Trends

Incorporating
Guideline

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Trends in Environmental Education

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Environmental Education: A Cornerstone of Park Interpretation

by Bill Dunmire

"Of course environmental education is a part of our interpretive program—how could it be otherwise"? So pronounced a friend in the business of interpreting parks not long ago. His particular park did not happen to have a formal environmental education program for school classes. Yet to him it was obvious that an understanding of environmental relationships, including the human factor, is fundamental to any park story; that both the message and methods of environmental education could not help but be an underlying cornerstone of contemporary park interpretation.

Why, then, does the myth of separateness of the two functions somehow persist in the minds of more than a few park interpreters, managers, and environmental specialists? You sometimes hear that environmental education is fine for school groups but that it somehow does not fit into the interpretive theme of a particular park, as though environmental education were some sort of appendage that, depending on its relevance to specific park features, may or may not be attached to the whole. Not so, of course, and I would hope to make the case here for recognizing a oneness of philosophy and approach, for an integration of the spirit and carrying out of environmental education within the field of interpretation.

A brief review of how we have arrived at where we are today is in order. A formal program for interpreting national parks to visitors originated in the 1920's when it was recognized that parks presented an unparalleled opportunity for public education as well as serving a role as "pleasuring grounds." Interpretation is those days centered on acquainting visitors with the natural (and, later, historic) features of a park and providing first-hand explanations of these features. In ensuing years interpreters expanded their explanations to cover the interrelationships between the indigenous plants and animals, and brought into the equation the relationship with the parkland itself. But interpretation remained inwardly focused on resources in the immediate area of the park.

More than a generation later the nation abruptly awakened to a realization that all was not well with its land; Stewart Udall's "quiet crisis" had thundered upon the national consciousness. At the same time,

park managers were becoming acutely aware that their boundaries could hardly serve as barriers that would stem the tide of environmental degradation pressing on all sides from outside the parks. Parks no longer could be thought of as existing in a vacuum.

In the late 1960's the National Park Service began to move in two directions toward facing the environmental crisis. The first addressed the parks themselves, evolving from greater management concern for the park environment and the increasing pressure by visitors upon it. Environmental conditions within any given park were acknowledged as a prime influence on the quality of experience that a visitor might enjoy. Therefore, if parks were to serve as outstanding examples of natural or historic environment free of disruptive impact by modern man, management would have to act on this premise: that parks must *do* so as they *said*.

But the Service also began to recognize that it had an opportunity as an instrument of the Nation's educational establishment to foster a national environmental consciousness among its visitors. This would be done through embodying a total-environment approach in its interpretive programs. Only by making parks themselves relevant to the evolving society of which they were part could the park system itself survive.

With the launching of the National Environmental Education Development (NEED) and National Environmental Study Area (NESA) programs in 1968, the Service extended its educational efforts beyond the traditional limits of park boundaries. Parklands would henceforth serve an additional purpose—places where students might take environmental concepts learned in the classroom and apply them to natural surroundings.

Meanwhile, traditional interpretation had evolved to the point of incorporating environmental awareness as one of its principal goals. Environmental awareness meant helping visitors to expand their perception of immediate surroundings—leading them to derive a fuller satisfaction from experiencing the exciting diversity of color, texture, sound and motions of the world around them. A greater appreciation of natural and cultural surroundings and an understanding of the processes linking each element to the whole environment could lead to more responsible ecological behavior—both within and out of the park.

Achieving greater awareness often required stripping away the physical barriers that separate visitors from the park environment. And the great barrier of our time, paradoxically, has been our accustomed means of transportation. In the words of Douglas MacAgy from his poem "Turnabout in a Roundout,"

> . . . A car is a seal of comfort
> It is also a cell of culture
> From behind its windows we joke our way through nature
> Ours is a world apart, a peek-through world
> But the safety glass is two-way.

So, one direction taken by sensitive modern day interpreters has been to guide visitors toward discovering that they must leave their "seal of comfort" in order to gain an enriching park experience. "Get them out of their cars and into the parks," became the watchword.

Unfortunately, an ingredient often missing in environmental awareness programs, at least in the natural areas, was the human element itself. But the living history interpretation programs that were evolving independently in parks across the country contributed much toward bridging this gap. Many of these historic role-playing and demonstration programs brought into focus how cultures and societies have been shaped by their environment and have influenced their natural surroundings. The individual's place in the total environment, from place in the food chain to position in the history of culture, took on new meaning as visitors were exposed to living history interpretation.

While living history interpretation related peoples of the past to historic environments, environmental educators were emphasizing the role of humans in today's environment.

The formal curricula developed for classroom students places heavy stress on human interdependence with the environment, showing the way for park interpreters to incorporate this in their resource-based interpretive presentations. Interpretation today, then, draws

from the spheres of both living history and environmental education in defining a new concept of environment for the visiting public.

Perhaps the greatest contribution of environmental education to the larger function of interpretation has been the injection of a new methodology—that of *involving* visitors in our interpretive events, not as mere spectators but as participants. Virtually all of the many new curricula are based on a tenet of direct interaction between student and nature. Steve Van Matre's approach, *Acclimatization*, (see p. 12) is just one good example where the stress is on immersing the whole person in the *feelings* of his or her surroundings. Van Matre has developed a technique of taking kids into the outdoor world and, through the framework of various perceptual exercises, leading them to discover and develop their own feelings for environment—what he calls the "interpretive encounter." But the youngsters don't think of it as learning—to them it is just plain fun.

If interpretation through immersion and discovery is fun and has lasting benefits for kids, why not for adults? So parks have experimented with activities that would directly involve their visitors with natural surroundings. Two successful immersion programs developed a continent apart immediately come to mind: the "slough slog" at Everglades and the ecology float trips at Yosemite. There are now many others being offered in parks throughout the country. The new breed of interpreters are finding that the more visitors will participate by using all their senses, by making their own discoveries and by getting into the thick of any given environment, the more they will carry away from the experience.

But participation and involvement should not be thought of as limited to physical activities. If we are aiming toward shaping an environmentally conscious and concerned citizenry, we must involve our visitors' minds as well. The U.S. Forest Service, for example, has developed an environmental education curriculum that strives toward giving participants a basic understanding of ecological relationships, equipping them with mental process tools that enable them to develop their own criteria and conclusions on any particular environmental situation or problem. Park interpreters, too, are incorporating this approach, knowing that if visitors can take with them an increased understanding of natural processes when they leave the confines of the park, then, as citizens, they will be better able to make ecologically sound decisions as they vote on community issues, elect political representatives, and as they directly act upon the environment itself.

Revealing the intricacies of a park story, encouraging attitudes of respect and concern for the total environment and leading visitors to discover and think for themselves has become the accepted role of interpretation. Today, however, we are hearing of another horizon for park interpretation that goes beyond enjoyment and learning in the traditional sense. It is based on the supposition that parks are places that can offer a particular kind of experience seldom encountered in the modern technological world—a total personal involvement with the environment at hand.

Interest in the possibility of expanding interpretation into the area of personal

environmental involvement has been stimulated by the research of Dr. Arthur J. Deikman, a young San Francisco psychiatrist who has recently addressed his theories to some National Park Service interpreters. Deikman is concerned with the division of the human personality into two basic attitudes, or "modes," of behavior. He has shown that humans program their minds into one or the other of these two modes.

One, which he terms the "action" mode is the more prevalent, or dominant, in most Americans, who are largely concerned with problem solving. It is a state of mental and physical striving, a state of doing. In contrast, the "receptive" mode is that division of the personality which is reflective, which is contemplative rather than action oriented. A person who has programmed himself at any given moment in the receptive mode allows himself to be nourished through all his senses by his surroundings. If interpreters could help park visitors to call upon the receptive rather than the action mode of their personalities, their appreciation of park values might be considerably heightened.

Recognizing that humans have the capacity to shift into a receptive mode of consciousness enables interpreters to lead visitors into situations within a park where they can make the shift. It may be nothing more than leading people to contemplate and feel the richness of a particular setting of beauty in a park without posing or answering the traditional questions of how and why. A few of these kinds of experiences can powerfully shape a person's attitude toward environment and can be a beginning in developing a new personal value system.

Experiential interpretation has found particular appeal among our growing clientele of young adult visitors. This segment of our visiting public, who today are intrigued by a "back to nature" movement, always have tended to steer clear of traditional interpretive events. Yet as a group they are the very ones seeking to establish personal identities and to formulate personal value systems. Park interpretation can and must address itself to youth, and, as a very logical offshoot of the philosophy and methods of environmental education, experiential interpretation is proving to be one effective way of achieving it.

In the past decade we have been witnessing a quickening convergence of the goals and methods of environmental education with those of park interpretation. It seems to me that we have arrived at the focal point where they are one and the same. In any case, parks can no longer afford the luxury of dividing their resources between what has too often been two competing activities, for, in essence, neither competes with the other.

In the National Park Service a stated objective (from the soon to be republished NPS Administrative Policies) of our interpretive program is to communicate an understanding of the forces that shape the environment, an awareness of the individual as an intergral part of the environment, and man's dependency upon and responsibility for the quality of his environment. The objective is one that easily applies to state and local park interpretive programs as well. To achieve this objective requires that we first interest, then motivate the entire spectrum of park visitors.

In one sense the environmental education cornerstone is an avenue to what Freeman Tilden told us we ought to be doing a generation ago. He said, "Here lies the greatest challenge to the interpreter who works in the field: what to do; what to say; how to point the way; how to connect the visitor's own life with something, even one thing among all the custodial treasures; how finally to elicit from the aimless visitor the specific thought: 'This is something I believe I could get interested in.'"

Bill Dunmire has been the Chief of Interpretation for the National Park Service since 1973 and is presently the Acting Director for Interpretation. His Division has the responsibility to represent at the Washington level all National Park Service interpreters, and to develop national policies and priorities for interpretive services conducted throughout the National Park System.

The environmental education program is one part of the overall interpretive operations of the National Park Service. This program has a two-fold aim: (1) to develop a public understanding of the forces that shape the total environment and (2) to produce individual awareness of man's dependency upon and responsibility for environmental quality. The Division of Interpretation works closely with the regional office staffs in coordinating current environmental edcation programs and in developing new programs.

The intent of this issue of TRENDS is to inform others of some of the various styles and contents of a few environmental education programs of the Service, and the philosophy that underlies these programs.

Roundtable on Environmental Education

The following roundtable discussion with Gary Everhardt, Director of the National Park Service explores some of the important issues surrounding the development of environmental education programs in parks, schools and in the community.

Joining Mr. Everhardt are: William Dunmire, Acting Director of Interpretation for the National Park Service; Dick Cunningham, Chief, Division of Interpretation, Cape Cod National Seashore in South Wellfleet, Massachusetts; Nancy Strader, an Environmental Education Specialist with the Klingle Urban Environmental Center of National Capital Parks in Washington, D. C.; and Sandy Walter, Interpretive Specalist with the New York Group, National Park Service.

Mr. Dunmire: Our thought today is that this would be a good opportunity to hear from the new Director your ideas about environmental education, and we've brought three people in who represent a good cross-section of field personnel who are involved in the interpretation of environmental education.

So maybe we could start with your giving some general thoughts as to how you see environmental education and its role and mission in the National Park Service.

Director Everhardt: One of the goals that we have set, as the new Director of the National Park Service, is one that I hope is going to result in a renewed emphasis in the total umbrella that is spanned by interpretation. I think that in recent years we have suffered some cutbacks that have affected our effectiveness in interpretation. We hope to communicate to the field area a renewed emphasis, a new statement of our goals with respect to interpretation.

We think that we will see an exciting and a new time for people that are located in the parks, that are communicating the objective and the goals, what the purposes of these parks are in administering to the mind and the spirit of Americans as they visit a National Park Service area.

I feel environmental education is certainly one of the very important purposes

Director Everhardt

of our goals and objectives in interpretation.

I am very excited about the possibilities of giving young people the opportunity to associate the natural environment that surrounds them with every day practical kinds of experience under some kind of a curriculum, so that we can begin to shape their attitudes toward environment. In the future they are going to be making the important decisions about what happens to our land-managing agencies. The National Park Service is one of them along with others—the Bureau of Land Management, Army Corps of Engineers, Forest Service, as well as many of the state land-managing agencies.

Ms. Walter: Do you think we should encourage park interpreters to use the kind of techniques that have been developed in environmental education, more of the inquiry-discovery type of approaches than, say, more standard format?

Director Everhardt: Well, I think we should find some way to invite the general visitor to a park to become involved in environmental education. And certainly, I see that there is a great opportunity to utilize some of the techniques that have been developed in our interpretive programs with the visitor.

I think that one of the greatest opportunities I ever had, as Superintendent, was to attend some environmental rap sessions that we had in our campfire program and to view actions of the people, and the interplay that takes place—you just become a catalyst to get this thing started. It was of great benefit to the management of the park in making some decisions about some problem areas that we had.

Mr. Cunningham: From my own experience, Mr. Everhardt, I think ever since the beginning, in the early development of the environmental education program, it has been the general public or the schools themselves who realized the significance of what we had to offer in environmental education. To me it seems that some of the greatest obstacles are within our own park family. What I'm wondering is what we can do to re-emphasize the significance of environmental education as a part of our total park program, to our own people.

Director Everhardt: I think you are right on that, Dick. I would like to say that if there is any way I can convince people through this roundtable discussion, that anyone who has an idea about environmental education, and wants some assistance on setting up an environmental education center, either through a cooperative agreement in their park or nearby in the region, that person is going to have every support that I as the Director can give him.

This is not to say that everybody's going to be totally successful in their efforts because there are no doubt some constraints or restraints that would have a bearing on individual situations. But, I would be hopeful that this office and the regional offices, would give total support to the idea of environmental education.

Mr. Dunmire: I think one of our own problems is that our park family looks at environmental education as just talking to school groups and what we're seeing here, all of us, is that this is a much bigger concern. It's both a philosophy and perhaps a method of carrying out that philosophy.

Ms. Walter: What are some of the environmental education programs you feel are the ones that are really right on target?

Director Everhardt: I can only speak from my own experience, Sandy.

I have just recently come from a park where we did start an environmental education center from a facility that was made available to us. We had an environmental education specialist who had other duties and so we assigned the primary responsibility of coordinating an environmental education program through a cooperative agreement with a science school.

The program was cost free to the government. The science school even took over certain maintenance responsibilities for the facility. There was a charge to the students who came there. We were trying to encourage attendance by an entire class, and were hopeful of building a grant type of program whereby all the students could attend even if the parents were unable to afford it or the school itself was unable to afford it.

The encouraging thing about this program was the interest generated by the young people who were allowed to stay in the park environment for a week, and were given a certain kind of experiment to carry out. They had projects to follow up on that tended to be of their choosing. They weren't commanded to do this, it was something that stimulated their interest. The guidance that was given them was important to relate their experiments and experiences to the natural environment, to indicate to them the role or the place that man has among the many other factors of natural environment, so that they would be more aware of it. The ultimate objective was to give them the background knowledge to enable them to make informed decisions about the environment.

Another offshoot that I think was a real

Ms. Walter

Mr. Cunningham

advantage was the way these students were affecting their parents. They went back and talked about some of the difficult issues that were facing that park, facing that community, and also facing that region, in many areas that related to the management of land.

Ms. Walter: I don't think we should ever take just the park story by itself. In New York for example we relate the parks to the significant things in the New York environment.

Director Everhardt: Well, I think you are right. You know, parks cannot exist alone. They have a very defined and definite relationship with the community, with the area surrounding them, with the region that they exist in. I think the environmental education message must be interrelated to all of those different communities, inside and outside the parks, and how they affect each other as they make certain decisions and take certain courses of action.

Mr. Cunningham: I would appreciate any thought you might have on what we could do with teachers, because these are the individuals that year after year are going to be reaching the children that we ourselves cannot reach.

Director Everhardt: I think that one of the programs should include bringing teachers onto the scene. Certainly, the teachers in the situation that I was associated with did come and did stay with the students during the period of time that they were there. I would see no reason that we couldn't develop a program that would even make an approach like this more widespread, as you say, primarily defined and developed for the teachers themselves.

Mr. Cunningham: Including the teachers that are in college.

Director Everhardt: Right. We had arrangements with the colleges in the region surrounding Teton, the five states contiguous to Wyoming, for their students who were aspiring to become professional teachers involved in the Teton Program.

We had teachers coming in for three-day workshops, lectures, and seminars with our park personnel and the Teton Center staff working and participating in the programs.

And I can only say that when we first proposed this idea there was tremendous opposition to it. We were removing facilities from an operation that had been of some economic advantage to the area and a lot of people felt the Service was getting into an area of education that we shouldn't be in. To me there's such a fine line between interpretation and environmental education that I don't know how you can separate the two. After two years of operating, it was amazing to see the change in attitudes. I don't know whether the young kids, the young people, had that much of an affect or whether people just had an open mind to the point where they could see the great advantages that were being achieved and that changed their attitudes.

Ms. Walter: One of the things we are doing in New York in our environmental education center is working on a fifty-fifty basis with the New York City public school system, in that we put one person in and they put one person in; and we put X amount of dollars in and they put X amount of dollars in. How do you feel about those kinds of very closely cooperative programs?

Director Everhardt: You know, I'd be in favor of any new ideas that get the job done.

I think there must be lots of ways to approach it. We used one, you have another, Dick has an approach, Nancy has an approach to it—I would like to see all of these ideas come in and be massaged and ferment a little bit into something that we at the Washington level could share Servicewide.

Ms. Strader: This issue of TRENDS is one way of doing it, finding out who is doing what in what locale and matching it with similar kinds of needs and similar regions.

It seems to me there is a crying need not only within the Park Service to do that, to have some kinds of exchange of information, but to find out if other government agencies are doing the same things. We're all trying for the same goals, all trying to spread the good news.

Mr. Cunningham: There are many private organizations and conservation groups that have very good, viable environmental education programs which we need to know more about, because they have things to offer, just as we certainly have many things to offer.

We need a better grasp of what's going on with other people and their environmental education programs, too.

Mr. Dunmire: Well, Gary, in looking back over the Park Service's broad spectrum of environmental education programs, have you felt that there are some particular areas on which we should be focusing attention? You've mentioned young people and your feelings for the importance of communicating to young people. Are there other things that you would hope to see?

Director Everhardt: I would challenge all of the people that are involved in communications or interpretation to think about ideas of how to inform people about the environment they are going to move

Ms. Strader

Mr. Dunmire

into when they plan a trip to a National Park area.

