilitating comprehensive community health planning.

The citizen-consumer needs help in learning better to know himself and his environment, to shape his life style so as to maximize his personal options for living fully. He needs to learn how better to utilize health services and environmental supports, both personal and community with optimal efficiency and economy. Finally he needs help in learning how to participate more responsibly and constructively in community health and environmental planning, in priority-setting and in decision-making.

There must be the reality of involvement of community-citizens and of all segments of our society. Involvement and participation represent, in fact, the principal resources which must be mobilized if we are to create a sense of ecological understanding and action—a sense of the interdependence and wholeness and humanness of man.



Carrying Capacity of National Parks in Japan

by Michio Oi

Planning Section Chief
National Park Bureau
Ministry of Health and Welfare



A rice paddy field at the foot of Mt. Fuji.

Photo by NPS Division of International Affairs.

I
In dealing with the problem of capacity related to the national parks, I should like to mention the fact that I received deep impressions from varied topics discussed at the meeting held on May 21, 1968, at Williamsburg in the United States of America. All the expositions on varied aspects of the carrying capacity of national parks were splendidly delivered by Mr. Swem, Mr. Goodwin and Mr. Bergman. Of late, a great increase in the number of people who make use of the national parks and natural parks is noted in Japan. In fact over-use of the parks is a common phenomenon witnessed in Japan to-day. We who are concerned with the national park problems are brought to face an acute issue of capacity which we have to tackle in earnest. We were amazed at finding that even in America a similar issue is under study.

At the Williamsburg meeting the capacity question was adopted as a common problem to be taken up at the next American-Japanese National Parks Meeting.

Consequently, at this third meeting, I should like to have this issue taken up first and add some Japanese views and comments thereon.

II

The issue of capacity of national parks may be studied from two stand-points. One is the capacity for human beings within parks and wildlife reserves. The other is the capacity for wildlife in parks and other protected areas.

At this time, my subject will be limited to the first point, the capacity for human visitors.

As I have already mentioned, the number of people visiting national parks in Japan is increasing at a rapid pace. In 1958, 68 million people used our parks. By 1967 the number of park visitors had reached over the 218 million mark. In the United States 133 million is recorded for this number in 1966.

Why the use of national parks in Japan has made such a marked increase may be explained in the following:

1) The land area of Japan is one twenty-fifth of that of the United States but in this small country the population is over 100 million. Naturally, all areas are densely populated.

2) All national parks are situated close to these densely populated areas. Easy accessibility to the national parks from people's living quarters is one of the primary factors for this situation.

3) Compared with the national parks in the United States, Japanese national parks have made an advanced development in securing a greater capacity. (However, this very fact may not be a good thing altogether.)

There are two types of over-use of the national parks by the people. One is that which is observed in special areas. The Hakone area in the Fuji-Hakono Izu National Park which covers a small area of only 24,300 acres is utilized by over 18 million people a year. One other is the Rokko area in the Seto Inland Sea National Park which covers an area of 18,000 acres and which some 7.2 million visitors utilize each year. These two areas of the national parks are both located close to the major cities of the country. Not close to major cities but known for their scenic beauty are Ose (20,000 acres) and Kami-Kochi (7,000 acres), both of which are over used.

The other type of over-use is witnessed at special seasons of the year. In all the aftermentioned special areas, at specific periods of the year, the crowds are so large that they become almost uncontrollable. Take for instance, Mt. Fuji, the mountaineering of which officially opens on July 1st and closes on August 25th. During this period about 250,000 climbers make the ascent to the sacred Mt.

The last Sunday of July generally has the largest number, over 25,000, who form like a massive rope strung from the foot of the mountain to the tip of it.

This phenomenon presents a rather dismal picture of nature to the users. It degrades intricate relations between man and nature in one sense and, on the other hand, it is the act of despoliation of Nature.

Here lies a good reason for us to think deep and hard on the critical issue of carrying capacity of the national park, especially on its ade-

quacy. This trend of over-use is bound to continue both in the United States and Japan in the future.

III

A general outline for determining an adequate carrying capacity for national parks in Japan may be described in the following manner.

1. National parks of larger sizes generally have a developed area where roads for vehicles and footpath are laid for the use of visitors, and a wide area just for viewing. In smaller parks designated as historical sites, there are historical buildings provided with parking lots and picnic grounds.
2. When the problem of capacity of a park in a developed area is taken up, the first thing studied must be the parking space,

WASHINGTON, D.C. Members of the Second U.S.-Japan Panel on National Park Management gather at the Department of the Interior to discuss mutual park problems. From left to right are: Fred Packard, International Specialist, National Park Service; William J. Lucas, Assistant Director, U.S. Forest Service; C. P. Austin, Director, U.S. Travel Service; Michio Oi, Chief, Planning Section, National Parks Bureau Ministry of Health and Welfare, Tokyo, Japan; Assistant Director Theodor R. Swem, National Park Service, Harry Goodwin, Chief, Bureau of Sport Fisheries and Wildlife; Jerry Shimoda, Supervisory Historian, National Park Service—and interpreter for the Japanese delegation; and C. Gordon Fredine, Chief, Division of International Affairs, NPS.

NPS Photo



overnight facilities, picnic grounds, etc. Particularly the availability of space for each of these items must be studied.

