Nature Study

A JOURNAL OF ENVIRONMENTAL EDUCATION AND INTERPRETATION

Summer, 1971 *Vol. 25, No. 2*

Environmental Restoration

The American Nature Study Society

National Environmental Study Areas

The National Park Service, through the National Capital Parks, has established several national environmental study areas in the greater Washington area. These areas may serve as prototypes for similar programs in other cities and parts of the country.

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"National environmental study areas are places where teachers, children, ALL kinds of people learn to 'put it all together.' They learn how the environment works, how they fit into it, how they interact with it. Used in conjunction with the regular school curriculum, the NESA can help do these things: (1) Introduce students to the TOTAL environment, cultural and natural, past and present, and help them realize that they are a rightful part of it; (2) Develop in them an understanding of how man is using his resources; and (3) Equip them to be responsible members of the world they are shaping and being shaped by.

"When man first stood upright and began using tools, he started to gain a sense of mastery over his environment. As history and culture grew up from wall paintings and memories into museums and libraries, man grew further and further away from his early dependency on nature, or so he thought.

"Today we look around at filthy air, stinking water, dwindling food supplies and vanishing open spaces and ask ourselves 'Is this really mastery over nature?' So far, our technology has given us ease and comfort and facility by consuming our natural resource base without regard to the result. Nature has been subtracting remorselessly from the purity and beauty — even the safety — of our world. Unless we bring our human behavior into harmony with the environmental rules that govern us, we will destroy OURSELVES before we completely destroy our world.

"Guides to human behavior we call 'ethics.' A good environmental education is the strongest base for building a valid environmental ethic. The NESA approach is along five 'environmental strands' — tools for understanding. The strands are:

1. **Interaction and Interdependence**
2. **Variety and Similarity**
3. **Patterns**
4. **Change and Continuity**
5. **Adaptation and Evolution**

These strands run through all your subjects at all grade levels. We invite you to use them at NESA sites and in your own school."

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For further information, write National Capital Parks, National Park Service, 1100 Ohio Drive, S. W., Washington, D. C. 20242.

Environmental Restoration

ROBERT M. HOWES

Keynote address before the Association of Interpretive Naturalists 1971 Annual Workshop and Meeting, Kentucky Dam Village State Resort Park, March 31, 1971.

The time is the 20 years just before the Civil War; the place, the land between the Tennessee and Cumberland Rivers in west Kentucky and Tennessee. Man, the tool-making animal, is engaged in his age-old quest of wresting metal from the earth and fashioning it to his purposes. In the process he is consuming not only the ore but the living earth itself as he fells centuries-old oaks and scrapes up leaves, humus, and topsoil to make charcoal for his iron furnaces. The furnaces belch forth smoke, slag, and molten metal. Each is fed by scores of charcoal hearths that cast a pungent haze over the countryside as they devour the forest and topsoil, first from the creek bottoms and then from every ridge and hillside.

For nearly a century the age of iron held sway in the land between the rivers. The last blast cycle ceased in 1912, not so much for the lack of ore as because the forest, the source of charcoal fuel, had finally been consumed. Gone with the forest were the wild turkey, deer, beaver, buffalo, and other wildlife. Also soon to go were most of the people for whom woodcutting, charcoal burning, and iron making had been a way of life. They left behind a land devoid of protective cover and stripped of life-giving soil and water on which remaining men could depend. For another 50 years men struggled against impossible environmental odds, striving to make a living from depleted land. Their struggle served only to further deplete both land and human resources.

Yet this was the same land between the rivers that 150 years earlier had been blessed with an abundance of timber, wildlife, and water. A historian in 1884 wrote, "Seventy-five years ago 1,000 acres of land between the rivers would not have been exchanged for the same quantity of the richest [land elsewhere in Trigg County] . . . The finest springs, the coolest water gurgled up in the sandy bottoms or came pouring out from the hillsides, and the whole country was covered in a growth of timber as luxuriant as could be found in any other portion of the state, whilst in the other rich . . . sections of the county there were few springs and scarcely a sufficiency of timber to afford roosts for the wild turkeys at night."[1]

The late 1930's brought the first of several Federal efforts aimed at restoring the depleted resources of the land between the rivers. At the same time even greater efforts to tame and harness the bordering rivers were taking shape in more distant planning councils. All these efforts climaxed a decade or so ago when TVA advanced plans for Federal acquisition and development of the entire 170,000-acre area.

Since 1964 in the area between the rivers – now become Land Between the Lakes – TVA has been engaged in a program of environmental restoration for public outdoor recreation and conservation education.

Already the area is described by outdoor writers (not on the TVA payroll) an an "alluring peninsula, cool and green as a mint julep,"[2] stretching 40 miles between two great inland lakes. Man-made scars of the past century and a half are being obliterated, junk cars buried, billboards removed, trees planted, and erosion healed. Deer, waterfowl, and small game have returned in abundance. Eagles and wild turkey are again in evidence. Even a small herd of buffalo once again grazes on a protected range. Already the area is becoming established throughout the Midwest and beyond as a favored destination for camping, hunting, fishing, birdwatching, and other outdoor activities. Already the area has become an important learning center concerned with conservation, the out-of-doors, and the environment.

The area's land and water resources have been publicly acquired, and the conceptual outlines of a long-range program in the public interest are firmly established. Much activity is under way. But each day I recall Winston Churchill's remark, "So much accomplished; so far yet to go."

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Concern with the environment is part of today's mode; as a slogan, environment is almost as popular as love and peace and is fast replacing motherhood, the full dinner pail, and the car in every garage.