To me it becomes a very important thing that we find the mechanism to communicate with this potential visitor long before he gets there. I think a lot of our problems are that people just aren't well prepared at that late stage when we give them that interpretive folder or we give them that brochure on the park at the entrance gate. The guy is already there, and he has too short a visit planned and has many things already pre-determined that he's going to do while he's there.

I think that we should start thinking about what kind of uses are appropriate in the various areas that we are challenged and mandated by Congress, by the President, by the Secretary, to protect and use as part of the National Park System.

For example, I would be hopeful that within the next few years, our interpreters could communicate some thought about an energy interpretive program. What could be a better idea than having some of our facilities open for interpretation and review where energy conservation and the operation of the building is the paramount consideration in its design and its construction?

So we are now just waiting for the person that comes out of the organization with ideas in this direction. I think that would be a tremendous challenge and a tremendous opportunity to do something so beneficial for the well-being of all Americans.

Mr. Cunningham: Maybe in the design of some of these new areas that are coming into the System, like Cape Canaveral, certain energy solutions can be designed into the visitor center operation, and headquarters operation like solar energy, and—

Ms. Strader: It doesn't have to be a new situation such as that.

Glen Echo Park has got already a new site, as I understand it, for using solar energy and we hope to redesign an interpretive program for Glen Echo so people coming to the park will not only have their bodies warmed by solar energy, but can see it, understand what's happening, and come away from it with an enriched experience.

Mr. Cunningham: At least some people feel that environmental education is an appropriate thing for a natural area or a recreation area, but how does it fit it into an historic site? I know some historians have qualms about that.

Director Everhardt: Well, certainly one of the great benefits of the historical areas is to have those opportunities to interpret that historic legacy to the people of today.

Because I think through history we not only learn, but we also derive a certain amount of hope for our future attitudes and our future actions.

I would hope that there would be ways found that our interpreters could involve themselves into an environmental education program with the community or within the region in some fashion.

Mr. Dunmire: How about weaving environmental understanding into the interpretation of the historic site itself?

Director Everhardt: The theme of environmental education, it seems to me, would have untold opportunities to weave back and forth within the historic message an environmental relationship both inside and outside the community.

Ms. Walter: Maybe we should instead call it an historical education program for school children, using the same sort of techniques that we use in environmental education—discovery, project-oriented types of programs. History is environmental education.

Ms. Strader: And all the kinds of exciting things that you could do to involve children in living history. Kids could simulate those kinds of things in an educational program, using the techniques of environmental education.

Mr. Dunmire: Some superintendents or some interpreters question whether it's even permissible to go outside the immediate confines of a park to a school. Would you comment on that suggestion one way or the other?

Director Everhardt: Well, it's hard for me to rationalize how they would conduct their program solely inside the park.

I certainly see no constraints being placed on a manager. And I wouldn't necessarily classify the manager as just the superintendent alone. It might mean the person who is in charge of interpretation, the uniformed ranger division, maybe even your chief of maintenance, or maybe even your administrative officer. I don't think there would be constraints placed on these people in going to a school and conducting some kind of a program in environmental education or interpretation or any program that relates what our goals are, what our purposes are, how we relate to that environment.

Mr. Dunmire: Well, Gary, we've heard some very positive words from you today on the subject of interpretation and environmental education as a part of our whole interpretive effort. It certainly has been a privilege for us to have shared your thoughts at such an early time in your new administration.

Director Everhardt: Well, I appreciate the opportunity to see each of you.

I only want to say that I guess that maybe somebody will measure my success some day, and I think it's going to be measured by the opportunity for input that the people in the National Park Service have, the feeling they have that they can try innovative things and can experiment a little. Those programs that are successful we will expand upon; those that are unsuccessful, well, we can consider them the better part of a learning experience.

As I have said before, I want to give everybody the opportunity to share in the direction and the establishment of our goals and our priorities in the National Park System because it's as much a part of each of you and each employee as it is myself.

Good luck with your programs.

Conceptual Framework for Building Interpretive Programs

Environmental Dimensions

by Doug Evans

Since the earliest days of the Environmental Age, interpreters have exhibited confusion about environmental education versus interpretation. Although vaguely associated with interpretation, our initial over-reaction was to identify environmental education as a distinct program. Interpreters with few or no qualifications were thrown into the new specialty. (Some managers incorrectly assumed a professional synonymity between interpretation and environmental education.) The program and its objectives were poorly defined and even more poorly articulated. Much of the fog has since cleared, but even to this day we grope for a common definition of environmental education.

Now, that ubiquitous pendulum of over-reaction is beginning its inevitable swing towards the center, and sighs of relief can be heard throughout the ranks, "At last! Back to interpretation!" But now, thanks to the environmania of the past decade, it's back to interpretation which is greatly enriched by a much deeper environmental dimension.

Interpreters have traditionally perceived interpretation in two dimensions: factual and conceptual. The factual dimensions comprise the purely informational aspects of interpretation such as directions, distances, dimensions, statistics, names of places and objects, etc. Although fundamental to any interpretive effort, the factual dimension is the least meaningful

and the most mechanical level of interpretation. The conceptual dimension deals with ideas. It coalesces facts and details into a unified whole, and relates them in ways meaningful to visitors. This is the ecological dimension which gives meaning and body to interpretation. The Strands approach is a good example of conceptual interpretation (see story on Strands, p. 15).

There has always been a third dimension to interpretation, that of environmental morality. We haven't always been fully conscious of this dimension, and it rarely has received its deserved emphasis. The environmental dimension transcends the mere communication of facts and ideas. It is the human dimension that adds soul to the body of interpretation. This dimension doesn't expose so much as it challenges and questions. Its questions have a heavy component of "you" in them, and help to lead visitors toward a greater awareness of their own thoughts and feelings. They see how their lives are related to the web of life, and how human actions can alter that relationship. They are asked to examine alternative actions, and to consider their consequences.

Let's look at some examples of the three interpretive dimensions.

Factual Dimension

Kangaroo rats live here.

Conceptual Dimension

Kangaroo rats are well adapted, through natural evolution, to thrive in this desert environment.

Environmental Dimension

If you were a park manager, would you be concerned about kangaroo rats? Why? Of what value are they? How would you manage them and their habitat?

Factual Dimension

Lake Mead National Recreation Area gets over 5,000,000 visits per year.

Conceptual Dimension

Crowded city living produces tension, frustration, and distrust. Parks can provide respite from the ills of overcrowding. But, now, parks are getting crowded, too.

Environmental Dimension

How do you feel about crowded beaches and park roads? Do you mind waiting in line to launch your boat? Or to use the restrooms? If you were a park manager would you limit the area's use to insure uncrowded recreation? How?

Factual Dimension

Bighorn sheep live in these mountains.

Conceptual Dimension

Bighorn populations are controlled by water and food supplies, disease, and predation.

Environmental Dimension

How do you feel about trophy hunting? Or predator control? Should every herd be hunted? Are non-hunted animals of benefit to man? How?

The environmental dimension of interpretation encourages visitors to rely on their own abilities to evaluate environmental questions. Rather than appealing to authority to make these value judgements for them, they are exposed to another channel of a more self-directed nature. And, the conclusions they reach may depend to a large degree on your skills as an interpreter in all three dimensions of interpretation.

Mr. Evans is an Interpretive Specialist with the National Park Service's Southwest Region.

The Four "R's" of Education

by Steve Van Matre

August, Isle Royale, 1974

The sun has burst out from under a day's growth of gray clouds to bathe the conifers across the bay with a soft, golden light. As Chris grabs his journal and heads down the path toward his newly discovered magic spot, I point to the horizon. In the distance, a glistening streamer of gulls are riding the winds. When they're broadside to us they appear to be white flakes, then disappear suddenly as they turn from the sunlight toward the ridge. Earlier in the afternoon I had suggested to Chris that perhaps he would like to try out some of our techniques for drawing closer to the natural world. Now, after locating a secret place over on the rocky shoreline, he is going off to experiment on his own.

When Chris returned that evening, everyone could tell that his immersion had been a success. As we talked a bit about the experience, his words echoed those from other trips and times: "I never liked English much in school, but sitting out here on the rocks by yourself you just want to put it all down." At fifteen, Chris had never known the thrill of flowing with the sights and sounds and smells of a wild evening. Sadly, he had never stilled himself and let the processes of life sweep him up in their endless supply of beauty and pattern. Chris had seen the natural world, but he had never absorbed its feeling.

All photos this article courtesy Mr. Van Matre

The most pressing environmental issue of our times is this need to help people reawaken their innate sensitivity towards life. On a recent television interview I was asked whether environmental education isn't superfluous in view of the current and strong emphasis upon getting back to the basics or the three R's in education? My answer was, "No," for getting back to the basics is the whole point of environmental education. What could be more basic than an understanding of—and a feeling for—the processes which govern our existence on this planet?

Surely, environmental education is as important as a mental summation of abstract symbols, or the cognition of a certain arrangement of lines and curves. We say that we want our youngsters to be able to read and to make correct monetary change, but shouldn't we first wish them to be aware of their own role in our planets processes of life? Common sense tells us that those who don't feel anything probably won't do anything. If you can't feel the heat of a stove-top you probably won't pull away your hand. By the same token, if you don't feel anything for a forest community, you probably won't hasten to object to its demise. Pointedly, re-sensitizing ourselves to the processes of life must become the fourth 'R' of education.

For many people environmental education is viewed not as a basic, but rather as a stepchild of education. Again and again it turns up focusing upon the nomenclature of existence without being tempered by activities which address the feelings of those it is meant to serve. The results have placed much of our environmental education in an affective vacuum.

We have been led to believe that one should teach substantive content and hide feelings, as if feelings can thereby be separated from learning. Not so. We learn best what we feel best about learning. We pursue most things in life because of the good feelings they give us, be they people, places, positions or possessions. Accordingly, we are defeating our purpose if we ignore that which makes learning meaningful. It is true that the cognitive realm of education continues to receive much attention, but the affective realm may well prove to be the Cinderella of education in the decades ahead.

At the heart of those who evidence great environmental concern you will invariably find a well-developed awareness and appreciation of life's natural systems. Ten years ago a group of us set out to help young people develop such awareness—*while at the same time* helping them build a conceptual understanding of the basic processes upon which these systems are organized and operate. It was our desire to help young people build a framework for the environmental decision-making that comes with growth. In some sense we followed Maslow's lead in looking at those we considered to be healthy (vis-à-vis environmental awareness) and then set out to help others gain such attitudes and understandings. We did not directly attack the problem of water pollution or land planning or recycling wastes, but endeavored to help our youngsters put together the matrix out of which positive concern for these issues would naturally evolve. Within the scope of this article it is not possible to convey very much of the results of our re-sensitizing work, but here are a few basic tools that we have found successful for helping people recognize and amplify their feelings and attitudes:

Sharing Circles

After many of our learning activities, particularly ones which focus upon a conceptual understanding, such as the interpretive encounters, we form a sharing circle. The group joins hands then pulls together in a tight circle before sitting down. The leader begins by asking everyone to complete a given statement according to their feelings, e.g., "The feeling today that I would like to recapture was . . . ," or "I felt most uncomfortable today with . . .".

Each person repeats the first portion before filling in his or her thoughts. After the first round the circle is open for general expression or the leader may ask for another completion which probes a bit deeper into the reasons for the initial comments. Here are some opening examples and possible second-round choices: The neatest thing for me today was . . .

I thought it was neat because it made me feel . . .
The thing that I would most enjoy doing again was . . .
I wish everyone could do it because . . .
The feeling today that I would most like to share was . . .
One thing that I could do to share that feeling would be . . .
Of everything that I have seen today, I felt closest to . . .
Someday, I want my children to feel the same because . . .

Personal Journals

Providing individual journals (or notebooks, sketchbooks or logs) has become a major part of our programming. Their value is in expressing and clarifying feelings. Sometimes we ask for volunteers to share something from their journals as we sit around a small fire in the evening, or we request that they leave them with us at the end of the experience, but the journals are always private and never seen without permission.

It is important to note that we don't require people to write; we suggest and model the act of writing. In addition, we add special inserts to the journals (quotes, poems, notations) which encourage both a look inside and, at least, momentary reflection. They are usually put together by the staff. A special cover, a stimulating reading clipped inside, blockprinted designs, a slipcase or pouch—all help provide an air of importance, care, and concern. Finally, a formal, almost ceremonial, atmosphere surrounds their distribution.

In most cases we ask everyone to find a "magic spot," a special place or niche, where they can go each day to sit and be alone—to write, to contemplate, to just "let it be." If such quiet times are set aside during the day for solitude and natural observation, most young people will use their journals. Above all, if the leaders take care to tend their own journals, the group is likely to follow suit.

Sensory Strategies

The importance of the activities in this category lies in both the doing and the telling. Their goal is to heighten one's sense of a personal relationship with all life. These activities provide a first-hand, often empathetic contact with the natural world. After the various experiences, the feelings of the participants are amplified in both formal and informal situations (the underlying premise being that shared experiences produce shared values). Culminating activities used have included a "sharing circle," a "gallery" of sketches made during an activity, or having everyone go off to sit shoulder-to-shoulder with a partner and tell one another about personal discoveries.

Getting to know a tree

A group is led into a wooded area while blindfolded. Everyone finds a tree and proceeds to get to know it without seeing it. After returning to the starting point, everyone removes their blindfold and sees if they can go back and locate their personal, "one-of-a-kind" tree.

Making friends with a plant

Everyone finds a single plant that they would like to have as a friend. They spend at least fifteen minutes quietly examining their discovery. Then everyone introduces their new friend to the group. The punch line is that whenever they return to the spot they now know that a friend of theirs is waiting.

Hanging around with a frog

Each member of the group selects an animal that he or she would like to spend an hour or more with (frogs are particularly good). The idea is just to spend some time with one animal. Sit and watch it. Follow it around. Try to imagine being inside its skin: How does it see the world? Share a few moments of life with it. Everything is unique.

One final note: experiences like these are designed primarily to expose and strengthen *feelings* for the natural world through direct contact. The activities are not so much values-clarifying as they are values-building. Why? Indications are that people have very few *values* that they are willing to act upon with any degree of regularity. Thus, to instill environmental values amongst the rather eclectic assortment that each of us carries around will take much more than a few of the indoors, classroom-type activities now popular. At their best such values-clarifying techniques appear to illuminate the existence and degree of values, but developing and strengthening those values appears to come from immediate, most often shared, experience. We believe that re-sensitizing people to the natural world through direct, purposeful activities will lead to the development of individual values that reflect a personal cherishing of all life.

Mr. Van Matre is the author of ACCLIMATIZATION: A Sensory and Conceptual Approach to Ecological Involvement, and ACCLIMATIZING: A Personal and Reflective Approach to a Natural Relationship (American Camping Association, Bradford Woods, Martinsville, Indiana 46151). He is an assistant professor of environmental studies with the Institute for Environmental Awareness at George Williams College, where he conducts workshops on the ACCLIMATIZATION approach to environmental education.

The Strands Concepts

by Glenn L. Hinsdale

The Strands concepts, which form the conceptual framework for the National Environmental Education Development (NEED) Program, are based on the premise that people learn and think in the context of *Similarities* and *Varieties, Patterns, Interrelationships* and *Interdependencies, Continuity* and *Change*, and *Adaptation* and *Evolution*. All the experiences of man are included in these concepts. They are intuitively discovered by children in the process of normal development. Any teaching-learning experience will therefore be more effective if what is taught is taught in harmony with these early, self-developed systems for coping—the Strands concepts. By learning to use them deliberately, as conscious-level tools, the child will retain more insights and achieve a heightened sense of values. The Strands can be used to teach any subject matter. Here is a brief description of the concepts and their relationships to our everyday lives:

Similarities and Varieties

People acquire citizenship on earth by being born. No one remembers being born, and by the time people are old enough to consider birth in the abstract, they know that birth is a well safe guarded process. It occurs in the presence of instinctive parental behavior, it is usually surrounded by a highly refined technology, a skilled medical staff, and an environment that insures an impressively high survival ratio. However, the event is entirely different for a child experiencing the trauma of birth. He has just been summarily evicted from an environment he considered perfect. He has no assurances, no intellectual insights—no understandings that there are helpers and technology at hand. He is cold and exposed and threatened and outraged. Instinctively, he wants to survive, and to that end he bends every quivering ganglion in his small, intense body!

Of the many incredibly swift, complex learning activities that occur in the first hours or days of independent life, few yield to simple observation or casual description. Of those that do, the child's complete identification of its mother is the most interesting. With only his sensory equipment for tools—and those not yet fully functional—he imprints himself with the most intimate physical and psychological components of his mother. This is often accomplished in an atmosphere saturated with females, but the infant quickly learns that while they are all quite similar to mother, they are also different, and for many purposes they are not interchangeable with her.

Yet, these other females are useful, and the child learns ways to communicate his needs to them. Father, in apposition to fatherlike figures, is also soon identified. As perception develops, cascades of stimuli from all parts of the child's animate and inanimate environment are avidly processed—processed on arrival into two piles: a catalog of similarities and a catalog of varieties. On this basis—comparison and differentiation, the child copes with his environment and learns to manipulate it effectively.

Patterns

To be accosted by a strange toddler and accused of being his 'mommy' or 'daddy' is startling and often embarassing. Still, it is a common occurence. Why does a child who can usually quickly sort his real parents from a large sampling make such a mistake?

By the time a child has reached the age of nine to eighteen months, he has experienced many stimuli. He is increasingly encountering new ones to which he wishes to make immediate response—as in greeting a parent. Confronted with an individual who bears a strong parental resemblance, the child feels uncertain, but sorting through his now cumbersome catalog of similarities and varieties to make a positive identification is tedious. The child is frustrated by the process and bored with the time it takes. As older children do in thousands of classrooms every day, when process fails and boredom prevails, he guesses! However, wrong guesses bring unpleasant, negative responses. The negative results of too much guessing begins to force changes in the system that until now has served so well. Thus, of necessity, the child refines his procedures by inventing the concept of patterns. Patterns dramatically condense the content of similarity-variety catalogs. A pattern is a template—a predigested, permanently memorized set of information that serves as a model or stereotype for the testing of new stimuli. Now, when a parent prospect appears, he can be checked against a mental template synthesized from all the over-learned attributes of the parent. If there is some point at which the candidate does not conform—voice, eye color, size, etc.—that attribute is immediately obvious as a nonfit. Judgment can quickly be made without reference to an inventory of parts because the child's creative attention is now focused on only that small nonconforming fraction of the total stimuli radiated by the event. Later, this technique will allow routine handling of complete episodes—even whole days—because they conform to elaborate templates perfected through long use. Patterns accelerate process and save much energy, but they can be allowed to rule and limit lives too much!