3. In the plans for road and developed areas, no uniform density can be adopted in all parts of the park area. Features of the area, natural aspects of nature and cultural value of monuments must be taken into consideration for formulation of plans.
4. In setting a park capacity the primary importance is not to despoil nature and cultural assets nor to give unpleasant feelings to the users but to give them full enjoyment and pleasure of the day.
5. For the formulation of a plan for roads and developed areas in parks, keeping nature and cultural assests in their proper place, the American recommendation of 1962 O.R.R.R.C. for recreation areas in six classes is most effective.
6. In Japan Nagano Prefecture adoped a plan after the fashion of O.R.R.R.C. system over the entire area of 5.243 square miles dividing it into five areas in July 1969.

They are the following:

- (1) General Outdoor Recreation Area
- (2) Natural Environment Area
- (3) Unique Natural Area
- (4) Primitive Area
- (5) Historical and Cultural Area

The above classification is adopted for the entire area of Magano Prefecture, keeping harmonization of natural and cultural assets fully into consideration for the future tourism promotion. Accordingly, the plans for roads and developed areas will be put into execution and then the computation for an adequate capacity will be made possible.

7. The areas in the park will be divided into classes under this system. Thereby the computation of capacity for individual facilities can be made easily after the road and developed area plans have been drafted.
8. There are two bases for computing the capacity of individual facilities. One is the physical

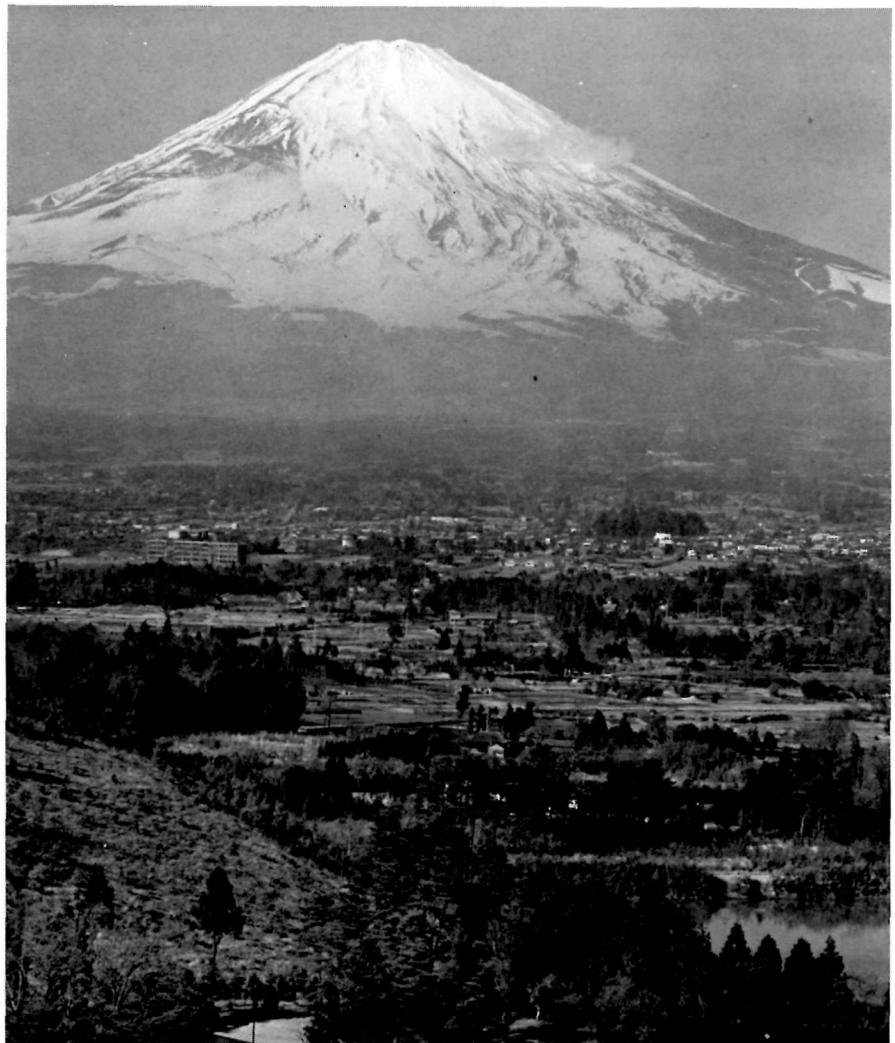
capacity of an area or facility. That is, one must ask what is the maximum accommodation in the first place. An example may be cited here. Japanese standards for roadbuilding for vehicles in mountainous regions is 5.5 meters in width. This will enable 260 vehicles to travel at the rate of 35 kilometers an hour normally. The other is a psychological element that comes into the capacity of a single facility. Examine a camping ground, for instance, which has accommodations for 100 campers. Supposing its full capacity is used, would it give the campers a full satisfaction and pleasure in a crowded condition? To obtain a better result, it should be reduced to 80 or even to a lower figure of 60 campers.

9. An instance may be cited with respect to this psychological capacity. There is a small park known as the Shirokane Natural Cultural Garden in Tokyo which covers an area of only 49 acres. It is mainly composed of woods to which only 300 visitors are permitted to enter at a time. In the wooded park are roads, resting quarters and botanical gardens which cover an area of 8 acres. The presence of 300 people in an 8-acre space seems to be the most ideal to give and maintain a quiet environmental effect.

10. Keeping the elements which have been mentioned heretofore, it is possible to compute a near adequate capacity for individual facilities in a park, the combination of which will constitute a general capacity for the park as a whole.

Mt. Fuji seen from Gotemba District.