Such concern reflects the realities of the times, and it has surfaced none too early. We need to be concerned, and others need to become concerned. Environmental quality must become a universal concern for a long time to come. We cannot allow it to pass as a fad like swallowing goldfish, overpopulating phone booths, or staging panty raids.

A valid concern for the environment must start from the premise that the earth is a place to be used, but used wisely – more wisely than in the recent past. But we cannot allow our concern to be dissolved in tears of pessimism or "What's the use?"

As Director of the Land Between the Lakes program I am a part of an organization – the Tennessee Valley Authority – that has long been concerned with the use of the earth's resources. It has also been engaged in environmental restoration for more than 35 years, before environment became a bandwagon word. In the 1930's soil erosion was rampant throughout the rural lands of the Tennessee Valley as it was throughout the South. Twenty-five years later I had difficulty in convincing a visitor from the Damodar Valley Authority in India that the Tennessee Valley had ever had problems of soil erosion. I could not find a single example of active erosion to show him within convenient driving range of Knoxville, and he could not believe that the hillside pastures we saw at every turn were once red and bleeding as they spilled their topsoil into the Valley's streams and reservoirs. In the intervening 25 years TVA, its cooperating agencies, and the people of the region had done their work so well that the results belied the problem.

Today the waters of the Tennessee River basin are generally cleaner than they were in the 1930's. Perhaps this is the only major river basin of the Nation where this is true. The Tennessee is controlled by some two dozen man-made reservoirs containing more than half a million acres of water surface surrounded by 11,000 miles of shoreline. Yet hundreds of miles of free-flowing stream continue to attract the canoeist, the hiker, and the trout fisherman.

TVA's air pollution research began nearly two decades ago. Today we are engaged in a $100 million program designed to remove 99 percent of fly ash at TVA coal-fired electric generating plants by 1975. We are spending additional millions in research and pilot studies for removal of sulphur dioxide discharges from these same plants and

1. William Henry Perrin, **History of Counties of Christian and Trigg, Kentucky** (Chicago and Louisville: F. A. Battey Publishing Company, 1884).

2. F. M. Paulson, "Fishing and Boating the Land Between," **Field & Stream,** July 1969 (Evinrude Writing Award Winner, 1970).

are fully prepared to implement any feasible results of these initial research and experimental efforts.

Although TVA did not become a large-scale user of coal until the early 1950's, it began work with the Virginia Department of Forestry as early as 1945 to demonstrate reclamation through tree planting of mountainsides stripped for coal. Well before 1945 the agency was reclaiming to full productive use those lands in middle Tennessee where it was obtaining phosphate ores through surface mining.

Even as environmental problems like soil erosion, malaria, and forest fires were being solved, others emerged that were unknown in the 1930's – organic mercury in fish, pesticides in the food chain, the noxious Eurasian water milfoil in TVA lakes, eutrophication of lakes and rivers, and radiation from thermonuclear electric generating plants. Still others like strip mining, on the basis of hindsight, proved to be of vastly greater proportions than first realized.

The problems of environmental restoration in the 1970's differ from those of the 1930's, primarily in their complexity and in the greater range of their impact. There are similar differences in the tools available to meet them. The tools of the 1930's were adequate for the job of the 1930's. Man knew how to correct erosion, how to prevent forest fires, how to keep from fouling his streams; he simply had not yet made the social decision to put technology to work. Until, he made the decision to put his knowledge to work on thousands of individual farms, in millions of acres of forest land, and along thousands of miles of streams the technology was of no avail. Once the decision was made – and made by hundreds of thousands of individuals – the problems were tackled and solved.

Today we also have technological systems adequate to solve the environmental problems of the 1970's. The larger question is whether we will make the necessary social decisions in time to put these systems to work. This is the question on which environmentalists cannot agree.

In his 1969 Pulitzer Prize book, *So Human an Animal*, René Dubos describes the "new pessimism." He writes, "The vision of the future, as seen in the light of the new intellectual pessimism or of the dismal optimism of some technologists, would be terribly depressing if it were not for the fact that it resembles visions of the future throughout history. Pessimists have repeatedly predicted the end of the world, and utopians have tried to force mankind into many forms of strait jackets. Fortunately," he goes on, "the creativeness of life always transcends the imaginings of scholars, technologists, and science-fiction writers."

Rejecting both the "new pessimism" and "dismal optimism," Dubos sets a course toward a "new optimism" with which I feel a strong sense of kinship.

The social decision to have a quality environment in the United States and in the world is the single most important decision that will be made in our times. There is a temptation to join the "new pessimism" and to believe that the decision is so great, so important, that the individual has no opportuity to influence whether and how it will be made. To succumb to this temptation is to believe with some that the most important public decisions are made in secret – in high councils beyond the influence of private citizens. However one may be persuaded by individual examples of the past and by current practice, we must believe that over time this is simply not true. To join the new optimism, to believe in the opportunity and the responsibility for individual citizens to influence major social decisions affecting his way of life, is as fundamental as the Bill of Rights and as American as apple pie.

The social decision to have a quality environment is, in reality, not a single decision but the composite of literally millions of individual decisions starting in the bedroom and extending upward and outward to the highest councils of the Nation. The bases for these decisions are as close to us as food, drink, clothing, transportation, and shelter. They influence and will be influenced by the food we buy, how we fill the gas tank of our car, what our neighbor does with his property, the size of our electric bill, and what we pay in taxes.

Increasingly, the decision to have a quality environment will be influenced by how we spend our leisure time – or would like to spend it.