Interrelationship and Interdependence

High voltage tension grips the delivery room if, at the moment of birth, a new child does not react vigorously to the trauma of that experience. He is immediately recognized as a problem and becomes the instant center of great anxiety

and concern. We know the child requires special handling if he is to survive. There are calls for resuscitative equipment and special procedures.

All life forms interact with and are dependent upon their environment. From the moment of conception a child is captive to the natural laws of interrelationship and interdependence. If an individual life is to be successful, it must be the product of constant improvement in the quality and scope of the interrelationships and interdependencies which shape it. Each individual must learn to effectively manage his relationships with Spaceship Earth and its other residents. This is the whole business of education.

Continuity and Change

In freshman psychology, students learn that man's basic needs are food, shelter, love, security, procreation, etc. The lists vary. While many people spend lifetimes in pursuit of such basic goals, for most there is time also for sublimated levels of concern. People also want spiritual fulfillment, professional competency, a degree of self-indulgence, creativity, public service—the list is almost endless. All have unique motivations for selecting and pursuing these secondary goals, but they do have a common denominator—they must all contribute to the continuity of life! Continuity is provided by the eternal verities. Continuity is the sun rising and setting reliably each day; it is firm concepts of good, bad, home, God, mother, apple pie, philosophy, etc. Such convictions are essential to mental, physical and emotional stability. By far the greater portion of the average person's total life energy is devoted to the acquisition and maintenance of his continuities.

Photo: Van Matre

Some continuities, held too tightly, too long, become obsolescences which eventually seriously reduce the quality of interrelationships and interdependencies.

His preoccupation with the maintenance of cherished continuities underscores man's endemic insecurity in the face of change. Change threatens continuity! Change demands energy, and people do not lightly yield their life energy. At least on the subliminal, reactive levels, change is bad, by simple, universal definition! Much time is spent in mutual reassurances that change can be good—even actively desired—but, in truth, it is usually suspect and accepted reluctantly unless the benefits are real, immediate and fully compensating.

Too much change too quickly can be dangerous! Even as obsolescence interferes with competency at one end of the continuum, so an unacceptable rate of change at the other can bring about aberrant behavior that may culminate in personality disintegration. More broadly, too-rapid changes, threatening too many continuities, can result in the failure of economic, political and philosophical systems, and cause wars. For each of us there is a personal fulcrum on which this continuum between obsolescence and total chaos is delicately balanced and daily maintained at the point of maximum personal comfort, because man's degree of tolerance for change is variable, as is his essential degree of continuity, on any given day! Familiarity—through education—with the nature and mechanics of the process of acquiring and maintaining this equilibrium enhances personal stability and facilitates its maintenance. Only when this facility has been personally achieved is an individual equipped to contribute intelligently to the placement and maintenance of the collective fulcrum of his society.

Adaptation and Evolution

Science fiction has often presented the hypothesis of time travel. Unexpected, instantaneous transport through a significant time span, however, would certainly result in a disoriented, nonfunctional person. Confused, frightened, uncomprehending of his new environmental relationships, the individual would wish most desperately to be back in an old, familiar context again. Yet, ten years ago, all mankind was as poorly prepared as that for what is transpiring in the world today! Instead of time travel, however, people have lived the intervening years, making daily incremental changes in behavior that compensated for small daily changes in their environment. Most of these behavioral changes were not individually noticed, but they continuously provided retention of orientation and permitted subtle shifts in responses to new stimuli—through the process of shedding a few obsolescences and picking up a few new skills. In sum, adaptation has occurred. Man is still coping, but nothing remains unchanged.

In the early Eocene days of mammalian life, there was, among the grasses of some precontinent, a fox-sized animal, the Eohippus, scurrying about on tippytoes—earnestly avoiding predators, finding food and coping with the climate. So dedicated was his effort that millions of years went by, as did impressive but unnoticed changes in predatory patterns, food supplies and climate. And still Tippytoes survived.

In the last flicker of an instant in the age of mammals, when humans came on the scene, some of the more clever of them found skeletons of Tippytoes, and, in moments of insight saw patterns emerge: Except for the vast difference in size, Eohippus fitted the template of the modern horse! However, with the success of Eohippus' adaptation to eons of changing environments came the loss of virtually all traces of his personality and physical identity. Only the experts could trace his history.

Is it possible that some future sequence of events might permit a modern Percheron to experience the history of Eohippus in reverse—to one day become a nervous, fox-size animal scurrying timidly through the grasses of some future clime? Most people reject that thesis. History is not reversible; for the great degree of adaptation that Eohippus has accomplished, and for that attained by the thousands of other ancient species, the concept of evolution is useful.

The Import

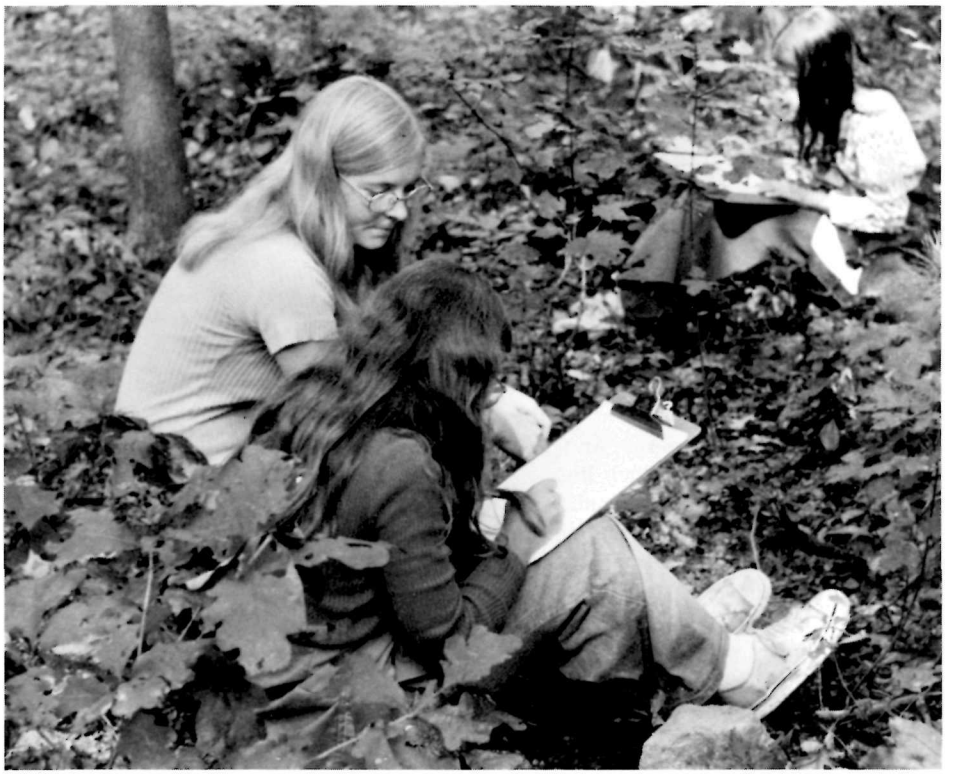
The Strands concepts can be used to teach any subject matter. In the National Park Service environmental interpretation has been made more effective, lucid and palatable through the thematic use of the Strands.

People whose natural educational orientations are reinforced through the deliberate, skillful use of Strands concepts can more easily acquire and more fully exercise a personal environmental ethic. They will more creatively and precisely contribute to the placement and maintenance of the collective fulcrum of their society. When that is well achieved, we may be said to possess a national environmental ethic.

Mr. Hinsdale is an Environmental Education Specialist with the National Park Service's Pacific Northwest Region.

A Process Approach to Education

by Audrey Dixon



NEED

The National Environmental Education Development (NEED) Program of the National Park Service is a *process* approach to education. Through use of the curriculum-integrating materials developed for the program by the National Park Foundation, school children from kindergarten through eighth grade get to look at the world through the eyes of discovery, and are helped to gradually expand their frames of reference for dealing realistically but flexibly with *their* total environment. As awareness pushes the students' boundaries of understanding outward, they learn that nothing is static, that all is in movement: everything is process. They are helped to see that, although they live on a planet that is essentially as closed a system as that of a spaceship that might be orbiting the same sun, their worlds for discovering process are limitless.

This discovery is made possible because NEED is multi-disciplinary, sidesteps the usually compartmentalized educative system which deals mainly with discrete bits of information, uses both indoors and outdoors as a classroom, and employs the Strands conceptual approach—a way of seeing, listening, comparing, understanding . . . and deciding . . . even during the very early elementary years. The concepts used in the Strands conceptual approach are:

- Similarity and Variety
- Patterns
- Interrelationship and Interdependence
- Continuity and Change
- Adaptation and Evolution.

When presented "en toto," they can readily be seen as a systems approach in environmental education.

Since the materials developed are mainly for use in schools, they do not ignore the fact that they must meet the schools where they are now if they are to be used. And right now, most schools have fixed curricula within areas labelled "social studies," "science," "math," "humanities," and "language arts." Even at first glance one can see that the set of Strands listed above can be used to teach or interpret *any* subject, yet in a way that helps avoid unnatural fragmentation.

The NEED Program strives to awaken or deepen a conscious awareness of all environments within each child it touches. It hopes to lengthen that awareness to understanding, and the understanding to a life of commitment to values that will enhance the quality of life for most people.

Thus far, this environmental education program has published materials in the formats of students' classroom books and outdoor books, and teacher's guides for grades three through six; it currently has a Teacher's Resource Guide for the kindergarten through second grades due for release June 16th. Additionally, in the Fall of 1975, a series of six filmstrips will be released for the seventh and eighth grades. Although produced with the school student in mind, the lessons and activities may be used in workshops and in park interpretation programs as well.

NESA

While the NEED program's thrust is mainly through written materials, the National Environmental Study Area (NESA) program of the National Park involves the identification of environmental study areas with active exemplary programs in environmental education to be used by schools and other interested groups. Study areas might include: a plot of land on school grounds, a city dump, aquatic environment (including sewage disposal stations), a forest, a prairie, a meadow, a historic site, an archeological excavation. The possibilities are endless, but those most valuable include the interfaces of two ecosystems. Each NESA serves as a resource base for students to explore and learn about the environment and their relationship and responsibility to it. Special site materials are developed by park and school personnel to deepen student awareness of the many elements within the study area.

NEEL

The National Environmental Education Landmark (NEEL) program, also administered by the National Park Service, has been organized to recognize superior local, state and private NESA.

Ms. Dixon is an Environmental Education Specialist with the Division of Interpretation, National Park Service in Washington, D. C.

The Scope of Environmental Education

by Bruce McHenry

How many times have you been faced with a surprise visit from a yellow school bus filled with children eager to explode out of the bus as if they were going to devour your park?

Following this restless crew one usually finds several harried but well-meaning teachers and parents eager to make this unscheduled venture into the park a meaningful one.

The typical solution is that handy 10-minute film or slide show on the park. But then what? For over 30 years the big yellow school bus has been arriving at our parks unannounced and for years we have been showing groups of school children into audio-visual rooms for quickie presentations. Then we usually give the unscheduled school group the standard park tour. And in the process, many of us treat our young visitors as less than regular "park visitors."

Environmental education is an approach to improving the park experiences taken home by the children of the yellow school bus, as well as all the visitors to the park.

In approaching the problem of providing a meaningful park experience—it's important to look at:

1. The impact on park resources.
2. The affect of environmental education on students.
3. The relationship between teachers and park personnel.

How do we treat park visitors and protect resources at the same time? In the mid-60's, many people in the National Park Service began to examine our park resources in light of visitor impact. At the same time, we discovered that the lowest use of our areas occurred during mid-week periods of fall, winter and spring. By spreading visitor use, we found that park resources suffered less damage. Thus, we encouraged schools to use parks as classrooms during these slack periods.

About the same time, the public began using words like environment, ecology, and awareness. Some of the people in the National Park Service began to examine the management of our parks in relationship to our environmental practices. Those of us in the parks at the time put these two sets of ideas together and found that by redesigning the use patterns to fill in the mid-week off-season with school groups and by using the new concepts of environmental awareness, we had a more lively school program than ever before.

By the late '60's, National Park Service areas began to develop special environmental education outreach programs to bring new meaning to the park experience.

Today there are hundreds of schools and other institutions practicing environmental education. Our relationships with students, teachers and community leaders have started the process of establishing good environmental ethics.

Let's examine our relationships with various members of school groups visiting parks.

The student is an important park visitor—tomorrow's responsible citizen. Young people have demonstrated time and again their eagerness to see, feel, smell, taste and listen to our parks. They are more active than passive. They learn best by discovery. A trip to a park can highlight environmental awareness which leads to understanding, which in turn leads to commitment for a better environment. The relationships which students forged with these resources become a strong foundation for their future and ours. No park can afford to be without this young constituency.

The great earth movement of the early 1970's apparently peaked as we became more involved in building our individual environmental education programs in the parks. Some may think it is past, but I can assure you that it isn't. There are hundreds of schools and other institutions involved in environmental education today—some of the many programs are described in the pages of this issue.

Teachers and community leaders can be great multipliers of experience and guides to discovery. In 1967, many park people began working with teachers. First, we assured ourselves that we were not educators, but rather resource managers. This was important because we were asking teachers to teach and we wanted to provide them with resources to use as outdoor classrooms.

We learned that if we sold the idea of environmental education programs to the Superintendent of Schools first, the cooperation up and down the line was greater. We learned that budgets are important to school administrators. We learned that, by using that individual in every school district who works within the school administration and has a strong interest in parks and environmental education, programs were developed more easily. We also found that by using teachers workdays for workshops in the parks, many more teachers volunteered to attend. We offered teachers credits towards academic degrees as incentives. In short, we became partners with school systems in designing environmental education as part of their curricula.

Teacher workshops in our parks became the most important activity we conducted in environmental education: a successful workshop motivates teachers to put their professional skills to work.

A program of pre- and post-site activities strengthens the field trip experience so it is not just "another trip." Once teachers have committed their own time and energy to this type of program, the chances are they will repeat it year after year. They then become the great multipliers. By carefully designing the system, you can develop a cadre of experienced teachers and teacher aides who can design and operate their own programs.

The same approach taken with teachers can be applied to workshops with other community and group leaders and park personnel. This further spreads the multiplier effect.

Workshops for park personnel on all levels are, I believe, crucial to the success of any environmental education program. The Southeast Regional Office of the National Park Service has recently supported

region-wide efforts to conduct environmental education awareness workshops for park personnel. Maintenance men, sub-district rangers, clerks, supervisors and administrators—the people who make the parks work—all have opportunities to become interpreters for the park.

The approaches to environmental education are vast. In this next section of this special issues of TRENDS, we will sketch the NEED program as it has been implemented in Spokane and Kirkland, Washington, and in Cape Cod National Seashore; the NESA programs at Shenandoah and Everglades National Parks and Delaware Water Gap National Recreation Area, and a number of other diverse efforts to bring environmental education to the public.

While most of the examples presented here have developed under the auspices of the National Park Service, the basic concepts are ones which can easily be adapted and applied to state, regional and local parks and recreation areas to add an important dimension to the public's interaction with the environment in all milieus—urban, suburban and rural.

The preceding pages of this special issue have touched on the basic philosophic approaches to environmental education. The programs described in the following pages will not focus on the individual philosophies behind each program but rather attempt to briefly sketch the essential elements of the individual programs.

These programs only scratch the surface of the vast potential for environmental education efforts in this country. In the next decade, I believe we will see a real blossoming of environmental education efforts in parks, in schools, and in private and public institutions concerned about our environment and the public's understanding of it.

Mr. McHenry is an Environmental Education Coordinator with the National Park Service's North Atlantic Region.

Cape Cod National Seashore in Eastham, Mass., operates two active environmental education programs for school children from all over New England. The purpose of both programs is to assist schools in developing their own environmental education programs based on the models developed through the NEED and NESA programs.

The Nauset Coast Guard Station serves as the focal point of one of the Cape Cod programs, operating as a classroom and an overnight accommodation for participating school classes. The program is so popular that it is in full operation, regardless of weather, from September through May and since its inception in 1969, has attracted over 175 classes of grades five through eight.

The Nauset program draws on the resources of five National Environmental Study areas designated within the Seashore. The program thrust is directed toward teachers—to create within them an environmental awareness based on the NEED program (see page 18 for a more detailed description of the NEED program) and to give them the experience of putting this program's concepts to use in the field and in their classroom. Teacher materials and slide-text programs for use in pre-site orientation for the NESA sites and the overall NEED program at Cape Cod have been developed.

An example of the kind of activity students in the Nauset program enjoy is the Thursday trips to the wharf at Provincetown, where a local resident and former fisherman, now on staff as a park technician, shares with students his knowledge of commercial fishing and its methods. He talks with students about offshore foreign fishing fleets, marine ecology, and pollution, and weaves the topics together to make a coherent whole—environmental education. The site and the speaker both bring reality and depth to the experience. Special curriculum materials for pre-site background information on marine

fishery resources are being developed to further enhance this experience.

At the Falmouth-Harwich-Yarmouth NEED Collaborative, the approach is different. The Seashore, through a special use permit, has made a facility available to non-park school system personnel, to operate their own environmental education program.

The vast resources of both the National Seashore and nearby educational opportunities are available to both programs and make the experience of participating a rewarding one. For example, the Eastham Shellfish Warden meets classes in a salt marsh. There he presents a shell-fishing demonstration and discusses the ecological values of salt marshes, and the marshes 'importance to the larger ecosystem of the area'. Classes frequently visit the nearby Cape Cod Museum of Natural History where the students' understanding is enlarged by the superimposition of that institution's own environmental education programs onto the one received at the Seashore. Other resources near the Seashore include: the nature trails at the Massachusetts Audubon Society's Wellfleet Bay Wildlife Sanctuary, the Provincetown Museum, and a hike to Henry Beston's 'Outermost House'—an environmental literary experience.

Both Cape Cod programs offer a total environmental education experience—which includes awareness and understanding of the individual's role in the environment and its resources—ecology, economy, history, fishery technology, pollution, local culture and international politics.

The cultural and educational values of the interrelationships developed between students and teachers participating in these programs is another valuable story in itself.

TRENDS wishes to thank Dick Cunningham, Chief of Interpretation, Cape Cod National Seashore, for providing information for the above article.