Photo, Courtesy Embassy of Japan.



11. Another concrete development plan projected by the Ministry of Health and Welfare in 1967 may be mentioned here. It was the plan to develop the Ose area, a portion in the Nikko National Park, which is known as a primitive area. This is a High Moor which covers an area of about 20,000 acres.

(a) In the land classification this area falls under the Primitive Area.

(b) As a consequence, there is not a single road for vehicles to be found and it is planned to allow about 100 kilometers of footpath for the visitors within the area.

(c) In fear of herds of people who might come in, natural softer grounds are prohibited entrance by the visitors.

(d) Lodging quarters are located in seven different spots in the area where there are mountain huts and camping grounds. Their accommodations are for 4,580 per day.

(e) According to the original plan, its physical capacity is for 29,500, but we should like to

maintain the psychological capacity at about 4,700.

12. Actually more than 4,700 visitors a day are coming in, and it is a matter of time before it will reach the physical capacity feared by the authorities concerned with the project.

13. To meet this new development the following four plans have been drawn up by the authorities:

1) It is proposed to adopt laws and regulations legally to cope with the situation to maintain the adequate capacity. In Kamikochi in the Central Mountain National Park, which is known for the natural beauty like Yosemite Valley in the U.S., it has already become impossible to open parking lots without impairing the natural beauty of the Park. In this situation a plan is advanced to build parking lots at some distance from the heart of the area, and from this area buses are to be run instead. To do this, however, it is necessary to amend the laws covering road traffic.

2) In order to effect a physical control over the traffic, it may be necessary to close the roads to vehicles where abuses destroy the natural beauty.

3) A campaign of education is planned to give full information on over-use of specific areas to control the situation. This must be done through mass media such as press, radio and television.

4) The last but not the least is a new positive plan which should be adopted to expand the areas for the National parks and quasi National parks at the earliest date. An addition of recreational areas should be provided for the users of the Parks. These ideas have been recommended by the Natural Parks Council in 1968.

This concludes a brief outline of the capacity problems related to the Japanese National Parks — what they are and what we propose to do in the future. Your comments on and guidance in the proposition will be highly appreciated.

Lake Ashi in Hakone National Park.

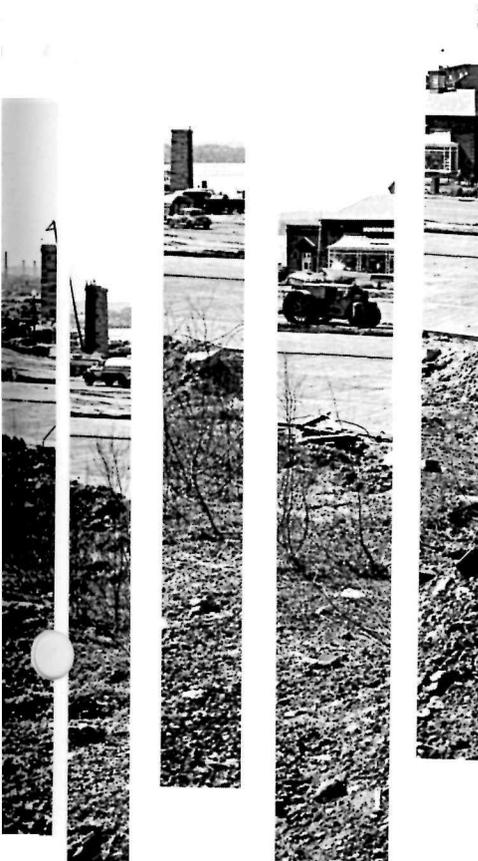
Photo, Courtesy Embassy of Japan.



A reprint from Appalachia, Volume 3, Number 3, November-December 1969.

“We need help in fighting the disease that now threatens our planet – a sort of cirrhosis of the environment.”

Conservationist David Brower



● Mr. Hugh B. Montgomery, a consulting geologist and mineral economist, received his A.B. in geology from the University of Rochester (1953), and his M.S. in economic geology from the Pennsylvania State University (1957).

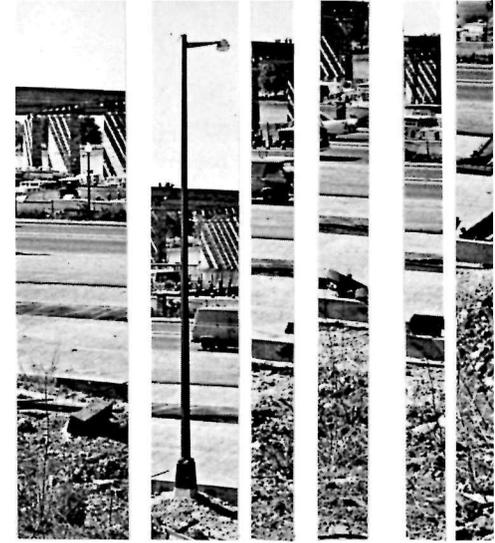
From 1957 to 1965, Mr. Montgomery served as chief of the Division of Minerals of the Pennsylvania Department of Forests and Waters.

Since 1965, Mr. Montgomery has served as consultant to such organizations as The Nature Conservancy, Greater Williamsport Area Recreation Authority, U.S. Army Corps of Engineers, Pennsylvania Game Commission, West Virginia Appalachian Development Office, Appalachian Regional Commission, the Federal Water Pollution Control Administration, and others. He is now assisting the Appalachian Re-



gional Commission in developing environmental quality educational materials.