And now we come to you.

I can think of no group that has better opportunities to influence a decision for a quality environment in the United States than the Association of Interpretive Naturalists. To use a current phrase, "You are on the cutting edge." You are meeting people who, aware of it or not, are seeking a quality environment. You meet them at times and places when they are most receptive to hearing about the environment. You have the skills necessary to discuss environmental questions and the necessary examples are at hand, needing only to be pointed out.

In short, and as I wrote in my letter welcoming you to this conference, I can think of no one better qualified "to work with people in helping to maintain a quality environment on public lands, in our communities, and throughout the Nation." In the process you will be helping to establish national environmental priorities.

Let me be specific:

- Each year those of us at this meeting await with concern and some dread the Secretary of Interior's latest list of endangered species. Yet many people remain unaware of its existence or the problem with which it deals. I think it is helpful to know and for your visitors to know that had the list been published in 1900 it would have contained the buffalo, the eastern grey squirrel, and the pileated woodpecker – perhaps even the white-tailed deer. We need to know this not to dismiss the significance of today's lists, but to motivate us to know why the buffalo, squirrel, and deer are no longer on the list and to learn what we must do so that species now on the list can be removed – and for the right reasons.
- If you are not familiar with the writings of a 19th century Vermonter, George Perkins Marsh, you should be. It is Marsh whom Stewart Udall credits with the beginnings of conservation wisdom in the United States. If you are familiar with Marsh's writings, you will recall that in 1840 Vermont's green mountains, like the land between the rivers, were eroding as the result of overcutting of lumber and overgrazing of sheep, its rivers overflowed, wool growing and lumbering were in decline, that not even corn and tobacco in the South were exhausting soils and mangling forests "more thoroughly than on the hillsides of Vermont."[3] Contrast the Vermont of today with the Vermont of 1840 and you will recognize the social decision made by Vermonters and advertised on billboards outside state boundaries (they are no longer permitted within the state) to maintain Vermont's quality environment.
- For the most part we have the enabling legislation and a growing body of supporting opinion in the courts to bring about the public land use controls to maintain quality environment throughout the Nation. But we have put these tools to use only sparingly throughout the Nation. Recently a plethora of national organizations have sprung up as "defenders of the environment." Some of these boast state and local chapters who are hard at work on local issues. Recent decisions such as those concerning the jet port in the Everglades, the Florida ship canal, the SST, and others illustrate their growing influence! Increasingly, and especially at the local level, these groups are seeking and need

3. Stewart Udall, **The Quiet Crisis** (Washington, D. C., 1963).

to find positive programs to be for rather than projects to be against. They need to recognize that our environment depends as much on wise use of resources as on their preservation. Having made these decisions, they need to support the needed research, laws, and tax dollars to put them into effect. Their ranks need to be swelled by new members, motivated to become involved on behalf of a quality environment. Where better can one become motivated to become involved, where better can one acquire the necessary skills, than through the kinds of interpretive programs that are your stock in trade?

• Recently one of these citizen groups – not a government agency – uncovered a forgotten law in the Nation's law books since the 1890's providing for control of pollution in the Nation's streams, lakes, and water courses. How many millions of gallons of public and private wastes have been flowing to the Nation's streams in the absence of enforcement of this law we will never know. Even now authorities are ambivalent about whether the law shall be used and to what extent. An informed citizenry can help remove such ambivalence. You can help to relate the joys of a woodland walk along a sparkling stream or lakeshore to the much larger question of whether the Nation's waterways will be restored to health.

• Do you smoke along the trail and in the woods? Do you permit or discourage others from smoking? Have you thought to relate this simple act to broader questions of air pollution?

• What about litter along your trails, throughout your parks, in your lakes and streams? Have you tried to relate the thoughtless – but nonetheless selfish – act of littering to your administrators' costs of keeping our parks and roadsides clean and to the even greater question of solid waste disposal?

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We could continue to ask ourselves more of these kinds of questions, but it would only serve to confirm the thesis that those of us here at this meeting have a special opportunity – and a special responsibility – for the quality of America's enviroment.

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It would be a mistake to underestimate either our opportunity or our responsibility. To obtain a quality environment will require that we rearrange both our personal and our national priorities. It will require hard work, but like all work it will be easier if it is also fun. And here I mean fun in the best sense of the word – fun that rewards with the deepest kinds of inner joys and satisfactions and fun that results in a genuine renewal of energy and spirit.

Perhaps it is in this sense that the National Wildlife Federation has taken over our name "Camp Energy" which we use to designate a campground in Land Between the Lakes. The Federation uses the same name for the 8-week environmental camp that it conducts each summer for youngsters from across the Nation in Land Between the Lakes. Certainly as we watched the camp last summer the youngsters were having fun. Certainly also as we read their letters afterward and heard the comments from their parents, these same youngsters left Land Between the Lakes energized with a joyful spirit on behalf of a quality environment.

Anne Morrow Lindbergh put it this way in a recent article: "To save the earth will take a revolution in values, a new ethic by which people think and act in terms of guardianship of the planet and its life . . . A revolutionary change in values does not usually come about without . . . suffering." But, she goes on, humanness requires "something left over beyond the sheer necessity to survive. Play, joy, spontaneity – these are the well springs of creativity. They may be extras, but they are among the most marvelous attributes of man. We cannot abondon them and still be fully human."[4]

Each of us as we live out our days is leaving, in the words of Aldo Leopold, "our signature upon the face of the land." The question is whether ours will be only graffiti defacing public places, or will they be, like John Hancock's, big enough and bold enough for all to see?