John Muir Elementary School

A good example of a dynamic environmental education program is under way at the John Muir Elementary School in Kirkland, Washington near Seattle. This is a school which prides itself on its progressive approach to education, using a computer management system, team teaching and the cluster concept of grouping.

The 750-pupil school is a certified intern teacher training institution where approximately 14–18 graduating student teachers a year receive their practical experience prior to being state-certified. The school has brought the NEED program philosophy into the classroom.

It began when the school's 55-member faculty participated in a NEED workshop several years ago. In response to the enthusiasm for the program, Principal Don Walker formed a committee of certified teachers and trainees to develop and implement the program. They call themselves the Muir Environmental Education Team (MEET) and in just a short time, wrote objectives on levels four through six to accompany NEED materials. "It is our goal," says MEET chairman Barclay Kruse, "to move environmental education out of the 'frill' area of education right into the mainstream."

The group has not only taken the NEED materials and adapted them to their own classroom setting, it has created learning kits pertaining to the resources found on their school grounds.

On the corner of the John Muir School campus are approximately two acres of land lying contiguous to another five acres belonging to a public utility company. Woods, a steep gradient here and there, and a variety of plant and small animal life are available. The site has been plotted and inventoried. The development of learning units for this resource, as well as development and refinement of the entire curriculum, will be an on-going part of the routine maintenance of the John Muir management system.

TRENDS wishes to thank Glenn L. Hinsdale, Environmental Education Specialist, National Park Service, Pacific Northwest Region for providing information for the above article.

Ragged Ridge Center

The Ragged Ridge Center of Whitworth College in Spokane, Washington, a 720-acre heavily forested area, serves as an environmental education facility available to a broad range of area schools, colleges, and universities.

The NEED Program, introduced to the Center by National Park Service personnel, has expanded local participation in the development of a comprehensive environmental education program. At least three major institutions of higher learning and more than a dozen local, state, federal and private agencies and organizations are assisting the Center in the technical aspects of the design and development of this program. In addition, they are providing research services for taking inventory and interpreting the educational resources on the Center's land.

At the same time, Whitworth College has become a training center for public school instructors in NEED concepts with assistance from the National Park Service Regional Office staff. The instructors at the sessions developed a curriculum manual with a comprehensive statement about their approach to environmental education plus one hundred specific lesson plans based on the NEED concepts.

The College has integrated environmental education training courses into its overall curriculum. At a recent session of one of Whitworth's environmental education courses, the State's Environmental Education Coordinator introduced a new publication, "Encounter with the Northwest Environment—Rural and Urban," using the STRANDS concepts (See p. 15). There is a good relationship between the resources of the Center, the College and the state's environmental education program.

It appears that this is the first time in the history of the NEED program that an institution of higher learning has provided professionally written curricula and offered college-level credit courses of instruction in the application of the Strands concepts to the integration of existing elementary and secondary shcool curricula.

The best statements of the philosophy and objectives of the Ragged Ridge Center occur in the curriculum manual:

> "Environmental awareness education uses the sum total of a person's surroundings as a teaching/learning vehicle. All of life is therefore used whether learning is in the natural sciences, social studies, or humanities areas. Interrelatedness is stressed within and between disciplines . . .
>
> ". . . It becomes a process for developing awareness, understanding, and value through curriculum that puts the world back together again.
>
> The program is now self-sustaining. It is the intent of President Lindaman and the Whitworth College Board of Trustees that Ragged Ridge be managed and recognized as a national model for regional environmental education resources.

TRENDS wishes to thank Glenn L. Hinsdale, Environmental Education Specialist, National Park Service, Pacific Northwest Region for providing information for the above article.

Shenandoah

While many environmental education programs through parks are student related, the efforts at Shenandoah National Park concentrate exclusively on teachers. The purpose of the program is to provide training and resource materials for on-site and off-site use, to encourage and assist schools in developing their own programs, and to bring environmental education into the park's total interpretive effort.

The thrust toward teacher training evolved from earlier heavy demands on park interpretive personnel for off-site programs and park visits. It became impossible for the staff alone to meet the needs of the communities surrounding the park.

Working with the leaders of thirteen local school districts, park officials helped organize an Environmental Education Council made up of representatives from each school district. For many, it was the first time they had joined together in any kind of cooperative venture.

In 1972, the Council received a $10,000 grant from the Office of Health, Education, and Welfare, under the Environmental Education Act. This money, plus contributions from the schools and the Shenandoah Natural History Association, enabled the Council to hire a full-time director to coordinate its operation.

Through the Council, the environmental education workshops for teachers took shape and now are conducted at one of the park's three NESA locations. The emphasis is on letting the teacher teach. Participants go through a series of tasks, role playing, problem-solving and other awareness activities which they later use with their students. Special teacher resource guides are available for each area including a site description, use suggestions and a list of resources available both in and out of the park.

In its three years of operation, the Council has produced an eleven-part video-tape series entitled "Environmental Methods." This is a series of teacher training programs designed to show how teachers of various disciplines can incorporate environmental education activities into their curricula. The programs all convey

Shenandoah's view of environmental education—the park is inextricably linked to the man-made world beyond its borders.

The 20-minute video tapes include an overview of environmental education for both lower and upper elementary school students, individual treatments of environmental education as it relates to vocational education, fine arts, history, physical sciences, natural sciences, mathematics, social studies and language arts. The tapes are made available free to teachers as part of a wide range of resources in a library maintained by the Environmental Education Council.

Teachers can call on the resources of the library and borrow materials for use in the schools. Individuals interested in obtaining copies of the training video-tape cassette presentations on ¾-inch tape should write to: Environmental Education Council, Shenandoah Natural History Association, Shenandoah National Park, Luray, Virginia 22835.

TRENDS wishes to thank Paul Lee, Environmental Education Specialist at Shenandoah National Park for providing information for the above article.

Everglades

Most people do not think of the Everglades National Park as a semi-urban location, yet it sits directly adjacent to the Greater Miami metropolitan area. The one-million acre park has developed a unique cooperative relationship with the Dade County school system to bring select students and teachers into the park setting. Using National Environmental Study Areas for day-use and National Environmental Education Development areas for overnight use, students in grades four through six have been exposed to a year-round program of environmental education which has had a dramatic spillover effect in the schools.

Teachers participate in workshops held at NESA sites. Introductory and advanced workshops give teachers the tools they need to share the environmental experiences of the park with their students. Workshops are scheduled for regular work days when students are not in school and are held with permission of the school board.

The great demands on the park's resources and staff require a reservation system for the environmental education program. Only groups whose teachers have been through introductory or advanced training workshops can participate in the Everglades program. Another important factor in the smooth administration of the program is the park's responsibility for busing students to the Everglades. Each year a special fund taken from the park's overall budget is matched by the city. Therefore, teachers using these buses in this cooperative program have the advantage of advanced planning for their trips to the park.

Other teachers who have not participated in the workshops are encouraged to come to the park to lead their own environmental education programs.

Everglades' planned environmental education programs include a variety of activities designed to create in the students a special awareness of their environment. During slough slogging trips, for instance, students learn to confront and overcome their fears of the swamp areas; canoeing trips demonstrate an alternate—and quiet—method of trans-

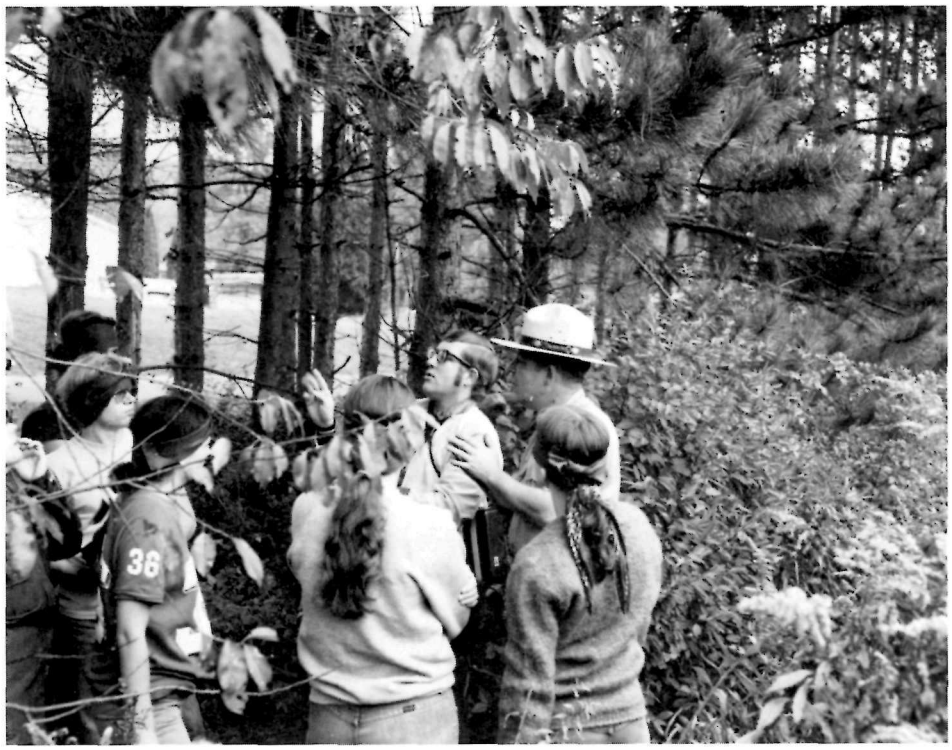
portation; snakes and other wildlife species are available so that pupils can make contact with the unusual in their environment.

Since another step in environmental awareness involves communications, students take part in campfire programs by writing and performing skits, composing music, or using other art forms to describe their observations of the environment. Total freedom to express their feelings is encouraged in these evening programs and the students are urged to communicate the values they've learned at the park to their friends, classmates, and parents on their return.

Environmental education in the Everglades is an outdoor sensory program which demonstrates to the students how humans, animals, plants, and their environment are all intimately interrelated. The program strives to get students submerged in the Everglades so that they not only see it but also feel, hear, smell, and taste it.

TRENDS wishes to thank O. Frank Wilson Jr., Environmental Education Coordinator at Everglades National Park for providing information for the above article.

Delaware Water Gap



Delaware Water Gap National Recreation Area in New Jersey and Pennsylvania has a broad range of environmental education programs which span biological concepts, ethics and values, culture and history.

The underlying idea behind the development of all the programs at Delaware Water Gap has been to make the facilities available to educational and other interested groups. The park has transformed former resort-type facilities into residential and day-use centers for interdisciplinary study of the area which is rich in both natural and cultural resources. Today the facilities are used year-round by everyone from pre-school children to adults. In each of the environmental education programs, the National Park Service has entered into a cooperative agreement with a public or private educational institution which commits both parties to a quasi-partnership arrangement.

The area offers a working organic farm at Thunder Mountain Vocational-Environmental Education Center; an environmental education center called Watergate where students can study the life communities in and around a freshwater environment; a 19th century restored Millbrook Village where students can compare their own lives with those of people a century ago; an art school which relies heavily on the natural setting for students' work; and Pocono Environmental Education Center, the largest and most complete residential center in the park.

The evolution of the various centers at Delaware Water Gap came about through a series of cooperative agreements. The first, Thunder Mountain Education Center, was entered into by the park and the Newton Board of Education in nearby Newton, New Jersey. This agreement called for the joint administration of what had been a 167-acre "dude ranch." Through grants from the New Jersey Department of Education and private donations, Thunder Mountain has become a working organic farm with livestock, maple sugar trees to be tapped for syrup, and crops to be planted, fertilized and harvested. A full-time teacher is employed by the school district to work with school children.

Another similar agreement with the Eatontown, New Jersey School District made an old summer estate, "Watergate," into a center for the study of a fresh water environment. About one-half mile from Watergate, the National Park Service is restoring a 19th century village —Millbrook—thereby broadening the possibilities for understanding the area, its history, and the total environment today and yesterday.

The entire Delaware Water Gap area is filled with former estates and recreation areas. One of these sites was a White Russian art colony known as Salamovka which has become the base for a non-profit foundation called Artists for Environment, affiliated with the Union of Independent Colleges of Art. Art students from all over the country spend whole semesters in this tranquil setting, using the natural surroundings as inspiration for their work.

One of the newer programs in the park is the Pocono Environmental Education Center. Sitting atop a hill, the Center is a 57-building complex which until as late as 1972 had the charming name "Honeymoon Haven." Today, Keystone Junior College of LaPlume, Pennsylvania and the National Park Service have entered into a cooperative agreement to make this facility available on a year-round basis as an environmental education center. The Center has a capacity for 250 persons, waterfalls within an easy walk, thousands of acres of public grounds and a network of trails ideal for a comprehensive study of the natural environment.

At present still another center is in the planning stages with a local university. This one also promises to become an outdoor laboratory for future public school teachers.

Without question the Delaware Water Gap has used its facilities to build maximum public awareness of the many forms of environmental education. The use of cooperative agreements has made these programs both possible and successful.

TRENDS wishes to thank Ray Fauber, Interpretive Specialist, Delaware Water Gap National Recreation Area for providing information for the above article.

Lightship Chesapeake

In August 1971, the National Park Service acquired a 133-foot ex-Coast Guard lightship, the Chesapeake. Formerly a floating aid to navigation, the Chesapeake served 20 years off the mouth of the Chesapeake Bay. No longer alerting sailors to the Bay dangers, the Chesapeake is anchored in the Potomac channel in downtown Washington, D.C., serving as an environmental education facility to promote an understanding of water as a precious natural resource.

For example, twenty-three Boy Scout Explorers, ages 14-21, are aboard on weekends and school vacations to serve as her crew. Their training spans such diverse areas as navigation and seamanship, electronics, small craft piloting, engineering and welding. When the Lightship is opened to the general public, she is an interesting part of American history as the Explorers carry out their duty assignments of interpreting the lives and jobs of the original crew and keeping her as a living historical monument.

Since the inception of an environmental studies program for school children in the Washington, D.C. area in 1971, over 8,000 students have spent a day on board the Chesapeake learning about the ecology of the Potomac and having fun being shipboard. The visit to the ship is an exciting one and teachers prepare students for it for weeks in advance with material received at workshops held at the ship at the start of each semester. The resource manual received at this workshop is the combined effort of teachers, National Park Service personnel, and other professional people. In preparation the students may discuss the use of the ship's compass as compared to driving with a road map; they might examine the terminology of the hydrological cycle, or convert fathoms to feet. The week prior to the class visit, NPS rangers take a slide presentation about the ship to the school and prepare the students visually for their shipboard adventure.

As the children board the ship they are immediately aware of the difference between land and ship environment: the walls and overhead are steel, the decks slant, and the ladder (not stairs) descends

at an 80 degree angle. The Captain, a former Navy man, sets the stage for the day's activities as he stresses safety and encourages the students to ask questions.

While aboard, the students will visit the pilot house and study aquatic food chains and animal relationships in the ship's aquarium installed in the crew's recreation area. Inhabitants of the aquarium are former residents of the Potomac River and include such notables as catfish, gar, eel, and snapping turtle. There is also a 270-gallon tank depicting the Chesapeake Bay estuary with blue crab, oyster, hog choker, and horseshoe crab.

The highlight of the visit to the Lightship is when the students board the Wood Duck (a Navy Liberty Launch) and ride to a point of land in the Potomac which they might have visited by car. For most students, it is their first personal acquaintance with the river since the Potomac, like most of our Nation's water systems, suffers some form of pollution and the children have been alienated from it. Many are horrified to learn that the Potomac is the source of their drinking water. While aboard the Wood Duck, the students measure weather parameters and take a water sample to be analyzed in the lightship's laboratory.

As the students learn to orient themselves on the river with large maps and a compass, they mark where they are in relation to the Atlantic Ocean, Chesapeake Bay and the Anacostia River. They discuss how man has affected the ecological change of the river. Suddenly the Potomac becomes an important natural resource—vital to their existence.

For the remainder of the day, in addition to study in the aquarium, the students will do microscope work, perform a simple water quality test with Hach Kits, and study the water content.

The lightship visit is a unique learning resource for urban students. It gives visiting children and adults an opportunity to increase their understanding of environmental problems directly related to their city.

An important key to the success of the Lightship is the service of Volunteers in the Park who donated over 8,000 service hours alone in fiscal year 1974.

TRENDS wishes to thank Vicki Glenn, Program Coordinator, Lightship Chesapeake, National Capital Parks, National Park Service.

Urban Environmental Education: TREE

Many environmental education programs operate in wide open space in a park setting. Yet, there is an important place for environmental education in the urban setting.

TREE is an environmental education program for elementary school children operated in New York City in cooperation with the Board of Education.

The Resource Center for Environmental Education (TREE), located at Federal Hall in New York City, focuses on four aspects of New York's environment:

- New York Water Ways and Water Systems
- The Plant-Food-Waste Cycle
- Manmade Systems and Technology
- New York Neighborhoods

The program operates every other week in a select number of city elementary, junior and senior high schools. The thrust of the program is to bring to teachers and students a better understanding of the interrelationships between all elements in the environment; stressing that change is a part of the life processes and that all life forms have basic needs which must be satisfied.

The program draws on New York's rich resources. The TREE Center plans to expand its activities to include the development of technical information to augment curriculum materials and additional workshops. The bulk of the writing for these materials will be done by former teachers of the program who have been the most successful in developing activities on their own. This effort will provide opportunities for teachers to use ideas in ways that best suit their needs and abilities.

In addition to working in a number of schools and providing materials to many others, TREE staff offer technical assistance to schools not directly involved in the program, conduct teacher workshops and publish a periodic newsletter.

The core of the program is the four basic learning units from which a number of different activities have been developed to bring the individual students and teachers in touch with as many aspects of their environment as possible.

In studying the water system and waterways of New York City, students learn what and where these are, the types, and how man uses them. They concentrate on their historical development from the time of their earliest settlement on Manhattan to present day problems. The dependence of the New York water system on the outside factors of a much larger system is also covered.

An example of an activity for this learning unit might be an exercise developed for the program by the Wave Hill Center for Environmental Studies, a National Environmental Education Landmark. Using a sand table, the children might investigate the functions and operation of a watershed. Or they might take a trip to the water reservoir in their school and visit the boiler room. They might also take fish or other aquatic organisms, caught in another learning activity associated with this unit, and set up a classroom aquarium.

The unit on plant-food-waste cycle concentrates on man's dependence on plants and on the land for the food he needs to live and the air he breathes. Classes learn what nutrients and conditions plants need in order to grow. They learn about man's dependence on processed foods, and the possibilities it creates for inadequate nutrition. While many students are familiar with modern recycling plants, few have ever been exposed to nature's own system of recycling which is also covered in this learning unit.