His organization memberships include American Institute of Professional Geologists, Sigma Gamma Epsilon Geological Honor Society, American Institute of Mining Engineers, American Petroleum Institute, American Association of Petroleum Landmen, and the Pittsburgh and Washington Geological Societies.



ENVIRONMENTAL ANALYSIS IN LOCAL DEVELOPMENT PLANNING

by HUGH B. MONTGOMERY •

As the nation approaches a 300-million population and a trillion-dollar economy and as our strip cities, industrial complexes and communities grow, the time remaining to prevent the destruction of our natural environment and erosion of our resources needed to support life is becoming dangerously short.

As each man-made change occurs, it has effects on the environment which we, through shortsightedness, frequently fail to anticipate. And since our physical resources are limited and interdependent, the misuse of each resource alters the availability of usefulness of the others.

The nation is rapidly coming to realize that if action is not taken now on the national, regional and local levels to preserve our environment, we will soon lack the environment and resources necessary to sustain our civilization and perhaps human life itself.

Where will more and more people live, work and play? It may soon be true that in many metropolitan areas the nearest open space for a picnic within 25 miles of the downtown area will be the city dump.

Where will we dispose of the waste products of our increasing population and industrialized society?

The conservation of wildlife, wilderness and recreation land and

the pollution of our water, land, and air have finally become matters of public concern.

In Appalachia, where the mountainous environment has historically been an inspiration to poets and musicians but an impediment to planners, we have a unique opportunity to demonstrate the reciprocal relationship between resource conservation and economic progress.

stages of local development planning?

- What are the various aspects of the environment that should be inventoried and assessed in overall planning?
- What specific steps must be taken to incorporate environmental factors in any plan for local economic development?
- What resources exist or are needed

was built on clay subsoil which broke away when subjected to the tremors of the earthquake.

● In Columbiana, Alabama, in August and September of 1968, major cracks appeared in the concrete filter-plant water reservoir; the water storage tank leaned southeast, out of plumb by 13 1/2 inches; commercial buildings and walls and sidewalks in a federal housing project were dam-



Improper drainage under a parking lot caused two landslides in two years at a shopping plaza east of Pittsburgh.

Although many of Appalachia's environmental and resource problems are regional in character, it is often only at the local level that the planned use of our natural resources can be effective.

It has long been recognized in the region that resources analysis is an important step in certain types of local planning. In determining the location of an industrial plant or industrial park, for example, analysis of water supply and topography have become an important part of standard planning procedure.

Local planners are now becoming aware, however, that their efforts are more effective if a systematic analysis of the total environment is undertaken. In fact, many have discovered that only by incorporating environmental planning in the overall economic and social planning can development be successful.

These local planners are seeking answers to such questions:

- Why is environmental analysis important, and why should it be carried out during the very early

to provide local planners with necessary information on environmental factors?

IMPORTANCE OF EARLY ANALYSIS AND PLANNING

On a Sunday in mid-September, a square block area of Scranton, Pennsylvania, pivoted slightly and settled a few inches toward the collapsed tunnels of an abandoned coal mine 90 feet below, leaving front doors that would not open and two-inch cracks in kitchen walls.

In other areas, automobiles have fallen into gaping holes in city streets because of the collapse of subsurface mines.

The Federal Bureau of Mines estimates that 2 million surface acres have already experienced mine subsidence, and that nearly a million more will sink by the year 2,000:

● In March 1964, an earthquake in Anchorage, Alaska, caused 14 percent of the city to slide into the Pacific, killing nine people and causing property damage valued at more than \$300 million. The land- and mud-slide was caused by the fact that the city

aged; water lines were broken and the tracks of the Louisville and Nashville Railroad were severed. The cause of the damage was a particular form of subsidence which is common in areas underlain by limestone. The flow of ground water erodes a subsoil layer which lies between the limestone and the topsoil, causing surface depression, tension cracks, and sinkholes.

● In May of 1967, rock slides closed off Route 28 in Pennsylvania's O'Hara Township. Some of the boulders were as large as buses, and three days were required to clear the blocked road of rocks and debris. The force of the slide, which extended for 100 feet, also damaged tracks of the Pennsylvania Railroad's main lines through the upper Allegheny Valley.

These are only a few examples of cases where public and private projects have been figuratively—and in some cases, literally—undermined by the lack of thorough environmental analysis.

Less spectacular, but equally significant, are areas where the inter-relationship between the environment and man's activity offer opportunities for improvement of economic and

social life.

- Knowledge of the type and location of various mineral resources permits hospitals and medical centers to plan staff capable of treating and undertaking research on the health problems associated with mineral extraction. The Environmental Health Centers established by the Public Health Service have done pioneer work in this field.
- Limestone terrains with open solution channels provide both wells for water supply and adjacent wells for waste disposal. The work of engineers planning water and sewerage systems is facilitated by resource surveys showing where this type of terrain exists.
- If soil is relatively impermeable, use of certain human waste disposal systems will result in malodorous and unhygienic conditions. Planners of public and private housing should avoid this unhealthy pitfall.
- If highways are built through highly erodible land, erosion control is essential to conserve neighboring soil and streams.
- If highways are built over land which contains valuable mineral resources, right-of-way becomes expensive, and the resources are unavailable for economic development.
- If landscapes are scarred, archaeological treasures inundated or virgin land and water defiled, the damage is irreparable and the loss unmeasurable, both in aesthetic and commercial terms.
- Local areas may suffer loss of potential mineral land tax revenue because precise information is lacking as to the location and extraction potential of mineral resources within their taxing jurisdictions.
- Foresighted resource analysis and environmental planning can help the local planner make wise investment decisions and facilitate his application for various types of funds which are available to finance activities in his area.