4. Anne Morrow Lindbergh, "Harmony With the Life Around Us," **Good Housekeeping** (July 1970).

Human Ecology in the Curriculum

JOHN W. BRAINARD

Human ecology is the study of the relation of man to his environment. Today this study is needed more than ever before because man has greater ability to manage or to mismanage his environment.

The successes and failures of today's education will determine the fate of human society.

Human ecology should not be taught as a specified subject in the curriculum: rather it should premeate every subject. Human ecology should involve: The social sciences, studying groups of people; the behavioral sciences, researching the relationships of individuals in the complex of society; The biological sciences, seeking to understand organisms and their relationships to environment. The physical sciences, trying to explain the basis of life.

Human ecology should also involve the communicative arts, interchanging facts and ideas between our countless peoples of diverse backgrounds and interests. Modern and ancient languages, visual arts, graphic arts, medical arts, indeed all arts are communicative arts – as is mathematics, the art of telling how many.

In short, human ecology should relate to every science and every art in the curriculum.

Human ecology can actually involve every school activity, not just the arts and sciences. For example physical education, home economics, and shop subjects teach skills and ideas helping make students more effective and therefore happier in the complicated milieu of human existence.

If you accept the definition of human ecology – which is standard – you will find it hard to disagree with any of the above statements, but –

If human ecology is a study of such breadth, does it spread out to form a nonsensical film one molecule thick, obscuring the neat organization of existing subjects in the curriculum, gumming up crisp compartmentalizations so beloved by the academic mind? It can – but it never need do so.

Human ecology can be a binding agent making a cohesive whole out of education, an integrative force desperately needed today when so many people do such superficial thinking about the purposes and values of human life, even their own.

For the many young people who look at a formal education merely as a social requirement rather than as an intensely exciting opportunity to learn about life, the educational approach which stresses human ecology can create vitalizing experiences.

Of course human ecology is not new but we need far more of it. Too often have we failed to teach ecologically, to stress environmental correlations.

To motivate teachers and students to give closer attention at school to human ecology, we need a wider variety of *Outdoor Environments at School.*

Our urban and suburban youths are cut off from the natural resource base. Will you help your community to give back to its youth their soil and water, woods and wildlife? Give back to youth a place on the face of the earth, an unpaved and unlawned place. Let them be useful by practicing conservation on the land itself where they can study first-hand the natural resources to which science, art, and Man himself must relate.

Environmental Education

Beulah A. Frey

Outdoor Education and Environmental Education are the two terms being used to replace Nature Study. Nature Study was dropped from most educational curriculum as fewer natural areas were available to the school, as the curriculum got more crowded and as the nature teachers stopped changing with the educational practices and the times.

Outdoor education is as the name implies education in the out-of-doors. It was defined by the late L. B. Sharp as all those things that could best be taught out-of-doors. Each school which offers outdoor education does so with its own approach. Most do not separate these offerings from the curriculum as its own discipline with its own objectives, but use the out-of-doors as a learning laboratory wherein the school curriculum is enriched through direct experience. Others take the students on a week or two camping program which is then integrated into the school program for the rest of the year. In some schools, where the teachers are not a working team or where it is felt that outdoors experiences only apply to science, it is used in science classes all year round or just at certain seasons.

No matter which of the approaches is used, the best programs are those which are closely correlated with classroom activities where the teacher and the students plan and share the experiences together, and where the parents are also involved.

John Dewey must have envisioned something of this nature in education when he expounded the philosophy of learning by doing. In all subject areas, whenever it is possible, direct experience should be employed as a teaching tool. There is no subject taught in the school which could not have some direct experiences in the out-of-doors which the student will utilize throughout his life: mathematics, social studies, language arts, music, art, physical education, and health.

Environmental Education is based upon understanding of all factors of the environment and builds the understandings which come from the subjects of economics and sociology, the sciences including mathematics and the interpretive phase of education. Nature study and outdoor education are tools and a functional part of the broader term environmental education.

Most children of today are not learning to appreciate the rainbow, the rising sun, the song of the birds, the whispering winds through the pines, nor are they learning skills to live comfortably in this environment. Most men have forgotten man's relationship with the environment over the past generation because so many artificial environments with paved deserts and treeless yards have been developed. Many children of today no longer have home chores or even the most minute responsibility. Yet psychologists have shown that children learn better and are happier when they are directed in learning skills and appreciation and when they are given responsibilities. Children are by nature active creatures. Sitting and watching T.V. for hours is not natural and may lead to boredom and discontent for the healthy child. It does ruin their motivation for other activities such as reading. Families need to find activities that they can share. Outdoor recreation is one area that is ideal in meeting this need.

These are but a few of the needs our educational programs should be considering. During the educational process of an outdoor program the student is more nearly a whole person, he is less dominated by his elders, he has the opportunity to make decisions, to be responsible, to be creative, to meditate, to acquire new skills, to live and work with others, and to know the effects of democracy, but only if the situation is handled correctly.

How can we be sure it is being handled correctly? That the curriculum really fits the needs of the people? These and many other questions need to be studied scientifically for correct answers but from observations of some of the world's best teachers and from the students of such teachers the following practices could be set in motion immediately to help fill the void until some answers can be determined.

The most important factor here as in all education is for the children to develop a love for other individuals through teacher directed activities. Each child needs to feel he is an important part of the world and that he can contribute something to the community. This might be one of the hardest objectives to accomplish. Sometimes it seems an almost impossible task to find some place for each student to contribute the best he can and make it look as if he did some great feat.