An example of an activity connected with the teaching about natural foods and foraging is the lesson that concentrates on the Indians' dependence upon wild foods to supplement what they grew, and their uses of wild plants as dyes and medicines. In a visit to a local botanical garden, students actually forage for greens to make a salad as a climax for this activity.

The unit on man-made systems and technology draws on the urban environment. Students look at the changing nature of technology as people manipulate their environmental resources to meet their basically unchanging human needs. They also study people's dependence upon environmental resources to produce the things needed to live, and the need for more interdependence with other people as technology encourages specialization in the work sector of life. They also examine the effects of technology in helping create environmental problems which threaten the very source upon which humans depend. The needs for both new technology and wise citizen action to solve environmental problems is stressed.

One of the activities developed for this unit in conjunction with Pratt Institute in New York relates to energy and transportation. Students look at energy sources and the shortage of those sources. The car, mass transit, and air pollution are examined by testing air and noise activity and through a map-making exercise where students identify and locate on maps the energy users within the city.

In addition to learning about today's technologies, students also look at the skills and tools of the early Indian settlers in New York and how they used their natural environment. This learning activity is carried on in conjunction with the Museum of the American Indian, taking full advantage of the resources available within the city.

The TREE program offers new dimensions in learning about the environment. It builds a better understanding of yesterday and today, and sensitizes the individual to his/her relationship to the environment of the probable world of tomorrow. The same basic learning units, with different activities, could be adapted to many different groups within and outside of the school environment.

TRENDS wishes to thank Sandy Walter, Interpretive Specialist, National Park Service, New York Group, for providing information for the above article.

Environmental Education and Youth: the STEP Program

The STEP (Students Toward Environmental Participation) program was designed by and for high school students—offering them the possibility of a rich understanding of the environment and helping them prepare to teach younger children environmental awareness.

Students who participate in special training sessions become STEP members. They then can join with students in other schools and build area-wide and regional STEP organizations ready to work with younger children through environmental study areas, to push for reforms in their school and in their community demonstrating a conscientious environmental ethic. The three aims for STEP members are that they build an awareness and understanding of themselves and the environment, that they communicate with others that awareness and understanding, and that they develop commitment to bettering their environment through action.

"We are striving for a kind of awareness," says Ray Geerdes, one of the founders of the program, "that is not defined in specific knowledge about automobile exhausts or sanitary landfills, but an awareness that helps a high school student learn to live in harmony with a natural world and with other people. Only after this sensitivity can ideas such as land-use planning, energy conservation measures and population control be utilized."

Crucial to building that sensitivity is a 10-hour leadership training course designed to prepare high school students to act as resource people to elementary schools in taking the younger students on Environmental Study Area walks. With this training, the students can set up "Environmental Learning Places" on school grounds and begin to work with younger students, their peers, and their teachers and use much of the very same material taught in their training sessions.

"STEP's environmental action programs," says Pat Stanek, "are bounded only by the needs of their communities and by the energy of the members. STEP students are not 'pollution headhunters.' They operate as Volunteers in the Park (VIP's) and environmental interpreters in National Park areas; investigate, monitor water quality; study issues sur-

rounding bottle legislation, testify at public hearings, lobby for needed changes, and dialogue with industry when environmental violations are evident. Without 'making waves,' a soft drink bottling company was persuaded to fulfill its recycling promises by not depositing bottle collections in sanitary landfills; community recycling centers were begun, operated and turned into a profitable community enterprise; EPA funds in a wastewater treatment plant construction were withdrawn until contract violating actions were stopped; 10,000 tiny pine trees were planted along highway access ways to provide a sound barrier."

The key to building this kind of active concern for the environment is in the design of the leadership workshops for young people and their response to them. In 10 hours, students begin to grasp a new understanding of their environment's past and present and how their culture relates to that environment. They begin by looking at man's changing attitudes towards the environment during the agricultural and industrial eras leading to today. The words of Thoreau, Roosevelt, Muir and Leopold continue to build that awareness. The Strands concepts (see p. 15) are then introduced and used to look at man through time. Each learning unit is accompanied by activities, role playing, and opportunities to solve problems essential to building a lasting understanding of basic environmental problems.

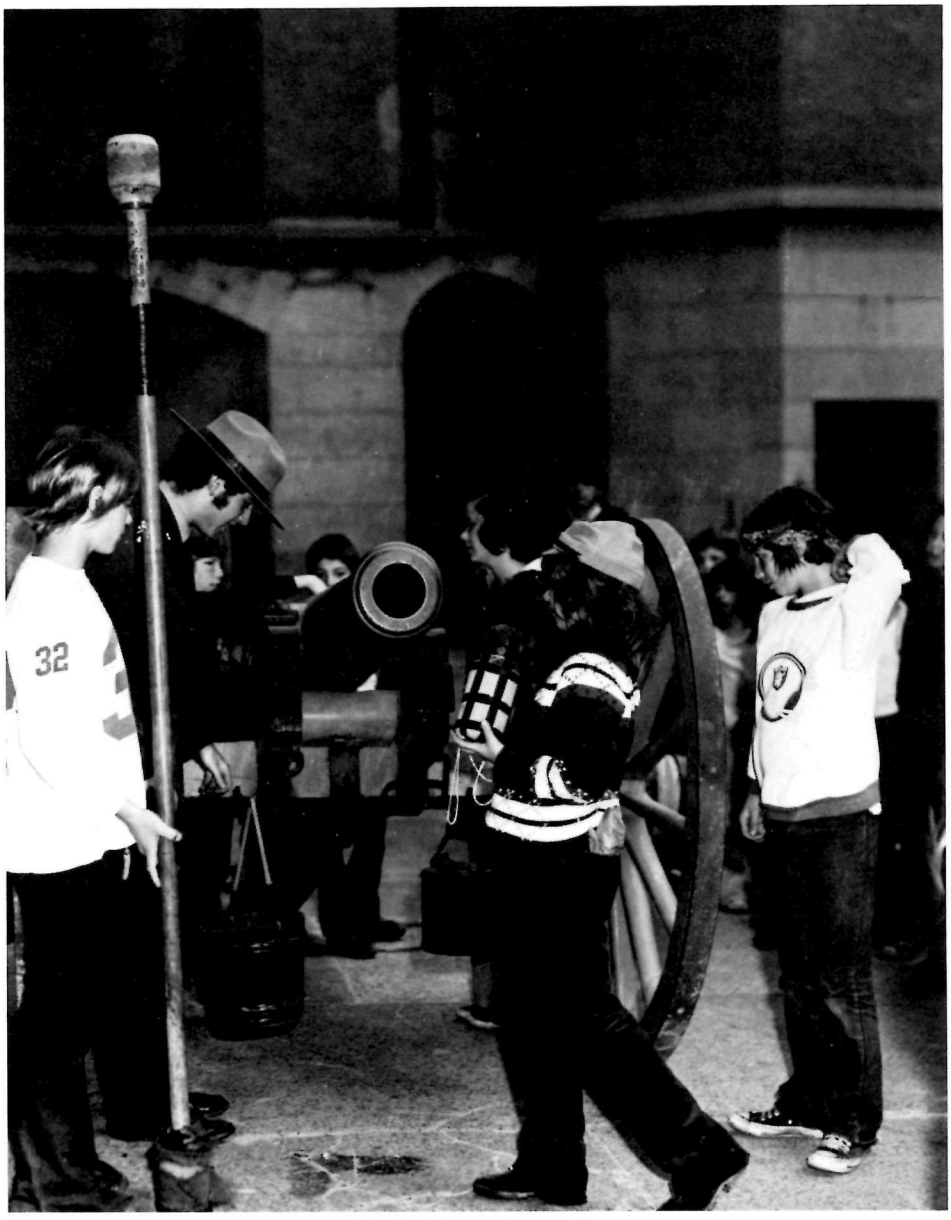
Moving from the Strands concepts, students begin to learn how to relate to nature in a personal way. Again, great figures in literature and history are quoted to add depth to this understanding. Students then move from reading the thoughts of others about the environment to learning how to share their own feelings about their "sense of place"—through words, art, music, poetry or prose, through film.

Having digested a great deal in a short span of time, students now approach the concept of an environmental study area which they will need to understand in order to bring their awareness to others. This last phase of the training session culminates in practical methods of teaching others.

Since STEP's institution in 1971, over 22 states have active programs in parks and educational institutions. The overall effect of the STEP program is making tomorrow's teachers today's leaders—a "ripple" toward developing an informed and active citizenry with a new environmental ethic.

TRENDS wishes to thank Patricia M. Stanek, Environmental Education Specialist and STEP Coordinator for the National Park Service's Southeast Region for providing information for the above article.

Linking Living History and Environmental Education



Environmental education residential programs are growing in numbers because they allow students broad opportunities to experience the ecological and cultural balance in life and learn about their environment from a new perspective.

The Environmental Living Program in the San Francisco Bay area, in other parts of California and in Arizona, enables young people to live history while they learn about the effects of environmental elements on human, animal and plant life. The program has been so successful that it has spread to a number of state, federal and local parks in the two states.

A manual for the Environmental Living Program which includes sections on classroom preparation, specific environmental living sites, teacher preparation and basic answers to organizational questions has been prepared by the National Park Service and will soon be available to school teachers and resource managers.

The exciting aspect of linking living history to environmental education is that it provides a happy marriage of interpretation of natural and historical resources—and through this, students come to a better understanding of themselves. This approach offers an opportunity for young people to understand how others in earlier times in our history coped with their environment which included the historic events of the period.

The program offers teacher training, a special class visit to the site they will later experience, classroom activities, an overnight experience and classroom follow-up. Sites where this program has been used are: John Muir National Historic Site, Petaluma Adobe State Historic Park, Fort Point National Historic Site, Hyde Street Pier State Park in San Francisco, Tubac State Historic Park, Tumacacori National Monument, Fort Bowie National Monument, Coronado National Memorial, Turlock Lake State Park, Fort Tejon, and the Old Folsom Southern Pacific Railway Depot.

Students become enmeshed in the roles of the people who once occupied the sites they are visiting. They may work in orchards and gardens formerly cultivated by Chinese field hands in the late 1880's, a Mexican California rancho environment, a Civil War military garrison, a turn-of-the-century schooner, an old train, an adobe schoolhouse or an old fort. Problem solving in this context requires participants in the program to define the duties that their historic counterparts would have faced.

One Environmental Living site is a lumber schooner docked at the San Francisco Maritime State Historic Park where students are required to stand watch all night, just as their counterparts did years ago. A log, using a twenty-hour hour clock, must be kept by the guard on duty—recording every movement on the boat and in the area. The students organize the watch themselves, taking turns as guards in order to maintain order and safety on board.

Student response to the program has been extremely positive: "When we were doing our Environmental Living at Tumacacori," said one student, "I felt as if I was someone else, a different person.

When we finished and I was home in front of the television, it felt weird—like I didn't belong there. It seemed funny to be watching TV instead of weaving mats, making pottery or even eating tortillas."

The roles students play are not without basis in history—the program uses local historic figures, early grave markers, or a child's real ancestor to lend an air of authenticity to each character. The experience, while simulated often becomes the means for children to shed some of their personal defenses and open themselves to a new kind of learning experience that fully explores the life and environment of their historic counterparts.

Bill Taylor, Interpretive Specialist, and Mary Lou Baldi, Reading Specialist on the program, point out that "the students are responsible for the major decisions. But teachers and park resource people must prepare themselves to guide the student program. Teacher workshops, sponsored by the sites involved in the program, help both teachers and resource people define their roles and develop a framework for the program."

They caution, however, that the program, "is designed for the teacher who wishes to reach out and who feels confident although not always knowing the end result of the student's planning. The teacher must be willing to let students make mistakes and learn from them."

At Tubac State Park, an eighth grade class recreated a school day of 1885. After a day playing "Amos," a young participant in the program said, "I wonder how Amos would have felt if he had known I would be trying to be him a hundred years later. If he had known, would he have been any different?"

Thinking about what he has said, he adds, "I wonder if a hundred years from now someone will be looking back on my life, wondering who I was?"

TRENDS wishes to thank Bill Taylor, Interpretive Specialist with the National Park Service's Western Region and Mary Lou Baldi, Reading Specialist with the Sahaurita School District of California for providing information for the above article.

Two Residential Approaches

Residential programs in environmental education offer some of the most comprehensive opportunities for students of all ages to become enmeshed in their environment.

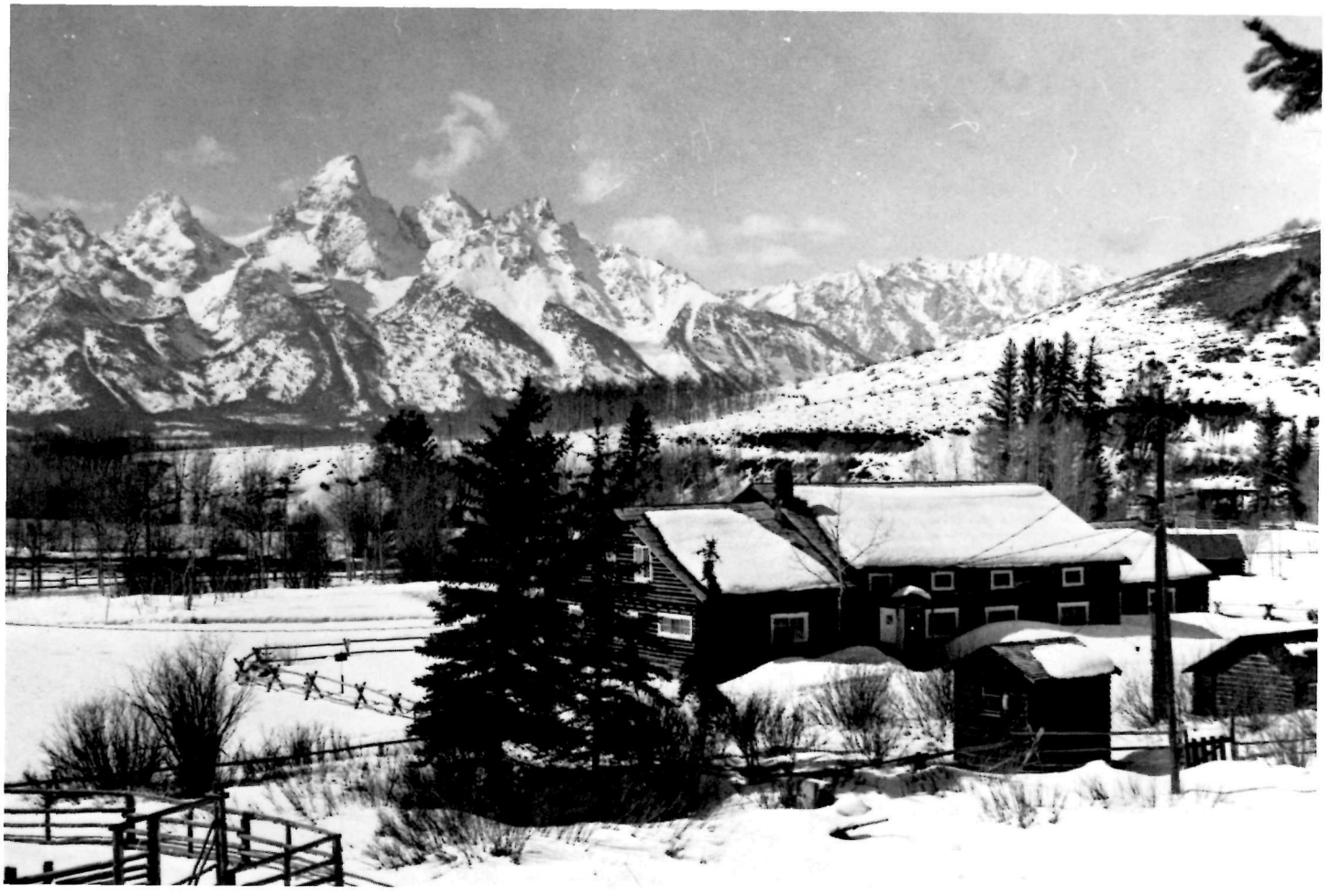
The programs at Yosemite National Park and Grand Teton National Park provide two important models for residential park-based schools of environmental education.

The *Yosemite Institute* is a non-profit educational corporation founded by high school teacher Don Rees in 1971. Staffed by a group of interpreters and teachers, the Institute is administered by a Board of Directors. The outdoor school operates year-round and is open to school and college groups. A series of teacher in-service programs through the campus of the University of California is also offered.

In the beginning of the week-long sessions the students are assigned to orientation hikes. Afterwards, each student signs up to explore specific topics based on what they find most interesting to them. However, since the Yosemite program deals with interrelationships and processes, these specialty programs serve as jumping off points to larger subjects rather than as ends in themselves. In a natural setting, the students are exposed to the various forest, meadow and stream habitats, the wildlife, insects and geology of the area. They learn of the cultural aspects through involvement in classes on history and anthropology (particularly American Indian history and culture), aesthetics and philosophy. Students may snow camp, cross-country ski, rock climb or hike as part of the overall residential program. Evening programs bring the total group together for discussions, slide programs, or academic sessions.

As the week comes to an end, a wrap-up session pulls together the threads of an individual's activities, bringing an additional sense of group cohesiveness to the experience. This last session is also used to consider ways to take the experiences home to benefit the community.

The curriculum offered by the Institute's professional staff of teachers is more diverse than most high schools and colleges can provide. Students can be offered a unique blend of program compo-



nents because the natural environment is all around them. The "Politics of Land Use Management," for example, is an important element in the curriculum. It covers prevalent American attitudes toward land use, preservation of wilderness areas versus open use areas, and land use priorities in a context of political and economic realities.

The Institute is founded in the belief that human behavior and human value systems are prime determinants of the quality of man's environment. Its primary purpose is to emphasize environmental understanding through education and communication.

The *Grand Teton Environmental Education Center* is administered by the Teton Science School, a local nonprofit organization. It is a park residential program offering a close-to-nature living experience which brings students in touch with the natural environment on its own terms. The Teton Center, initiated by National Park Service Director Gary Everhardt in 1972, when he was Superintendent of Grand Teton National Park, has grown to a year-round program.

The Center's program is geared to high school, college, and adult students and presents a diversified range of specialized workshops on very specific aspects of the environment. An additional three-day environmental awareness program is also available to all fifth graders in Teton County.