The planning activities of Washington County, Pennsylvania, furnish an excellent example of these benefits. Traditionally a coal-mining economy, the county was urged to consider making large-scale investments in reservoirs which would serve as the center of future recreational activities. Before making the decision, this county obtained professional advice on mine drainage, surface subsidence and the value of minerals in the area that would be affected by the reservoirs. As a result of these studies, it was decided that while construction of some of the reservoirs was feasi-

ble, others should not be built because of the negative overall effects of mining on the area. Time was saved, and unwise decisions were avoided.

At another time, when federal agencies were inventorying mine drainage sources in part of the same county, county officials hired their own personnel, arranged to have them trained by federal scientists and took the initiative in completing an inventory of the entire county. When mine drainage pollution control funds became available from the state government, Washington County was ready to file and immediate application, complete with all necessary detailed backup information.

The importance of environmental planning in connection with specific projects is being recognized more frequently by governmental bodies at all levels. For example, in 1968 Congress added to the federal highway legislation a clause requiring that in submitting plans for a federally aided highway project a state highway department must certify that it has considered the "economic and social effects of the location of the project, its impact on the environment and its consistency with the goals and objectives of such urban planning as has been promulgated by the community." The additional words reflect the growing concern of lawmakers that our environment be conserved and the

use of our natural resources planned.

Environmental resources are of two basic types: biological or living (plants and animals) and physical (air, water and land). Ecology is the science which explains the nature of the living resources in terms of the physical environment within which they are found and then describes the effects that the biological and physical resources have on each other. In this broad sense every element of the environment is important in creating a plan for economic development and understanding its long-term effects.

But in developmental planning, some aspects of the environment are more important than others—especially those aspects of the physical and geological environment that significantly affect other economic and social development projects, such as:

- AIR. Man can live only a few seconds without this essential resource. Yet we are polluting it with: exhausts from motor vehicles, airplanes and ships; smoke and gasses from residential heating; wastes from industrial plants (especially steel, oil refining and coal-fired steam power); waste from mining; and certain construction materials, such as silts and sands, which are light and easily blown about, and which are frequently improperly stored. Public Health Service figures show that 72 million tons of carbon monoxide, 26



Devastating result of strip mining without reclamation planning.

million tons of sulfur dioxide and 12 million tons of uncaptured airborne particulate matter were dumped into U.S. air in 1965. This pollution causes corrosion of materials, human illness—much of it serious—and personal discomfort.

□ WATER. Water comes from two sources—streams and underground flows.

The quality of stream water is affected by two major factors: the biological systems which inhabit the streams (whose tenants range in size from bacteria to mammals as large as beaver) and the chemical processes which take place in the stream water. Any human activity which affects either of these factors will determine whether the water will be usable and at what expense. Prime examples are the discharge of human and industrial waste. Stream water quantity is also a matter of public concern. Planning can assure that future water supplies will be sufficient to meet total needs, and streams with unique qualities (for example, the "white water" rapids which attract adventurous tourists) can be preserved for special-priority uses. Flow of streams can also be controlled to prevent damaging torrents and floods.

Underground water performs two important functions: when it comes to the surface, it is a major source of supply, sustaining the flow and quality of streams; if it remains underground, it influences the performance of soils, rock strata and mineral resources. Underground water is "recharged"—and may be purified—by surface water which seeps down through the soil, subsoil and rock. If these upper layers are contaminated, however, the underground water is also contaminated by the recharging process. In order to maintain needed supplies of highquality underground water, its use must be carefully planned, and there must be control of waste disposal which takes place in the subsurface rock strata and on the surface areas where recharge of underground water occurs.

□ LAND: SOIL AND TOPOGRAPHY. Soil is used for farming; it is frequently a mineral resource (as in the case of sand, gravel and clays); and it plays an important role in the construction of buildings and highways and in the operation of many systems of waste disposal. Since soils vary greatly in composition, their responses to water and gravity also vary. These variations have important effects on the productive capacity of the soil and on its ability to support heavy loads, serve as a medium for

waste disposal or hold its shape and slope after excavation. Variations in topography—hills and valleys, plateaus and ridges—also play an important role in economic development. When we do not know about these differences or fail to recognize their importance in the planning process, the result is irreversible erosion, smelly waste disposal plants, highways that fall apart and buildings that sink.

□ LAND: ROCK. Although we use rock strata in the deeper subsurface layers of the land less frequently than we do the soil, these layers are of critical importance. They are a source of raw materials, including water; they serve as disposal sites; and they give the land "backbone" so it can support heavy structures on the surface. Improper use of this resource results in jeopardized water supplies, ineffective disposal systems and damaged buildings and highways.

□ LAND: MINERALS. The man-minerals relationship has written many of the most important pages in history—gold in our American west, diamonds in South Africa, uranium in Canada, oil in the Middle East and coal in Appalachia. However, the methods used to extract and purify these minerals have frequently degraded our water supplies, contaminated our land, polluted our air, caused subsidence of our land surfaces—and wastefully depleted our supplies of the minerals themselves. Long-range planning of mineral resource extraction can avoid these problems.