A proper attitude on the part of the teacher and parent, such as enthusiasm and interest toward participation in all activities, is of utmost importance. The negative approach of a parent concerning snakes, for instance, can undo hours of constructive teaching of the teacher. Enthusiasm and interest can only be obtained by direct involvement with the materials to be used. Teachers, parents, and students can join such organizations as the Audubon Society, the Botanical Society, the Entomological Society, and the Aquarium Society where people are willing to share their knowledge with interested individuals. These organizations can help give identification answers, ecological answers, and interest. For interest and enthusiasm nothing can take the place of a little time spent each day in the out-of-doors with a questioning mind, use of the school and public libraries to answer questions and visits and telephone calls to the museum and universities for answers which cannot be found in books. Any questions that cannot be answered should develop into a research project because there are many unknowns. If all of this can be done in groups of two or more it is surprising how much enthusiasm is generated and *passed on* to others. It can best be done with the students, because they learn with teachers and are thrilled if they can find an answer and help the teacher increase in knowledge.

A humanistic attitude must be developed in youth. Understanding through observation, measurement, and interpretation of the organisms in the total habitat, and not just the observation phase as in the trip to the zoo, are important in developing this attitude. I never quite realized how important this knowledge was until I was searching in my mind for why I use my money to take students on field trips. I realized that they knew answers others did not, but I could not figure why. Then there was an earthquake in Alaska. The year before there had been one in Chile, I had put a loose dollar in the collection plate, but I had a friend and her child lost in this one and so a dress was sacrificed as well as all loose change. If this effected me in this way no wonder children who saw, held, measured, observed, and interpreted had a different attitude to their environment.

The students must be motivated to find information. If the teacher first helps look up information and shows he enjoys it, the student soon wants to look it up on his own. This was demonstrated and the value shown at the Audubon Camp of Maine this summer when one of the teachers asked why our students from the Audubon Society of

Western Pennsylvania were so outstanding, were they straight "A" students? Our reply was "No, but they had had training from the research program at the University of Pittsburgh, the Audubon Society, The Entomology Society, and the Botanical Society as well as at school and on many fieldtrips." One of the other leaders said, "I think I diagnosed it the other night as I watched the young people in the crowd. They *listen* well, are not afraid to ask questions when they do not understand or do not know something, and if an answer is not given they are not afraid to look it up, in fact they do so at the first opportunity. This makes them appear to be "A" students as well as makes them interesting young people to be around. They are not just parrots who can regurgitate what they are told to learn, but they have learned because they are interested and it has become a part of them."

For those of us who are religious we know that Christ went aside alone in the mountain or the garden. Here he found the strength he needed to continue. As we read history we see that the great men all had some place where they could go just to get away from it all. Everything in our society today seems to be giving us less opportunity to do this and less places where we can do it. In outdoor education we can give the student a chance to see the value of such experiences.

A desire to share knowledge and findings rather than to selfishly rank first in his class develops in the student a desire to learn more. This is easy to teach in an outdoor program where students work as teams and where there is no great competition for grades.

The students must develop a desire to do original research so that more can be known about the living things about them. This will give purpose to observtions and measurements, make them valuable. Also perhaps this will fulfill the greatest need in our world today. If man can save the wildlife from pollution and misuse perhaps he will find ways in which he will save himself from extinction.

Problems will be many. What can be done with the student who has so many allergies he just cannot be in the out-of-doors for any length of time? Does the teacher have to be able to identify every living creature? Does the teacher have to overcome her fear of snakes or insects? Does the parent need to become involved? Should all students like the work in the out-of-doors? Where should it start in school? Should all classes be coordinated? These and many others have already been answered by schools which have active programs. Perhaps the answers would not apply to every situation, but they should be reviewed before a complete program is undertaken.

Outdoor environmental education therefore must help build for citizenship, develop respect for authority, develop an appreciation of nature, and an understanding of the world around us. The task indeed is a great one. Can education meet the challenge by showing ways to preserve natural resources and of teaching youth how to live in a leisure time society? Are you ready for this challenge? If not, how can you make yourself ready right away?

Bullheads

Paul M. Kelsey

These warm spring evenings find nearly every pond with its complement of bullhead fishermen sitting around crackling fires waiting for the horned pout to take the bait. In spite of all the attention given to game fish like trout and bass, when it comes to fish-on-the-hook, the bullhead leads their combined take by about three to one. There are several reasons for its unique popularity, the two strongest being its cooperative nature and wide distribution, making it only a few minutes away from any fisherman.

By nature the bullhead is very indiscriminate in what he chooses to eat, his main concern being availability. Bullheads drift along the muddy bottom testing with their eight barbels to locate such things as mollusks, crayfish, minnows, worms, nymphs and even various forms of plant life. In spite of the great latitude that this leaves the fisherman in his choice of bait, most regular bullhead fishermen have their own pet ideas about what makes the best bait. Nightwalkers and pollywogs are among the favorite natural baits, but such things as frozen shrimp and chicken entrails also have their backers.

The novice bullhead fisherman may be frustrated by this obliging creature because, bite for bite, he could probably catch more brook trout. The key to connecting with a bullhead after it starts to play with the bait is patience. Yanking the bait away from the fish is probably the most common cause of failure. They will nibble and mouth the bait for some time before taking it sufficiently to be hooked. The old-timer may look like a lazy bloke as he lets the bobber dance around as he slowly gets up from his comfortable seat and reaches for the pole. Finally it stops dancing and starts sliding away – for the bullhead has finally taken the bait in his mouth and is moving off.