Center offerings include nature in literature classes; nature through photography seminars; accredited teacher's workshops; summer high school field biology sessions; field ecology sessions; winter ecology programs; special in-service training for seasonal interpreters; and some tailor-made programs to build and increase the appreciation for the total environment. During the residential sessions, participants take part in camping field trips, canoe excursions, backpacking, float trips and day hikes.

The National Park Service owns and maintains the facilities and makes available one full-time employee to serve as coordinator to the Center. The Grand Teton Environmental Education Center is charged with the responsibility for general upkeep of the facility and the development of environmental education programs under the direction of the Service.

The Center has a close working relationship with three major universities and just recently has begun working with three community colleges. Teton County school district recognizes the Center as an integral part of its total teaching system. State and other federal resource agencies have been cooperative in furnishing personnel to assist in course preparation and presentation.

"The ultimate objective," says Director Everhardt, "is to give the students the background knowledge to enable them to make informed decisions about the environment." And he goes further to say that "another real advantage is the way the students are affecting their parents—they go back and talk about some of the difficult issues facing the park, the community, and the region, and these issues are related to the management of the land."

TRENDS wishes to thank Robert A. Huggins, Environmental Education Specialist, Grand Teton National Park and Don Reese, Director of Yosemite Institute and John Krisko, Environmental Education Specialist at Yosemite National Park for information used in preparation of the above article.

Attacking the Problems of the Environment Through Education

by Lou Ritrovato

Too few of our citizens recognize the precarious nature of our environment despite the fact that the people of the United States collectively own in excess of 750 million acres.

This is a bonanza of natural resources to safeguard for future generations. Citizens fail to appreciate our country's natural wealth, its fabulous economic value, its moral and cultural dimensions. Most of us are too preoccupied to heed the exceeding limits of our natural resources.

The environmental dilemma stemming from man's interaction with the land is certainly not new. Recognition of the need to seek harmony between man and his environment has been with us for ages.

Pennsylvania, as a microcosm of the country, shows much evidence of this environmental degradation.

In a recent report to the Pennsylvania Department of Environmental Resources, the Citizen's Advisory Council noted that the state has failed to solve critical environmental problems facing its residents. Urban residents today live amid:

> "traffic tangles, poisoned water and crime.
>
> It is an environment marked by substandard housing and schools, unemployment and expanding solid waste.
>
> Every conceivable category of pollution—noise, water, air and landscape destruction—assails Pennsylvania cities large and small."

Clearly environmental education will not solve all our ills, but it can develop in the public both knowledge and skills and attitudes for today's total environment.

Beyond the Classroom

Environmental education cannot occur within the four walls of a classroom, or through formal experiences provided by traditional educational institutions.

Neither will it be derived solely through the efforts of environmental organizations, even those of national dimension. It is not merely a course in the curriculum, nor just another name for outdoor education. Environmental Education is not nature study or pollution investigations.

Instead Environmental Education is a "life-long learning process" which becomes part of ones entire learning experiences. It is the acceptance of new life values that contributes to a better world. Truly then it is a life process which transcends the walls of traditional education. It is a union of all disciplines of learning spanning one's lifetime.

THE STATE PLAN

The Department of Environmental Resources in Pennsylvania, charged with environmental enforcement, is also assuming a leadership role to provide facilities and programs in environmental education. Thus, the Pennsylvania Bureau of State Parks has included environmental education in its charge as one of its major objectives.

The need for a comprehensive statewide Environmental Education program emerges from two basic concerns. First, the realization that only through education can the management of current and long range environmental problems requiring on-going, broad-based support be effective. The second concern is for the sentiment which is engendered through familiarity and contact with the natural environment. Recognizing these environmentally related concerns for social and economic well-being, the Commonwealth, through the Bureau of State Parks, has accepted the most challenging job of the century.

In light of this challenge and the need for different agencies to work together for the same cause, the Bureau is cooperating with other organizations to combine their resources toward the environmental effort to make a better Pennsylvania. During the past five years the Bureau, with these combined resources, has developed and implemented vital environmental educational services for the citizens throughout the Commonwealth of Pennsylvania.

The goals for Environmental Education in the Bureau of State Parks are to develop within the citizens of the State:

1. An awareness of man's total environment and the problems and issues related to the environment.

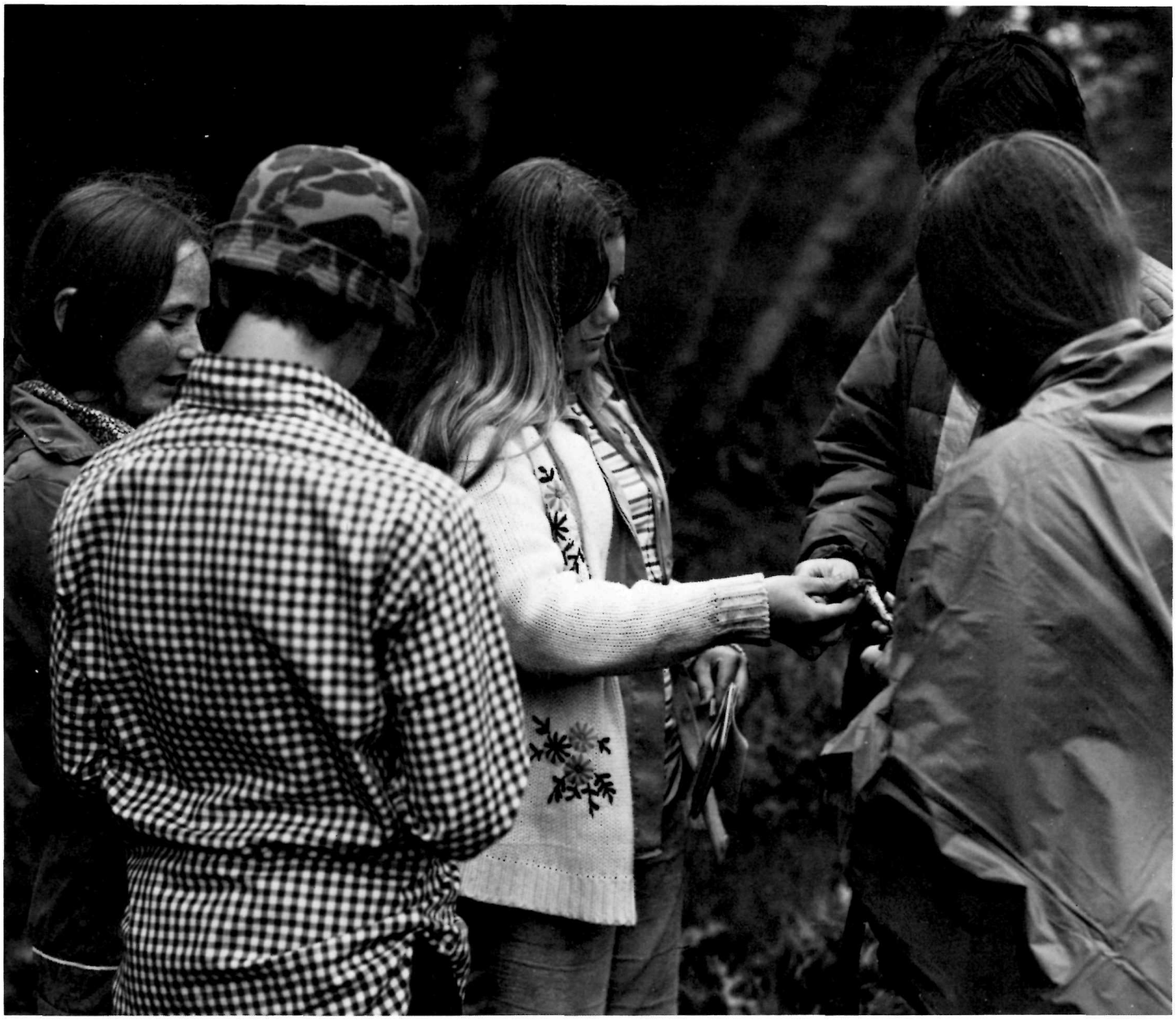
2. A knowledge concerning possible solutions and alternatives when dealing with environmental problems.

3. A commitment to undertake action for maintaining and improving the quality of the environment.

To achieve these goals, a learning process will involve people in:

4. Obtaining an understanding that man is an inseparable component of the ecosystem and whatever he does alters his environment.

5. Acquiring a basic knowledge of the natural laws which govern the environment, obtaining the skills of solving environmental problems and recognizing



the responsibility of individuals towards finding solutions.

6. Developing an environmental ethic toward the conservation of Pennsylvania's natural resources and the prevention and correction of continued environmental degradation.

Plans have been implemented to establish, operate, maintain and evaluate a comprehensive environmental education program at the widest possible segment of the population. Such a plan includes, but is not necessarily limited to, research, educational programs for elementary and secondary students and institutions of higher learning, continuing education programs, curriculum development, conferences, seminars, teacher training workshops, consultant assistance, material dissemination and informal interpretive programs.

Such program undertakings will necessitate the development and operation of day and resident environmental education centers to be strategically located on State Park lands. These facilities will complement the on-going seasonal interpretive programs traditionally provided by the Bureau.

A successful model for environmental education centers has been conceptualized and tested. In July, 1971, the Pennsylvania Bureau of State Parks, in cooperation with the Berks County Intermediate School Unit with program funds from the United States Office of Education under a Title III, 306 Grant, established and implemented the Nolde Environmental Education Center, south of Reading, Pennsylvania. The Center consists of 644 acres of State Park land maintained by the Bureau solely as an Environmental Education complex.

At the Nolde Center a major emphasis is placed on the problem solving approach. Some 30,000 students with their teachers and community resource people within an

eleven county region of southeastern Pennsylvania are studying local environmental problems. This community-based learning is the focus for interdisciplinary learning. The community with all its resources and the schools are working together to solve environmental problems.

At Ridley Creek State Park, located near urban Philadelphia, similar Environmental Education studies are being offered in cooperation with the Tri-County Conservancy. Also at this park and unique in its concept for the Pennsylvania State Parks, a Colonial Plantation is under development. Under the direction of the Bishop's Mill Historical Institute, an 18th Century farm complex is coming to life. This Bicentennial project involves visitors in a recreation of what a real working farm was like in the 18th Century.

In the western part of the state, environmental interpretation programs have been developed at Clear Creek, McConnells Mill, Prince Gallitzin and Raccoon Creek State Parks. At these sites people of all ages gain an awareness of their environment, its beauties and its problems, by learning through discovery. Through multi-disciplinary learning experiences, the participants gain the knowledge and skills of collecting information which will communicate to others the need for concern and commitment towards improving the quality of the environment.

During the summer of 1975, 40 State Parks will provide environmental interpretive programs. From mid-June to Labor Day, environmental interpreters are on duty to provide activities for visitor enjoyment and to help them gain a better appreciation of Pennsylvania's natural and historical resources.

The services provided by the Environmental Education and Interpretive Section throughout the Pennsylvania State Parks can be categorized into six components:

1. *Environmental Resource Centers*—an integral part of the total system of services providing facilities, information and staff resources to the community-at-large.

2. *Educational Services*—provides comprehensive, multi-disciplinary environmental learning experiences for the total citizenry of Pennsylvania.

3. *Consultant Service*—provides assistance to schools and the community-at-large with environmental education program development.

4. *Environmental Interpretive Services*—provides informal learning experiences for those individuals visiting the State Parks year-round.

5. *Historic Interpretive Services*—provides visitors with learning experiences of the heritage of our state.

6. *Supportive Services*—providing concurrent services such as; museums, nature trails, displays, exhibits, publications and multi-media programs.

Annually millions of people visit Pennsylvania's State Parks. The potential for exposing these individuals to a greater awareness and to integrate environmental values into their daily lives is endless.

Holt Bodinson, from the New York State Department of Environmental Conservation, adequately expresses our environmental dilemma by stating:

> "The problem is we've lost our consciousness, our sensitivity to life. Environmental Education is a process of rediscovery—a rediscovery of our wider, deep relationship to the world."

As custodians of a major part of the Commonwealth's natural resources, the Pennsylvania Bureau of State Parks has accepted the responsibility to provide the leadership in this process of rediscovery.

In the February-March issue of the *National Wildlife* magazine, the sixth environmental quality index still shows a decline in the overall quality of life in the United States.

Needless to say the job to achieve the goal for environmental quality creating an environmentally literate citizenry needs the support of the entire community.

Mr. Ritrovato is Chief of Environmental Education of the Pennsylvania Bureau of State Parks

Natural Resource Management and Environmental Education

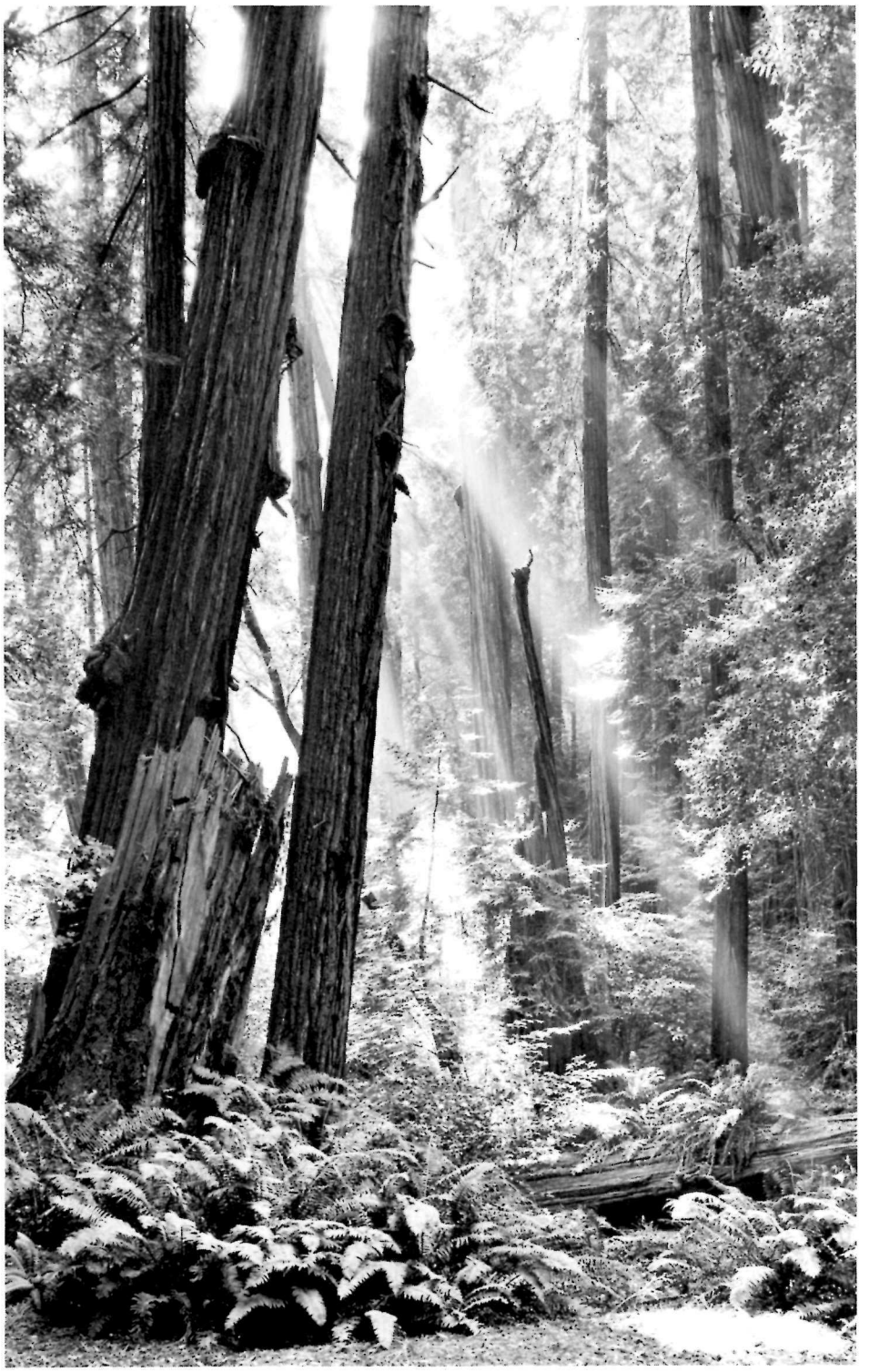
by Roger E. Giddings

During the past two decades, concern for natural resources has become more evident than ever before. The need for wise management of our resources has become a priority issue of concern by the general public as well as managers of park and recreation areas.

Areas bountiful in natural resources may include those which are set aside for scientific study, recreational use, or aesthetic enjoyment as well as those which are vital to the physical health, economic and social well-being of people from all over the world. The growing interest in sound management of natural resources wherever they are found is evidenced by the formation and growth of conservation groups, the enactment of more environmental protection laws, and the increase in number areas permanently set aside as "natural" ecosystems.

To provide for the use and enjoyment of areas within the National Park System, without degradation of its natural resources, is not a simple task. Active management is crucial, and environmental education/interpretation is one of management's important tools. This approach alerts the public to a greater understanding of the forces that shape the environment, and an awareness of the individual as an integral part of the environment. It stresses the necessity of our dependency upon—and responsibility for—the quality of our environment as a whole or in part. Each of the sections which follows might be labelled "management policies," but the attempt I have made here is merely to point out a few of the major concerns in resource management and some ways in which environmental education relates to protection of our natural resources.

Research. Research is a vital component in the management of natural resources. It is the diagnostic tool a manager often needs prior to determining the initial type of management program required. Additional research is often required when it is obvious that the direction of an ongoing management program in an area should be altered. Having identified the new directions for resource management, resource managers should in turn keep local residents and visitors to the area informed of the overall resources management effort. A continuing environmental education program provides this necessary link with those persons who are not employed in the day-to-day park operations.



Research studies of wildlife populations and behavioral patterns often provide valuable data that resource management personnel can use to predict changes in a specific natural environment that eventually may affect the quality of parts of the environment. Let me give just two examples of how this might occur. First, as wildlife generally are more sensitive to subtle environmental changes than people, wildlife studies may detect that certain animal or plant species are not continuing to

thrive in a particular stream or marsh. This finding may lead to the further detection that the stream has become too polluted or the marsh is turning dry. In its turn, corrective management action can be taken before the situation turns to crisis proportions. Additionally, in studies of terrestrial environments, the noting that certain animal populations have changed dramatically in number may indicate a reduction or increase in certain vegetation or populations of other interrelated animal species in that area has also occurred. Environmental education programs that have alerted citizens to the quickly dropping populations of plants and animals now on our "endangered" and "threatened with extinction" species lists have resulted from this kind of research.