One example of this kind of planning is the multiple land use cycle developed in certain extractive industries where the minerals are found on or near the surface and excavation sites can be filled and then used for other purposes. For example, the phosphate industry in Florida and the sand and gravel industries in New Jersey have transformed excavation sites into artificial lakes, which could be used for recreational purposes. In Western Maryland, strip coal mining areas are being filled with city refuse and will be planted over with trees and grass. In the future, these areas may be used as open-space recreational sites.

□ LAND: HISTORICAL, AESTHETIC AND ARCHAEOLOGICAL SITES.

Certain pieces of land are "where the action was" in our history. Others are superbly scenic, ecologically unique or geologically unusual. They are finite in number and unreproducible, and should be identified and preserved as part of our visual and

inspirational heritage.

STEPS TO INCORPORATE ENVIRONMENTAL FACTORS INTO LOCAL DEVELOPMENT PLANNING

All of the environmental elements described above should be considered by local planners in determining what kinds of development are feasible or preferable in an area.

Information about the natural resources or geologic makeup of an area may be useful in determining overall development goals or objectives or deciding upon priorities among projects. Once these are determined, however, several steps should be taken to assure that information about the environment is incorporated into project planning. Each planner should:

1. Determine what environmental information is essential to plan a project.
2. Survey how much information is readily available from existing sources and obtain it.
3. Organize efforts to obtain the remainder of the required information through consultation with professionals or appeals to local, state and federal agencies for expertise, or funds to hire experts.
4. Incorporate this environmental information into plans and project proposals.

Most information about our physical environment is usually presented in map form. Table 1 is designed to help the planner make a decision as to which maps would be most valuable in relation to a specific problem area. The left-hand column shows six major categories of planning assistance decisions: construction (which contains several important subcategories), recreation, mining, cleaning up the environment, preservation of prime agricultural land and preservation of the heritage. The righthand column of the table shows the environmental maps which are most useful to planners, arranged according to the major categories of physical resources. The middle column performs a selection, indicating which maps would be of greatest value for each specific type of planning decision.

For example, if a planner is considering the construction of an industrial park, the maps which would be most relevant are those indicated by the arrows. They are:

- (1) Zones showing ability of areas to tolerate air pollution resulting from new industrial activity
- (5) Size of area required for sep-

tic tanks or sewage disposal facilities.

(6) Liquid waste acceptance capacity of soil and cost per 1,000 gallons

(7) Volume of solid waste which can be accommodated per acre and cost per acre of disposal

(8) Ground water level and yield

(9) Soils by origin

(10) Soil Slide zones

(11) Areas requiring intense rock blasting

(12) Rockfall and landslide zones

(13) Capacity of rock to accept liquid and solid waste

If, in addition, the area under consideration is one where mining has taken place in the past, maps (14) through (17) would be valuable:

(14) Cost per acre for reclamation

(15) Subsidence zones

(16) Underground mine fire areas

(17) Cost per cubic yard or acre for refuse treatment or for quenching or burial of mine fires.

Most maps listed in this table have been specifically designed to meet the needs of development planners. The drawing "Preparation of Environmental Maps" illustrates schematically how such maps are prepared. Raw basic data are collected and measured, then organized and presented graphically. The basic data maps are then interpreted and translated into terms which have practical meaning to the planner. In the example shown on this drawing, geologic data on the various types of rock found in an area are ultimately translated into maps which show how much it would

cost to pump 1,000 gallons of water in various parts of that area.

Following the sequence shown in this schematic presentation, Table 2 shows in detail the steps required to prepare the 18 maps which are valuable in making specific planning decisions—the same 18 maps which were discussed earlier in the article and listed in Table.

The left-hand column of Table 2 shows for each resource category the basic environmental data required; the next column lists the basic data maps which can then be prepared. The third and fourth columns show the data interpreted and translated into the final planning maps.

Sources of information for each of the four steps are shown at the bottom of each column.

TABLE 1: ENVIRONMENTAL MAPS VALUABLE IN LOCAL PLANNING

TYPES OF DEVELOPMENT	MAPS NEEDED	TYPES OF MAPS USED IN PLANNING
CONSTRUCTION	All maps listed in the next column would be valuable in planning construction. Map 4 and maps 14 through 17 would be particularly important in areas where mining and agriculture are or have been significant activities. Map 18 would be relevant only in areas where special sites are located. Listed below are the maps which would be most useful for each category of construction:	(1) Zones showing ability of areas to tolerate air pollution resulting from new activity
	Industrial parks and manufacturing plants	1, 5, 6, 7, 8, 9, 10, 11, 12, 13
	Public buildings	1, 5, 8, 9, 10, 11, 12
	Public utilities	
	Water systems	2, 3, 8, 9, 10, 11, 12
	Waste disposal facilities	5, 6, 7, 8, 9, 10, 13, 17
	Electric power plants	2, 3, 9, 10, 11, 12
	Transportation facilities, including highways	8, 9, 10, 11, 12, 15, 16
	Housing developments	5, 6, 7, 8, 9, 10
	DEVELOPMENT OF RECREATIONAL FACILITIES	Map 18 is of critical importance in this category. If construction of a facility is required, the maps listed above would be valuable. If the recreation facility is to be developed on an area where there has been mining activity, maps 14 through 17 are particularly useful. Maps 2 and 8 are of basic importance in development of any recreational facility.
MINING DEVELOPMENT, CONTROL AND RESTORATION	All maps would be valuable in this type of planning. Maps 14 through 17 would be particularly important in areas where there has been mining activity. Maps useful in the two categories below are:	(11) Areas requiring intense rock blasting (12) Rockfall and landslide zones (13) Capacity to accept liquid and solid waste
	Determination of commercial extraction sites	14, 15, 16, 17
	Mine waste disposal	6, 7, 8, 9, 10, 13, 17
CLEANING UP THE ENVIRONMENT (Air, land and water pollution control)	1, 5, 6, 7, 8, 9, 10, 13, 14, 15, 16, 17	(14) Cost per acre for reclamation (15) Subsidence zones (16) Underground mine fire areas (17) Cost per cubic yard or acre for refuse treatment or for quenching or burial of mine fires
PRESERVATION OF PRIME AGRICULTURAL LAND	2, 3, 4, 6, 8, 9, 10, 14	(18) Location of historic, aesthetic and archaeological sites
PRESERVATION OF THE HERITAGE	2, 8, 18	