Equipment needs for bullhead fishing are certainly no deterrent, for a hand line tied to a limber willow shoot which is shoved into the mud bank will catch just as many pout as the most expensive rod and reel.

The other piece of standard equipment used to be a jug containing hard cider. This, unfortunately, has been replaced by the handy six-pack. The jug always was carried home for a refill, but aluminum cans are left along the shore or floating in the water. Many of the best fishing sites can now be identified not by the traditional crotched stick, but by voluminous piles of cans, bottles and other litter left behind by thoughtless fishermen.

It is litter of this type that puts posters up on private ponds. Around public waters the taxpayer and license buyer have their money diverted from more productive tasks to clean up their needless mess. There is no reason why the fisherman who can carry the cans in full can't carry them out empty.

Many people rate bullheads among the tastiest of fish. Getting the fish ready for the pan is not hard once a few tricks have been learned. Instead of cutting the head completely off, cut just far enough to sever the backbone, leaving the entrails untouched. Next, using a sharp knife, cut the skin along either side of the dorsal fin and forward to the original cut. Separate the point of skin from the flesh so that it hangs loose to the lower edge of the cut. Now bend the head down until the body is almost doubled, grasping the protruding backbone, pull the head toward the tail and off will come the head, entrails and skin, all in one piece.

Bullheads can be their own worst enemies – particularly in small ponds. When fish become too numerous for the food available in a pond, they do not starve but simply do not grow as large as normal. If they do not grow big enough to make fishing worthwhile, fishing ceases and the problem gets proportionately worse. Mother Nature often solves the problem with winter fishkills, giving those that survive enough food to grow to catchable size. Bullheads have such a low oxygen tolerance that they are seldom found in these fishkills. To avoid this pitfall, they must be fished heavily. It is virtually impossible to overfish bullheads. In fact, they thrive on heavy fishing.

So You Want to Get Involved

Prepared by the U.S. Department of the Interior

So you want to get involved in solving environmental problems! Maybe you want to *speak out* against air pollution, water pollution, land pollution, noise or over-population. Maybe you'll go so far as doing something instead of just talking about environmental problems. We hope you do become involved, because effective solutions to environmental problems will largely depend on the number of well-informed individuals committed to constructive action.

The purpose of this article is to suggest some of the complexities of our environmental problems and to point out ways your personal actions can become more effective. It gives a broad look at the meaning of the term "environment," and suggests some of the problems standing in the way of overnight solutions. It contains more philosophy than hard fact, and suggests ways you can arrive at your own conclusions.

A Few Definitions

Let's start with a few definitions. You don't have to accept these as valid; however, in this article, we will use terms as defined here:

Environment is the sum of all the factors that influence the growth and existence of an organism or a society (population of organisms).

Pollution is a physical or chemical condition that is detrimental to the growth, reproduction or health of an organism or society.

Society is a combination of government, business, industry, churches, schools and other institutions and individual citizens who operate in a common environment with each individual seeking fulfillment of his own goals within a given structure and set of rules.

Ecology is the science of the inter-relationships among organisms and their environment.

We're Running Out of Tolerance

Each organism has its own environmental requirements and its own best set of circumstances for survival and growth. "Best" is not always available. Most organisms tolerate something less than the ideal but still survive. However, such tolerance has limits beyond which the organism no longer survives. Environmental influences are numerous, but sometimes it takes only one to be missing, inadequate, or excessive for the organism to die. The trouble is, man has unleashed many detrimental factors, some of which, individually or in combination, threaten to go beyond mankind's own broad tolerance. With an increasing population, there will be more factors influencing the health of a society and a greater chance that some will be detrimental. To many experts, it follows that one of the most basic answers to environmental problems is to limit population growth; others are more concerned with better population distribution and changing the uses of technology. Any such basic attempt at a solution depends on educating people to one's views. Formal education requires time and thus is a long-term answer, one we must pursue while we seek more immediate solutions to environmental problems.

Partly Ignorance, Partly Economics

Before you take on the mission of patching up the environment, it might be a good idea to examine why some spots have worn embarrassingly thin. The environment might be compared to a garment, one which we indeed do wear around us. Pull one thread and the tugging may be felt all over. Pull enough threads, and a piece may fall off. And as a good garment, the environment wears fairly well, if properly used – but parts of it can wear out. Sewing a new patch on the environment may be neither simple nor cheap – if you can get a replacement at all. Where do you get a new land, a new river, a new ocean or a new atmosphere?

The basic cause of our problems, of course, is people – and too many of them. Why should people who depend on the limited resources of this planet abuse them so recklessly? It comes partly from ignorance, partly from economics. By the time awareness has replaced ignorance, there is usually someone who has established an economic interest in perpetuating the abuse.

Continued use of "hard" pesticides, such as DDT, is an example; DDT and other chlorinated hydrocarbons have been defined as essential to U. S. agriculture long after their harmful effects on wildlife were recognized.

DDT and other persistent pesticides are not the only ecological time-bombs that threaten to blow up in our faces. Recently, dangerous levels of mercury have been found in waters and in fish, and the death of some humans has been attributed to eating mercury-poisoned fish. Radioactive pollution of water and air has undetermined consequences, some of which may cause potentially adverse genetic changes. We have yet to learn what radiation levels, if any, are dangerous. The point is, all these substances are being put into our environment before we fully understand the consequences for man and for other elements of the earth eco-system. We and future generations are the guinea pigs!