Management Capacities. Management capacity stipulations have long been established as a standard procedure for many historical structures, contemporary buildings, campgrounds, and picnic areas. Often the need was based on available space or number of site facilities in relation to numbers and kinds of visitors expected at a given time. But only in recent years has this practice been extended to the backcountry and other areas of concentrated use where natural resources would be destroyed if left available to the numbers of visitors that could be anticipated at any one time.

The fact that there are thousands of acres in an area does not necessarily ensure that the area's natural resources will receive total protection against degradation. Too often people are thoughtless or lacking in knowledge that would preserve the integrity of an area . . . for example, hikers who shortcut trail switchbacks often accelerate soil erosion. Certain treads of people's shoe soles, or excessive horse use can quickly depreciate delicate natural ecosystems or other resources, such as trails. Human wastes or soaps can pollute streams and lakes. And much too frequently, non-biodegradable products, such as plastic and foil, become part of the "natural" environment along roadways and trails. Environmental education makes people aware of the effects of their behavior and helps instill a commitment to actions that help preserve natural resources.

Reservation systems are being utilized with appreciable success in some heavily used backcountry areas and campgrounds. This management tool should prove very satisfactory, not only from the viewpoint of protecting the natural resources in the areas, but also from the viewpoint of permitting visitors in numbers that will ensure each a higher quality experience while they are in the park.

In the future it may be necessary to establish a management capacity for the number of people permitted to visit a park

at the same time. However, the optimum number does not necessarily remain constant as evidenced by additional data we gain about the factors of changing public demands and the intricacies of the environment itself. Also, it is difficult to realize the management capacity of a park when we have not come fully to grips with what constitutes an optimum population for use of our world's natural resources. Clearly, environmental education helps inform our citizenry so that informed choices can be made.

Alternate Transportation Systems. The use of alternate transportation systems in lieu of the private motor vehicle has been established in several National Park Service areas. The use of shuttle buses in Yosemite has proven highly successful in lowering excessive fumes, noise, and vehicular congestion from Yosemite Valley and Mariposa Grove. Overland trams that carry visitors through a portion of the Shark River Valley of the Everglades permit them to view wildlife such as the endangered Southern bald eagle and the alligator under natural conditions.

The resulting effect of these systems has been a lessened impact on the resources by private motor vehicles because of their reduced number, accompanied by a significant increase in the quality of the park experience for the visitors. If the success of these transportation systems continues, additional systems may be installed in other sections of the country. There may also be cause for reevaluation of present philosophies regarding commercial vehicles. Today's commercial vehicles quite often carry more passengers per vehicle with no significantly greater effect on the ecosystem than a privately owned sedan or station wagon.

Interpreters accompanying visitors in alternative commercial vehicles have demonstrated that this is an excellent opportunity and place for environmental education and interpretation.

The Energy Crunch. During the recent energy crunch, people began to use parklands closer to their homes. Therefore, it can be expected that the present energy situation, coupled with rising costs of living—including gas costs—will have significant effect on future visitation patterns. New areas like Golden Gate National Recreation Area, San Francisco; Gateway East National Recreation Area, New York City; Indiana Dunes National Lakeshore, near Chicago; and other parklands near metropolitan areas will probably experience large increases in visitors.

The recent focus on energy availability—and higher prices for it—has also been cause for visitors to consider visiting some of the numerous less popular parklands, and to consider staying in one park for a longer period as a substitute for travel to several parks. Such patterns of behavior by visitors may not only use less energy, but might also reduce the impact

on site resources. It just might also sharpen such visitors' overall awareness faculties by eliminating the factors of time and speed required to otherwise visit thirteen parks in seven days, which is too often the case.

Creative resource management methods, including provision of visitor activities and enforcement measures, must be adopted with a view toward providing all natural and other resources the necessary protection for optimum use *and* perpetuation. For success, such management policies will depend upon adequate and far-reaching environmental education programs at all levels—in all these places.

Public Hearings. Public involvement in land use management through public hearings and meetings on master plans, environmental impact statements, and park management plans for individual parks has increased. The question of resource management continues to be a major concern of park superintendents. As each area must be managed on its own merits, as outlined by law or proclamation, a management decision for one park may not necessarily be applied to all other parks.

It cannot be stressed enough that public involvement in the management of natural resources can be expected to markedly increase as the public gains more information. Again, innovative environmental education/interpretive programs can play a vital role in the communication process between the park community and the visitor community. With an increased awareness and knowledge by both parties regarding the desires and concerns of the other, active management programs can be developed that are beneficial to the perpetuation of the resources and the enjoyment of visitor and park official alike.

Fire Management. Total control of all fires throughout the National Park Service was practiced until a few years ago. Then through research findings, it was revealed that absence of fire in some instances created unnatural conditions. Sequoia forests literally cannot perpetuate themselves without fire. Sawgrass glades also require fire. Therefore, fire is being utilized as a valuable management tool in Sequoia and Everglades National Parks. It has also been reintroduced in other parks where it is necessary to perpetuate a desired environment which cannot be claimed through the total control and suppression of fires.

At the present time, twelve areas in the Park System have ongoing fire management programs. During the recent Grand Teton Waterfall Canyon management fire, which was widely publicized, park personnel interpreted the philosophies and policies involved in the park's fire management program to park visitors and neighboring communities. Such an active program can certainly take the "heat" off management when involved with highly controversial issues.

We must not forget that natural resources are everchanging. Furthermore, it is imperative that managers and users of these resources consider these changes if we are to provide for the optimum use and enjoyment of the areas for all generations to come. The public can become an important force in aiding natural resource management—and environmental education can be a significant tool for resource managers.

Mr. Giddings is a Resource Management Specialist with the Division of Natural Resources, National Park Service, Washington, D. C.

Energy Accounting Systems

by Jean Matthews

Every park manager and every park interpreter is a basic dealer in energy and the systems through which it flows. Whether the particular packages are visitors or grizzly bears, trash or trees, sewer lines or nature trails, they all represent energy, either in motion or storage.

The common denominator of all living systems is energy, and this is true whether the system referred to is cultural (man-in-nature) or so-called "natural."

General systems theory is the hottest property in the information world today. The jolting energy crisis has intensified public interest in a methodology that couples the general systems approach with something called "energy accounting" and the emerging tool is helping us figure exactly what our money is buying these days in terms of both a better *life* and a better *world*.

Parks are still among the best places, available to the most people, for getting back "in touch" with the natural systems that underlie every arrangement of matter and energy that we've been able to imagine and then build out of what nature provided.

There are few better places anywhere on earth for coming to a basic, intuitive understanding of energy—beginning with the laws that govern its flows and storages, and ending with what effect these laws have on us and on the rest of the world outside our own skins.

General systems and energy accounting are finally coming up with some tools that make it possible for park planners and interpreters to see the environment and the economy as the single, interacting system it is. Energy provides the common denominator because it runs through both areas, and its unbreakable laws give us clues to how the future will unfold.

Energy Conversion Tables like the one shown here, make it possible to figure the "value" of a striped bass, and the "cost" of a swamp or a roadway or a Big Mac in terms of dollars, or kilocalories, or fossil fuel work equivalents—whatever common energy denominator is chosen for purposes of the study.

The energetic "work" being performed for the park by a tree, a stream, or a concessioner, can be studied in the *same terms* now, allowing planners and managers to make valid comparisons between the ecology and the economics of the overall environmental systems with which they must deal. Nature is rescued from the zoo, the artist's easel, the little old lady's tennis shoes. In addition to being cute, or aesthetic, or sentimental, nature now is *economic*.

The clear blue skies and cloudless waters of a recreation mecca take on dollars and cents "image" value; and the point at which the stress of human development and impact on the environment will probably cause the image to decline in terms of its attraction for both developer and visitor, can be spotted fairly accurately by means of a good energy systems model.

In Everglades National Park, for instance, park personnel know almost instinctively that Shark Slough is the great pumping heart of the whole area—that its failure would mean the end of the park and the energy flows that make it unique. But the ability to assign *energy values* to sawgrass, water, weeds, fire, payrolls and tourist dollars, and to see (either on an analog computer or in the mind's eye) the possible interactions of all these energy components, adds a whole new dimension to park management and interpretation.

The complex model of Everglades National Park is part of the South Florida Environmental Study now drawing to a close at the University of Florida under the leadership of Graduate Research Professor H.T. Odum. When energy value numbers have been attached to all the storages and flows shown, the model can be put onto a computer and a number of alternative "futures" for the park can be run—showing how various management decisions may create different future scenarios.

Any theory with sound logic as its base should be useable in simple form, and general systems in an energy framework is no exception. In fact, initial work with youngsters has shown they have less trouble grasping it than do many adults. (A phenomenon that occurred with the five environmental NEED strands also).

Children are born generalists—they tend to grasp at the wholeness of things, never mind the details. Ask a group of third graders what they want to know *first* about the Environmental Study Area trip they are about to take, and the answer almost invariably is "ALL of it."

General systems is an "all-of-it" look at a whole system. When we add the energy factor, *we must always go to the next-system-out*: the system within which the park (or whatever system is under study) is embedded. The possibilities for involving the visitor in interpretation are endless.

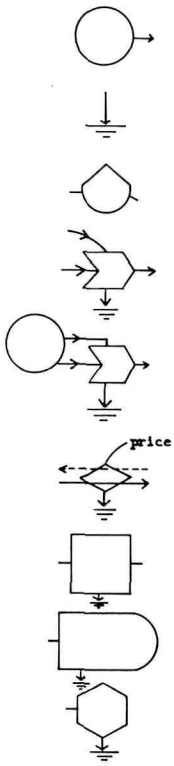
Who comes in and goes out of this system? Visitors? Migratory birds? Does a frog sometimes hop across the line? Does he even know there's a line there? How does a frog "pay his way" in the park system? What are the energies that move into and out of the park and keep it running? Sunlight, of course. And rain. Is that energy? How? And how about the dollars in visitors' pockets! Where do they leave them, and in exchange for what? Is litter energy? Does it take energy to get rid of it?

Many a taken-for-granted act, like tossing a gum wrapper out of a moving car window, has become a crusade by simply lifting peoples' awareness of what is going on, and their own part in it. Systems modeling and energy accounting are two new ways of jacking up our awareness another notch or two. For park interpreters, the implications are rich and rewarding.

First, remember that general systems means "lumping"—losing detail as you step back from, and look down into, a system that you're used to being only a small part of. And it means speeding up too—looking at the system over a longer period of time than we would normally observe if we remained merely a participant. In effect, we step back in time and in space; we take a larger-scale, longer-time look. The squirrel is an example of what you might expect to see.

A casual look at the squirrel reveals a busy little acorn-gatherer with a very bad memory for where he buried his supplies. Now move one-system-out, and look at him from the point of view of the oak forest that supplies him his food. What

SUMMARY OF SYMBOLS



Energy Source from outside accompanied by causal forces

Heat Sink drains out degraded energy after use in work

Energy Storage tank delivers energy flow to pathways

Energy Interaction where two kinds of energy are required to produce high quality energy flow

Super-Accelerating flow with interaction of two flows from the same source cooperating

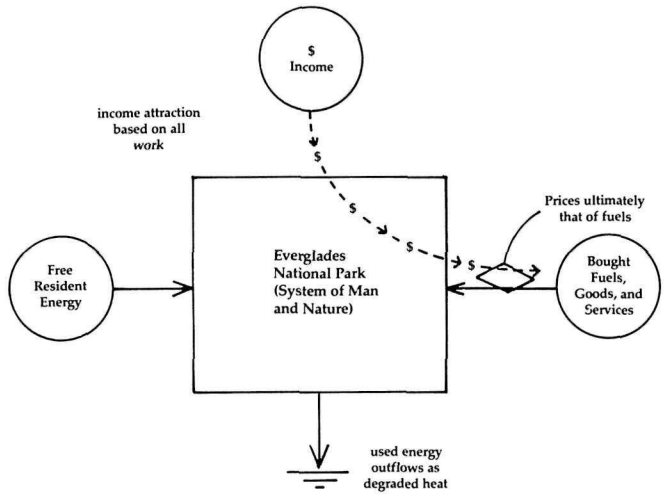
Energy-Money Transaction Price determines money per unit energy flow bought.

General Purpose Box for any sub-unit needed; box is labeled to indicate use

Producer Unit Converts and concentrates solar energy, self maintaining, details may be shown inside.

Consumer Unit uses high quality energy, self maintaining, details may be shown inside

Energy/money relations for Everglades National Park



our look now shows, is a fantastic little planter of oak trees—good for the forest and good for the squirrels.

The same insights hold for birds, bears, and berries. In the latter case, the berries are excreted rather than buried, but in both cases the systems have provided *mobile* means of seeing that their *immobile* components "got around." The reward loops for all components and for the overall system are obvious, and understanding their systems-survival value is a vital factor in improving *human* survival odds.

The survival "intelligence" of systems constitutes an open book that has been aeons in the writing. Nowhere is it more enjoyable to read than in a well-run park. The macroscope can help bring into focus some of the terribly important fine print.

If you throw a visitor (especially a child) one of the systems-type questions, you will probably find yourself with an unusually lively discussion on your hands. In the course of these dialogues you can introduce very naturally some more of the energy-accounting concepts—like "net energy."

It *takes* energy to *get* energy, and you can arouse a whole host of sleeping ideas by starting people thinking about the Second Law of Thermodynamics. You don't even have to mention it by name. Of course, if you *want* to, it's also called the Law of Entropy, and it says that every process of any kind must be accompanied by a "loss" of energy in some manner; friction (as in braking a car, or water running through a pipe), or sweat (the "waste" heat of your body's cool metabolism fire), or the so-called "thermal pollution" thrown out by a power plant manufacturing electricity.

General systems with an energy cast makes it natural and easy to show visitors the energy link between what they buy, in the park souvenir shop, and what has to be picked up along the roadside farther down the system; between the energy in food form they pay for at the park concession, and the energy in waste form that the park has to pay for at the sewage treatment facility.

An energy model of the park, set in the visitors center, could present a whole new look and feel of the park. Instead of an arrow indicating "you are here" in terms of surface space, an energy model could put the visitor directly into the flow-picture; depicting him in the model in relation to the park and its wonders, and to the energetics that move the park and are moving the visitor through it.

People could see the sun pumping the great weather engine of earth as its actions shape and warm and power the park. They could see the primary producers—the park's plant "furniture," and the park creatures who eat and are eaten—the resident characters in the play of the system. They could see the migrants who move in and out of the park—the wood storks and eagles and snapper and snook and mosquitoes and tourists, and the "work" they do for the system. They could see the beauty and excrement and litter and money that constitutes what they bring with them, what they came to find, and what they will leave behind and carry away.

One thing all park visitors take with them is the park image; a blend of the expectations with which they arrived and the experiences they had while there. Energy systems modeling can give the visitor more than just a surface image of a scenic wonder; it can create a deeper awareness of park and self and planet—a potential energy storage tank of concern and action on behalf of a better world.

Ms. Matthews is a writer/editor with the Office of the Chief Scientist, National Park Service, South Florida Environmental Study at the University of Florida.

What Is the Federal Government Doing About Environmental Education

by Don Cook

Students earning the President's Environmental Merit Award, campaign hatted rangers giving lectures on ecology, first graders picking up litter for Johnny Horizon and America's 200th birthday—these and similar activities are examples of Federally-sponsored environmental learning.

During Fiscal Year 1972, the last year in which a survey was conducted, Federal agencies spent over $24 million in support of environmental education. The Office of Education in HEW accounted for over $14 million of the total, providing about $9 million through the Research and Development provisions of the Elementary and Secondary Education Act (ESEA, Title III). Other agencies spending a million or more were the National Science Foundation (NSF), the Environmental Protection Agency (EPA) and the Departments of Interior and Agriculture.

The Problem of A Definition

Tracing the development of environmental education programs is difficult due to the controversy over the definition of environmental education. The words "education" and "environment" are among the most ambiguous in the language. A definition which is having increasing acceptance is one proposed by the Man and the Biosphere program of UNESCO:

Environmental education is learning concerned with

- the biophysical processes of the earth and its ecosystems;
- the relationship between human culture and the earth; and
- the corrective steps needed to harmonize human activities with natural processes.

Federal support of environmental learning is based on a national desire to encourage preparation for environmental jobs or careers; to promote behavior changes, some required legally and others encouraged voluntarily; to inform the public on how an agency is carrying out Federal laws; to inform the public of the complexity of environmental issues and the need for comprehensive solutions; lastly, to enrich an individual's basic education and living experience.

These reasons, while generally accepted, have not been recognized or adopted by any agency. However, the Federal Interagency Committee on Education (FICE) is currently assembling a list of agency learning objectives (from the standpoint of national programs) which should be met during the basic 12 grades of education. A preliminary compilation should be available in mid-1975.

Hopefully, a statement of the objectives will provide the inspiration to consider a wider range of delivery mechanisms and user groups for environmental concepts. Text book publishers, university education departments, educational television, curriculum supervisors, local volunteer groups and others would be more likely to incorporate national environmental efforts into their activities with appropriate help.

Environmental Awareness Levels

The current awareness levels of students and citizens are just beginning to be known with respect to environmental subjects. Robert Roth, in speaking to this point at the 1974 meeting of the American Association for the Advancement of Science, said that ". . . the youth of the U.S. have a positive attitude toward environmental management, but have little idea as to how or where things can be changed to achieve a quality environment." His remarks were based on studies covering more than 10,000 students in 11 states.

A tentative conclusion from this and other information is that environmental education is still at the problem recognition stage of development—it has not yet advanced to the corrective level. This is in sharp contrast with the treatment of other societal problems such as fire hazards, drug abuse, personal hygiene and traffic safety; in which preventive and corrective steps are stressed.

In the next few years there should be an increasing emphasis on learning the ways to protect and to enhance the environment.

Environmental Learning Projects and Activities

The following compilation of Federal activities is designed to be illustrative rather than comprehensive. Space did not permit the inclusion of a number of significant Federal projects.

Department of Agriculture—The Forest Service has an environmental education office which sponsors workshops in outdoor education. Originally aimed at rangers and other Forest Service personnel, the workshops have also included school teachers, local officials and members of volunteer groups.