In order to demonstrate the use of Table 2, let us return to the example of the planner who is interested in developing an industrial park. We found that six maps which would be relevant to his problem (numbers 5, 6, 7, 8, 9 and 10) were in the resource category of SOIL. Table 2 shows that in order to construct these maps the planner would need:

1. RAW BASIC DATA describing the location, distribution, composition, thickness and types of soil plus the history of origin of the area and its elevation above sea level at various points. From these data would be prepared

2. BASIC DATA MAPS: maps of soil, contour and land form.

As indicated in the bottom portion of the table, basic data can be obtained from various state and federal departments and commissions. For most areas, the soil map is available from the State Department of Agriculture and/or the U.S. Soil Conservation Service. Contour maps may be obtained from the State or U.S. Geological Surveys or the U.S. Army Map Service, and land form maps from the Geological Surveys or the Aeronautical Chart Information Service.

3. INTERPRETED DATA MAPS would then be prepared showing the thickness, fertility and engineering quality (such as permeability) of the soil, the degree of land slope and the location of flood plains. This information would then be translated into:

4. MAPS USED BY PLANNERS, in this case maps (5) through (10), dealing with such practical concerns as the size of area required for a sewage disposal facility, cost per 1,000 gallons for disposal of liquid waste, cost per acre for disposal of solid waste, the volumes of both liquid and solid waste which can be accommodated in different areas, and information showing which areas should be avoided because of the danger of soil slides.

The maps in the last two columns of Table 2 are not generally available to planners. They represent specialized analyses of basic data maps enriched by interpretation of other relevant engineering, technical and economic information, and are usually constructed by teams of natural resource scientists who can furnish expertise in geology, engineering and economic analysis.

How can a planner obtain the maps he needs? The answer to this question depends on the professional competence of his staff in the specialized fields described above. If the staff has the necessary training and experience, the basic geologic data can be obtained from the sources indi-

cated at the bottom of Table 2. Other technical and engineering information can then be gathered and the final tables prepared.

If the planner's staff does not include experts capable of doing this type of analysis:

- Competent personnel can be added to the staff.
- Local, state and federal agencies can be stimulated to furnish the required expert assistance.
- Professional services can be purchased from nongovernmental sources.

The following box lists the state agencies which may be able to furnish either technical assistance or funds to finance the purchase of such assistance.

AGENCIES USEFUL IN ENVIRONMENTAL PLANNING

The local planning and development district in your area should be able to offer assistance and serve as the coordinator of environmental planning efforts. The following state agencies might be contacted for information or technical advice:

- 1) Geological Surveys
- 2) Mineral Resources Agencies
- 3) Soil Surveys
- 4) Water Resource Agencies
- 5) Environmental Health Divisions of Health Agencies
- 6) Environmental Conservation Practices Departments
- 7) Commerce Agencies
- 8) Public Utility Commissions
- 9) Wildlife Commissions
- 10) Forestry Departments
- 11) State Appalachian Offices

TOOLS AVAILABLE TO IMPLEMENT LOCAL PLANS

This article has discussed the four steps that need to be taken to incorporate environmental factors into local development planning; determining what environmental information is essential; obtaining whatever is available from existing sources; organ-

izing efforts to obtain the remainder; and incorporating all relevant environmental information into plans and project proposals. The tools used by the planner in these four steps are primarily technical—data, maps and professional expertise.

Once these four steps have been completed, the final and most important step remains—translating the plans and project proposals into reality. This step requires other types of tools, primarily administrative and institutional in nature.

LEGISLATION. Certain types of local legislation can be effectively used by the planner in implementing his programs: zoning restrictions for land, water and air use; codes or standards of quality, as in the case of construction; and rules and regulations (including a system of consistently imposed fines and penalties), which may be passed by local legislative bodies to control various types of activities. In addition, the planner can stimulate interest in state and federal legislation which will encourage environmental planning at all levels.

SCHEDULING. One of the most important aspects of any plan is the timing of various activities which are scheduled to occur. Planners can use scheduling as a tool to insure that the physical environment is strengthened rather than depleted. For example, if there is need for clean water at a certain location on a stream, it may be more effective to schedule control of upstream industrial waste dumping before constructing a water purification plant. After the source of pollution has been brought under control, the need for downstream purification can be reassessed and appropriate measures taken.

BUDGET AND FINANCE. Working with local legislative bodies, planners can determine where money needs to be spent and then raise part of the money through taxes, user fees and permit and license fees. These local fiscal tools can be used to reward development activities which conserve our environmental heritage and discourage those which do not. Many resource analysts believe that the use of our public resources, such as air and water, is a privilege which should be paid for, particularly when their use results in their degradation. They also feel that the money obtained from these payments should be used to restore the resources to their original condition. A local use tax on stream water, for example, can be an effective method of financing the purification of water which has been polluted during industrial use.