Not everyone responsible for pollution does it deliberately or even consciously; many polluters simply fail to look at the consequences, and especially the side effects. A commercial process is adopted because it seems cheaper or simpler – and the harmful residues and products just happen. People have used chlorinated hydrocarbons such as DDT to control crop-eating insects. The intended victims were not the beneficial insects, insect-eating birds, predatory animals which feed on insectivorous birds, or rodents which eat the treated crops; but they became the victims nonetheless.

Until recently, most of us have been blaming "the other guy," without really considering or even recognizing how our own attitudes, actions, and general living habits contribute to environmental problems. For example, whenever we drive our cars, we are contributing to air pollution and traffic congestion and are helping to create demand for more petroleum products and more freeway construction. Similarly, each time we use a device that operates on electricity, we are helping to create demand for construction of more power plants with their accompanying environmental risks. This is not to say that the responsibility rests *solely* with the individual citizen, but each of us must share some of the responsibility with private enterprise and government.

A Chain of Consequences

Perhaps the attitudes of some polluters can be better understood if we look at our history.

Many of our attitudes trace their beginnings to a time when we could ignore the chain of environmental consequences created by our actions. These actions had impact on fewer people who were equipped with less sophisticated knowledge of health standards; air, land, water, forests and wildlife seemed unlimited in this huge country; industry created less waste, in amount and variety; government was less inclined to regulate big business; and individual citizens consumed less and wasted less.

Technological advances have historically moved in spurts,

rather than as part of a system. A simple example is the development of one-way containers, such as aluminum cans, non-returnable bottles, and plastic packaging, designed to provide greater convenience to the consumer. Increased production and use of these non-decayable, throw-away containers has resulted in a tremendous increase in solid wastes (trash). This has required cities to increase their burning and/or burying of wastes with resultant air, land, and water pollution. Additionally, each bottle or can that is buried or burned represents a loss of raw materials from the Earth's limited supply. Just recently, several aluminum and glass manufacturers have started programs to buy back these cans and bottles to be recycled into new containers. Government-sponsored pilot projects are underway in some cities to develop efficient methods of collecting and separating various types of solid wastes from household garbage. So recycling is part of the answer to this problem. But a more basic question is raised by this example. Since energy is required to recycle each one-way container, would it not be better to develop containers which can be used more than once before being recycled?

A more complex technology involves the automobile industry and all the associated industries that provide raw materials, fuel and services. The auto industry's increasing revenues depend on rapid turnover with replacement more profitable than repair – for the industry. The industry produces far more new cars each year than are reclaimed and recycled. Materials used in modern cars are difficult to separate once assembled. Differing ownership and salvage provisions and laws in each of the fifty states discourage concerted efforts to collect old heaps. The cost of auto repair for example, has resulted in a practice whereby some people prefer to abandon their cars on city streets and buy other ones rather than pay for repairs or tow-away charges. Thus the ecological impact of a technological market such as the automobile goes far beyond the parent industry.

In following the chain of consequences of pollution, you can as easily trace the chain of consequences of solutions. These may include reduced corporate profits, threats to community payrolls and services supplied by taxes, added cost to the consumer, and changes in the life-styles of most of us. By our definitions, most forms of pollution are by-products of industrialized society.

Simple Solutions May Not Work

The complexity of environment problems often defies simple solutions. Our present way of doing things is closely interwoven with economic interests, both at the level of corporate profits and in terms of jobs for factory workers. Halting pollution on any front calls for sacrifice by someone. Take again the environmental problems associated with the family car:

– Motor vehicles with internal combustion engines – the cars, trucks, and buses – contribute approximately 42 percent of the air pollution (by weight) in America. Raw materials for the family car contribute still more air pollution, from the manufacture of steel, copper, plastics, synthetic rubber, and other products.

– Abandoned and junked automobiles are a major source of land pollution, from an individual heap on the street to vast auto graveyards which rank as national eyesores.

– The insatiable thirst of gasoline-powered vehicles has created a huge petroleum industry with its own urgent requirements, ranging from offshore wells, to Alaskan pipelines, to seismographic exploration. Some of these activities have scarred some of the Nation's most beautiful beaches and remote wildlands.

– Byproducts of the automotive industry – used crankcase oil, discarded tires, accidental spillage of gasoline – contribute measurably to water pollution problems.

– Tremendous acreages of land have been taken from production of crops and trees to be smothered in concrete; even more land is diverted from production to be used for highway right-of-way. A single interstate interchange may require 200 acres or more.

– Urban freeways tend to concentrate pollutants along the most populous areas of cities. Urban freeways often displace people from their homes and businesses and can result in loss of enjoyable open space for city dwellers.

– Motor vehicles, especially the two-wheeled breed, are among the major sources of noise, nerve-wracking and soul-jarring.

– Mobility provided by the family car and vast amounts of new and improved roads have caused so much vacation travel that the privilege of visiting some of our national parks must now be rationed. You can camp for only a few days at several of the more popular parks. Too many prime recreation areas are being loved to death; too many cars are "enjoying" our recreation areas.

One simple solution might be to ban the private automobile. Are we willing to pay the price of this simple solution? Not likely. The complete banning of the private automobile is not a solution acceptable to many who would contemplate the chaos that would result. But that is no reason for inaction. Just as halting pollution on any front calls for sacrifice by someone, so does not halting pollution. Children and old people seldom drive cars, yet their lungs are damaged by air pollution from internal combustion engines. Obviously, we face many difficult choices.

An ecologist's world view is like that of the astronauts – there is only one, tiny world with finite amounts of air, water, land, soil, oil, ores, etc. We have a "closed" life support system. All changes are merely conversions involving matter and energy. Everything each one of us does affects others; often side effects are unknown or have more impact than the direct known consequences of any action. Further, in our closed system, every action eventually reverberates upon itself.