The Soil Conservation Service provides technical assistance in environmental learning through projects such as workshops for teachers, pamphlets and brochures on soil conservation and audio visual teaching aids. Contact:

Education and Publication Branch
Soil Conservation Service, USDA
Washington, DC 20250

Department of Health, Education and Welfare—The National Institute of Education supports *Resources in Education*. This publication is part of the ERIC system (Education Resources Information Centers). The abstracting of environmental documents for duplicating on microfiche and hard copy is done through a contract with the Ohio State University in Columbus. For information on abstracts and publications write:

Educational Document Reproduction Service
Box 190
Arlington, Virginia 22210

The Office of Education, an arm of HEW, supports a wide range of environmental learning activities. The Environmental Education Act authorizes many types of education projects, but budget limitations have enabled the funding of only about 5 out of each 100 proposals received.

Other provisions of education laws, however, have supported a wide range of activities in areas such as teacher training, curriculum development, and vocational education.

To learn more about various types of education assistance provided by the Office of Education as well as all other agencies, write for the *Catalog of Federal Education Assistance Programs*, Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402 (Mention Stock No. 1708-01286). The catalog costs $5.55 and contains 613 pages.

Department of the Interior—The National Park Service has perhaps the greatest number of Federal employees directly involved in teaching environmental concepts. Through naturalists, rangers, self-guiding trails and numerous exhibits, the Park Service encourages a wide variety of learning in an outdoor setting. The Park Service also sponsors a curriculum project called NEED (National Environmental Education Development). The project is an interdisciplinary approach, titled *Adventure in Environment*, and is aimed at the primary grades. The materials are available from a commercial publisher:

Silver Burdette Co.
250 James Street
Morristown, New Jersey 07960

The Bureau of Land Management has published a curriculum guide for teachers designed for grades three through eight. It is titled *All Around You—An Environmental Study Guide.* Individual copies can be ordered from the Department of the Interior:

Environmental Education Coordinator
Bureau of Land Management (220)
Department of the Interior
Washington, D.C. 20240

The Office of the Secretary of Interior sponsors the Johnny Horizon program in cooperation with the American Revolution Bicentennial Commission. The program provides teacher kits directed at the primary and middle school grades. For additional information write:

Johnny Horizon Coordinator
U.S. Department of the Interior
Washington, D.C. 20240

The Youth Conservation Corps is a program in which over 5,000 young people participate annually for an 8 week work/study project in an outdoor setting. Participants range in age from 15-18 years and gain an understanding of ecology and resource management through actually carrying out projects. For additional information write:

Director of Manpower, Training and Youth Activities
Office of the Secretary
Department of the Interior
Washington, D.C. 20240

Independent Agencies

The Environmental Protection Agency (EPA) sponsors the President's Environmental Merit Awards Program to provide recognition for school groups and individual students carrying out local projects. Under the program a local adult supervisory group establishes the standards for the award and determines which projects qualify. For additional information write:

The President's Environmental Merit Awards Program
U.S. Environmental Protection Agency
Washington, D.C. 20460

Another service is available through the publications branch. Teachers may request single copies of materials by writing:

Teacher Kits
Publications Branch
U.S. Environmental Protection Agency
Washington, D.C. 20460

The Federal Energy Administration (FEA) provides a number of materials on energy concepts and steps needed to conserve energy. An energy/environment guide for teachers grades K-12 is being sponsored jointly by the Office of Education and FEA. The guide is being written by the National Science Teachers Association and should become available in mid-1975. For pamphlets and information write:

Federal Energy Management Program
Room 6442
Federal Energy Administration
1200 Pennsylvania Avenue, N.W.
Washington, D.C. 20461

The Energy Research and Development Administration (ERDA) is the new arm of the government which has taken over some responsibilities formerly assigned to the Atomic Energy Commission plus the job of energy research on all other sources. The agency has educational materials and a film catalog available from:

ERDA, Technical Information Center
Box 62
Oak Ridge, Tennessee 37830

The National Science Foundation, in its role of supporting basic research and education in the sciences, has funded a number of environmental learning projects. Through Foundation efforts, teacher workshops and summer institutes are scheduled annually. The Public Understanding of Science Programs of the Foundation also sponsors a wide range of projects, some of which are concerned with environmental issues.

The Smithsonian Institution, the National Aeronautics and Space Administration, the Tennessee Valley Authority and the Army Corps of Engineers are other agencies with substantial activities in environmental education.

Mr. Cook is Assistant Director for Education with the Office of Education and Manpower Planning, U. S. Environmental Protection Agency.

There are many organizations active in the area of environmental education. The following list includes major groups actively interested in environmental education; some offer a broad series of publications, others offer technical assistance.

Federal

Atomic Energy Commission
Washington, DC 20545

Department of Agriculture
Independence bet. 12th & 14th Sts., NW
Washington, DC 20250

Forest Service
Soil Conservation Service

Department of Health, Education & Welfare
330 Independence Avenue, SW
Washington, DC 20202

Office of Education

Department of Housing and Urban Development
451 — 7th Street, SW
Washington, DC 20410

Department of the Interior
18th & C Streets, NW
Washington, DC 20240

Bureau of Land Management
National Park Service
Fish and Wildlife Service

Environmental Protection Agency
401 M Street, SW
Washington, DC 20460

National Aeronautics and Space Administration
7th & Independence Ave., SW
Washington, DC 20546

National Science Foundation
1800 G Street, NW
Washington, DC 20550

Smithsonian Institution
1000 Jefferson Drive, SW
Washington, DC 20560

Chesapeake Bay Center for Environmental Studies

Federal Energy Administration
1200 Pennsylvania Avenue, NW
Washington, DC 20461

Tennessee Valley Authority
Div. of Forestry, Fisheries & Wildlife Development
Norris, Tennessee 37828

ERDA, Technical Information Center
Box 62
Oak Ridge, Tennessee 37830

Private

These private organizations provide information or technical assistance to communities and individuals interested in environmental education oriented projects or programs.

Acclimatization Experiences Institute
Box 841
Lake Geneva, Wisconsin 53147

American Conservation Association
30 Rockefeller Plaza
New York, New York 10020

American Forestry Association
1319 — 18th Street, NW
Washington, DC 20036

Association of Interpretive Naturalists
6700 Needwood Road
Derwood, Maryland 20855

Conservation Education Association
University of Wisconsin—Green Bay
Green Bay, Wisconsin 54302

Conservation Foundation
1717 Massachusetts Avenue, NW
Washington, DC 20036

Garden Club of America
598 Madison Avenue
New York, New York 10022

Izaak Walton League of America
1800 N. Kent Street
Arlington, Virginia 22209

Keep America Beautiful, Inc.
99 Park Avenue
New York, New York 10016

National Audubon Society
1130 — 5th Avenue
New York, New York 10028

National Education Association
1201 — 16th Street, NW
Washington, DC 20036

J.N. "Ding" Darling Foundation, Inc.
40 Central National Bank and Trust Co.
Des Moines, Iowa 50304

National Geographic Society
1145 — 17th Street, NW
Washington, DC 20036

National Recreation and Park Association
1601 N. Kent Street
Arlington, Virginia 22209

National Wildlife Federation
1412 — 16th Street, NW
Washington, DC 20036

Open Lands Project
53 West Jackson Blvd.
Chicago, Illinois 60604

Pocono Environmental Education Center
R.D. 1, Box 268
Dingmans Ferry, Pennsylvania 18328

Resources for the Future, Inc.
1755 Massachusetts Avenue, NW
Washington, DC 20036

Teton Science School
Box 68
Kelly, Wyoming 83011

Thorne Ecological Foundation
1229 University Blvd.
Boulder, Colorado 80302

Wilderness Society
729 — 15th Street, NW
Washington, DC 20005

Yosemite Institute
P.O. Box 487
Yosemite, California 95389

Zero Population Growth, Inc.
1346 Connecticut Avenue, NW
Washington, DC 20036

State

At the state level, the most important individual to contact for information, advice and assistance is your local state coordinator for environmental education.

Environmental Education Coordinator
State Department of Education
State Office Building
Montgomery, Alabama 36104

Environmental Education Coordinator
State Department of Education
Pouch F
Juneau, Alaska 99801

Environmental Education Coordinator
Arizona State Department of Education
1535 West Jefferson
Phoenix, Arizona 85013

Environmental Education Coordinator
State Department of Education
New Education Building
Little Rock, Arkansas 72201

Environmental Education Coordinator
State Department of Education
State Education Building
721 Capitol Mall
Sacramento, California 95814

Environmental Education Coordinator
State Department of Education
State Office Building
201 East Colfax
Denver, Colorado 80203

Environmental Education Coordinator
P.O. Box 2219
State Department of Education
Hartford, Connecticut 06115

Environmental Education Coordinator
State Department of Public Instruction
Townsend Building
Dover, Delaware 19901

Environmental Education Coordinator
District of Columbia Public Schools
Madison School Building
10th and G Streets, N.E.
Washington, DC 20002

Environmental Education Coordinator
State Department of Education
Knott Building
Tallahassee, Florida 32304

Environmental Education Coordinator
State Department of Education
Division of Curriculum Development
Education Annex Building
Atlanta, Georgia 30334

Environmental Education Coordinator
Department of Education
Box DE
Agana, Guam 96910

Environmental Education Coordinator
State Department of Education
1270 Queen Emma Street
Room 902
Honolulu, Hawaii 96813

Environmental Education Coordinator
State Department of Education
Lynn B. Johnson Office Building
Boise, Idaho 83720

Environmental Education Coordinator
State Department of Education
Office of the State Superintendent of Public Instruction
316 South Second Street
Springfield, Illinois 62706

Environmental Education Coordinator
Division of Curriculum
State Department of Public Instruction
10th Floor, 120 W. Market Street
Indianapolis, Indiana 46204

Environmental Education Coordinator
State Department of Public Instruction
Division of Curriculum
Grimes State Office Building
Des Moines, Iowa 50319

Environmental Education Coordinator
State Department of Education
120 East 10th Street
Topeka, Kansas 66612

Environmental Education Coordinator
State Department of Education
Capitol Plaza Towers
Frankfort, Kentucky 40601

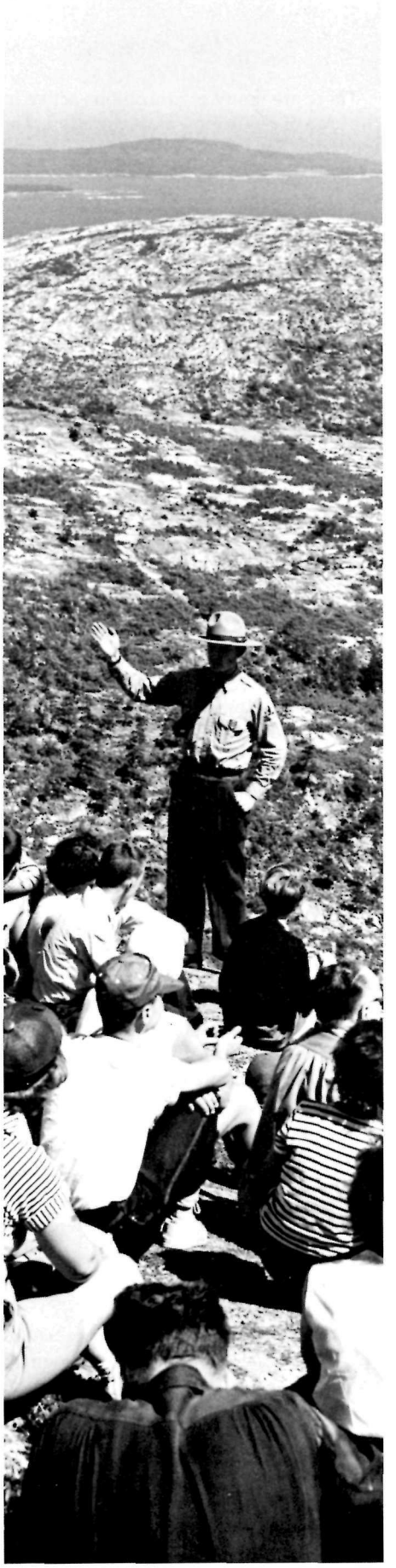
Environmental Education Coordinator
State Department of Education
Box 44064
Baton Rouge, Louisiana 70804

Environmental Education Coordinator
State Department of Educational and Cultural Services
Augusta, Maine 04330

Environmental Education Coordinator
State Department of Education
P.O. Box 8717, Friendship International Airport
Baltimore, Maryland 21240

Environmental Education Coordinator
State Department of Education
182 Tremont Street
Boston, Massachusetts 02111

Environmental Education Coordinator
State Department of Education
Box 420
Lansing, Michigan 48902



Environmental Education Coordinator
State Department of Education
644 Capitol Square Building
St. Paul, Minnesota 55101

Environmental Education Coordinator
State Department of Education
Division of Instruction
Box 771
Jackson, Mississippi 39025

Environmental Education Coordinator
State Department of Education
Box 480
Jefferson City, Missouri 65101

Environmental Education Coordinator
Office of the Superintendent of Public Instruction
State Capitol Building
Helena, Montana 59601

Environmental Education Coordinator
State Department of Education
233 South 10th Street
Lincoln, Nebraska 68508

Environmental Education Coordinator
State Department of Education
Heroes' Memorial Building
Carson City, Nevada 89701

Environmental Education Coordinator
State Department of Education
64 North Main Street
Concord, New Hampshire 03301

Environmental Education Coordinator
Division of Curriculum and Instruction
State Department of Education
225 West State Street
Trenton, New Jersey 08625

Environmental Education Coordinator
State Department of Education
State Education Building
Santa Fe, New Mexico 87501

Environmental Education Coordinator
Room 326 EB
State Department of Education
Albany, New York 12224

Environmental Education Coordinator
State Department of Public Instruction
Room 284
Raleigh, North Carolina 27611

Environmental Education Coordinator
State Department of Public Instruction
Bismarck, North Dakota 58501

Environmental Education Coordinator
State Department of Education
65 South Front Street
Columbus, Ohio 43125

Environmental Education Coordinator
State Department of Education
State Capitol
Oklahoma City, Oklahoma 73105

Environmental Education Coordinator
State Board of Education
942 Lancaster Driver, N.E.
Salem, Oregon 97310

Environmental Education Coordinator
State Department of Public Instruction
Box 911
Harrisburg, Pennsylvania 17126

Environmental Education Coordinator
Hayes Street
Providence, Rhode Island 02908

Environmental Education Coordinator
State Department of Education
Room 110, Rutledge Office Building
Columbia, South Carolina 29201

Environmental Education Coordinator
Box 135
University of South Dakota
Vermillion, South Dakota 51069

Environmental Education Coordinator
State Department of Education
Division of Instruction
Cordell Hull Building, Room C3-303
Nashville, Tennessee 37219

Environmental Education Coordinator
Texas Education Agency
201 East 11th Street
Austin, Texas 78781

Environmental Education Coordinator
State Board of Education
1400 University Club Building
Salt Lake City, Utah 84111

Environmental Education Coordinator
State Department of Education
Montepelier, Vermont 05602

Environmental Education Coordinator
State Department of Education
Box 6–Q
Richmond, Virginia 23216

Environmental Education Coordinator
State Department of Education
Office of State Superintendent
Old Capitol Building
Olympia, Washington 98504

Environmental Education Coordinator
State Department of Education
Capitol Complex
Room B 318, Building 6
Charleston, West Virginia 25305

Environmental Education Coordinator
State Department of Public Instruction
126 Langdon Street
Madison, Wisconsin 53702

Environmental Education Coordinator
State Department of Education
Capitol Building
Cheyenne, Wyoming 82002

Bibliography

Books

Bennett, Dean, *Organization and Operation of the Regional Environmental Education Program*, Yarmouth: Yarmouth Public Schools, 1969.

Brown, William E., *Island of Hope*, Washington, D.C.: National Recreation and Park Association, 1971.

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National Park Service and National Education Association, *A Guide to Planning and Conducting Environmental Study Area Workshops*, NEA Publications, 1972.

National Wildlife Federation, *Conservation Directory 1974*, Washington, D.C.: The National Wildlife Federation, 1971.

Simon, Sidney B., Howe, Leland W., Kirschenbaum, Howard, *Values Clarification*, New York: Hart Publishing Company, Inc., 1972.

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Tanner, R. Thomas, *Ecology, Environment, and Education*, Lincoln, Nebraska: Professional Educators Publications, Inc., 1974.

Toffler, Alvin, *Future Shock*, New York: Random House, 1970.

Troost, Cornelius J., Altman, Harold, *Environmental Education: A Source Book*, New York: John Wiley & Sons, Inc., 1972.

U.S. Department of Agriculture, Forest Service, *Environmental Education for Teachers and Resource People*, Washington, D.C.: Government Printing Office, 1974.

U.S. Department of Interior, Bureau of Land Management, *All Around You*, Washington, D.C.: Government Printing Office.

U.S. Department of the Interior, Johnny Horizon Program, *A Better Place To Be*, Washington, D.C.: Government Printing Office, 1975.

Van Matre, Steve, Acclimatizing: A Personal and Reflective Approach to a Natural Relationship, Martinsville, Indiana: American Camping Association, 1974.

Werling, Donn Paul, *Environmental Education and Your School Site*, Chicago: Open Lands Project, 1973.

Periodicals

American Forests Magazine
American Forestry Association
919 17th Street, N.W.
Washington, D.C. 20006

Environmental Awareness Reading List
National Technical Information Service
U. S. Department of Commerce
Springfield, Virginia 22161

Environmental Education Report
Environmental Educators, Inc.
1621 Connecticut Avenue, N.W.
Washington, D.C. 20009

Journal of Environmental Education
Heldref Publications
4000 Albermarle Street, N.W.
Washington, D.C. 20016

National Wildlife Magazine
National Wildlife Federation
1412 Sixteenth Street, N.W.
Washington, D.C. 20036

Films

Any Time, Any Place
Environmental Concerns, Inc., 1974

Children and Trees
Harpers Ferry Historical Association
P.O. Box 147
Harpers Ferry, West Virginia 25425

Fingerpainting: No. 1 Environmental Awareness: No. 2 Here We Are
Harpers Ferry Historical Association
P.O. Box 147
Harpers Ferry, West Virginia 25425

Home
(16mm color 29 min)
Radio and Television Commission of the Southern Baptist Convention
P.O. Box 12157
Fort Worth, Texas 76116, $300.

A Matter of Time
Conservation Foundation
1717 Massachusetts Avenue, N.W.
Washington, D.C. 20036

Rise and Fall of the Great Lakes
National Film Board of Canada
1251 Avenue of the Americas
New York, New York 10020

A Thousand Suns
Arthur Barr Productions, Inc.
P.O. Box 7–6
Pasadena, California 91104, $250.

Why Man Creates
Pyramid Films
Box 1048
Santa Monica, California 90406.