TABLE 2: DATA AND MATERIALS NEEDED TO PREPARE ENVIRONMENTAL MAPS

1. Basic Environmental Data		2. Maps of Basic Data		3. Interpreted Basic Data Maps	4. Maps Used in Making Specific Planning Decisions
AIR	Air pressures Moisture content Components Wind velocity	Airsheds map (a)		Patterns of pollutant distribution as affected by time of day and season	(1) Zones showing ability of areas to tolerate air pollution resulting from new industrial activity
WATER	Distribution Amount Quality	Groundwater geologic map and hydrologic atlas (b) Topographic map showing valleys and streams (c)		Water-supplying strata Groundwater recharge areas Groundwater quality Surface water flow	(2) Water yield per well or acre foot (3) Cost per 1,000 gallons of water
LAND: SOIL AND TOPOGRAPHY	Location Distribution Types Permeability Composition Thickness Elevation above sea level History of origin	Soil map (d) Topographic map (d) Land form maps (b) Orthophoto map (b)		Thickness Fertility Engineering qualities such as permeability Degree of slope Flood plains	(4) Agricultural products grown, including productivity and dollar value per acre (5) Size of area required for septic tanks or sewage disposal facilities (6) Liquid waste acceptance capacity and cost per 1,000 gallons (7) Volume of solid waste which can be accommodated per acre and cost per acre of disposal (8) Ground water level and yield (9) Soils by origin (10) Soil slide zones
LAND: ROCK	Distribution Thickness Composition Engineering qualities	Geophysical map (b) Geophysical map Orthophoto map (b)		Strata engineering qualities	(11) Areas requiring intense rock blasting (12) Rockfall and landslide zones (13) Capacity to accept liquid and solid waste
LAND: MINERALS	Location Distribution Amount Composition	Resource geologic map (b)		Mineral quality or quantity distribution Depth and type of overlying soil and rock Mineral areas Mine refuse areas	(14) Cost per acre for reclamation (15) Subsidence zones (16) Underground mine fire areas (17) Cost per cubic yard or acre for refuse treatment or for quenching or burial of mine fires
LAND: SPECIAL SITES	Location				(18) Location of historic, aesthetic and archaeological sites

Basic environmental data may be obtained from:

(a) Data sources listed in the next column.
(b) State and federal departments which carry on construction activities, such as agencies responsible for: water resource development, mines and minerals, highways, public buildings, public construction review bodies. For information as to whether and where these data can be obtained for a specific area, call or write the STATE GEOLOGICAL SURVEY (or its equivalent), the MAP INFORMATION OFFICE, U.S. Geological Survey, Room 1038, General Services Administration Building, Washington, D.C. 20242 or the GEOLOGIC INQUIRIES GROUP, U.S. Geological Survey, 801 19th St., N.W., Washington, D.C. 20242.

(c) Local and state public utilities commissions (for value and services information on water, gas and coal).

Types of Maps Published by Government Agencies, available at MAP INFORMATION OFFICE (address at left) includes addresses where maps may be ordered.

Maps in this column may be obtained from:
(a) Not generally available, but currently being developed for some areas by State University Meteorological Schools and local Weather Bureau meteorological stations.

(b) May be available from State Geological Survey. General information on U.S. Geological Survey maps, publications and open file reports from GEOLOGIC INQUIRIES GROUP (address at left). Maps from WASHINGTON DISTRIBUTION SECTION, 1200 Eads Street, Arlington, Virginia 22202. Copies of reports containing maps from SUPERINTENDENT OF DOCUMENTS, Government Printing Office, Washington, D.C. 20402. Inquiries on water resources to: Mr. James Randolph, Inquiries Unit, WATER RESOURCE DIVISION, U.S. Geological Survey, Washington, D.C. 20242.

(c) Information from MAP INFORMATION OFFICE (address at left) and maps from WASHINGTON DISTRIBUTION SECTION (address in (b) above).

(d) Soil and topographic maps from sources in (b) above and from Commanding Officer, U.S. ARMY TOPOGRAPHIC COMMAND, Attention: 16230, Washington, D.C. 20315.

Aerial photographs usually available at State Departments of Commerce or Agriculture. Also write MAP INFORMATION OFFICE (address at left).

These maps are not generally available.

For some areas, they may be obtained from sources cited for basic data maps (see column at left).

If not available, they can be constructed by a professional geologist from basic data, available data maps and other relevant engineering, technical and economic information.

These maps, which are based on special analyses of basic environmental data, are not usually available, but can be constructed by physical resource teams using data and maps described in left-hand portion of this table.

□ ORGANIZATION OF COMPACTS. One of the most effective—and least used—tools available to local planners and legislatures is their ability to organize into compacts. Compacts are of various types. They may be intergovernmental (combining town-

ships, counties, development districts or states) or interdisciplinary (bringing together experts from various professions). They may be formed to study problems, to propose plans or to carry out programs. They may deal with many resources or with

one, as in the case of watershed compacts, which have been organized because state and local officials have realized the inefficiency and expense of handling water and sewage disposal on a community-by-community basis.



New growth on a 4-year-old shortleaf pine plantation of 30 acres covering a strip mine area.

U.S. Soil Conservation Service Photo.