Given this philosophy of a closed system and the theory of our political system of majority rules/minority regrets, consider some of the solutions that other groups and individuals have suggested to curb the problems of the family car.

– Limit the number of cars a family may own.

– Reduce the number of drivers by implementing more restrictive licensing standards – this could be done by using such criteria as age, ability, wealth, intelligence, driving record, etc. Not only would there be a direct drop in air pollution, but an indirect drop as congestion decreased and efficiency increased. The whole plan could be implemented over a time scale to allow people to adjust.

– Increase the number of people in each car. Tolls could be prorated by number of people per vehicle, with capacity taken into account. Computers could be utilized to organize and coordinate car pools. Office buildings and factories could post car pool ride boards. Special roadside areas (such as bus stops) could be designated as "pedestrian pick-up" areas, as long as traffic safety factors were considered.

– Provide viable alternate methods of transportation, recreation and travel that do not necessitate owning an auto. In most locations in the U. S., it is presently extremely inconvenient, if not impossible, for most people to find such alternatives.

– Ration fuel – whether gasoline, electricity, natural gas.

– Limit horsepower of engine.

– Monitor exhausts and fine motorists for excessive emis-

sions, poorly tuned engines, malfunctioning "smog control" devices.

– The environmental costs of producing a car could be incorporated into the cost of doing business.

– What to do about abandoned and junked cars? Consumers can exercise their power by not buying new cars, by being less responsive to style changes, and by demanding a more durable car with a longer useful lifetime.

For every abandoned automobile, the owner and the manufacturer of the car might be fined an equal amount. The money collected could be used to offer mechanic's training and cover costs of collection and storage of the heap. About $10 each seems a nice round sum to begin with. In addition, ownership laws as they relate to salvage operations must be revised to encourage quick pick-up and processing of the car. The person who abandons his car is a litter bug of the worst sort.

There are other alternatives, some dealing with the basic problem of the automobile and some treating the symptoms. For example, steam or electric engines would pollute far less than any version of an internal combustion engine. More planning on the drawing board could mean car bodies that would be more easily reclaimed. Increased mass rapid transportation and urban planning could lessen highway pollution and reduce the congestion of our roads.

In each of the above alternatives, however, someone "loses." More restrictive licensing for drivers would not be unanimously accepted because the sacrifice of the privilege of driving would be distributed unfairly – at least in the view of those losing their right to drive. The automobile industry thrives on producing new models each year; the petroleum industry profits as gasoline consumption goes up; segments of the mining industry employ thousands of people, producing ore for new steel; the highway construction industry relies on ever-increasing demands for new roads.

But loss is really only opportunity passed by. Innovative and creative minds need not work overtime to turn the above "losses" into gains.

For the environmental activist, there are a myraid of alternatives none of which are completely acceptable to everyone. Pick your battleground carefully. You are affecting people's livelihoods as well as their life styles. Know the strength of your adversary; as Pogo says, "We have met the enemy and he is us."

Some Less Obvious Polluters

We have chosen the motor vehicle as an example because most of us share the responsibility for the problems it creates, and most of us would be called upon to sacrifice something we see as convenient or necessary if it were banned. And most of us would have to reorient our thinking to willingly deemphasize the role of the auto in our personal lives, and would have to find reasonable alternatives such as mass transportation. Some other sources of pollution have their own problems, though they may be less obvious than these of the family car.

You may find some of these less obvious polluters by taking a careful look around your community. What about the builder who disregards soil conservation practices and allows his bulldozers to start a chain of erosion that clogs flowing streams with tons of priceless topsoil? Or the local building code and zoning authority which tolerates such a practice?

What about the local sawmill which burns its slash, thus contributing to air pollution while wasting organic material? Or the rancher who grazes his livestock until the denuded rangeland washes away with every rain and shifts with every wind?

Or what about the miner whose settling basins fail to hold the wastes? Where do you get a new stream to replace the one he's contaminated? And what about the careless camper, who hikes far into the back country for the privilege of being the first to litter.

The Good Guys and the Bad Guys

Life would be much simpler if the good guys always wore white hats and the villains dressed in black. But it's not that way. Some industrial concerns have made tremendous investments in reducing pollution, sometimes on their own initiative and sometimes with urging. Before you apply a label, it might be only fair to investigate and see what a particular company has done.

– Some companies have installed expensive precipitators in their smokestacks to reduce ash and other particles causing air pollution.

– Some breweries are now buying back their empty beer cans to reclaim the aluminum, paying $200 per ton for the old cans.

– One Colorado sawmill operator stopped burning his wastes and found that the sawdust and trimmings helped improve worn-out soils.

– An Arizona copper company built a nine-mile dike to hold its acid-laden tailings and landscaped and irrigated the dike to improve natural beauty.

– Some power companies have gone to the expense of adding cooling ponds or towers so that waste water from stream plants won't raise the temperature of nearby streams.

An Opportunity for Personal Commitment

Why should an individual personally fight for a better environment? There is the opportunity to bring about quality in our environment and in the lives of many people, while creating a concern and commitment for these things in others. There is frustration and the lessons you learn from dealing with frustration. There is the opportunity to meet and work with the broad spectrum of Americans who are concerned about the environment. In this country especially, such changes can have deep effect on much of the rest of the world, on the greater environment and on our brothers and sisters around the globe.

How do you show that you care and bring local and even national attention to environmental problems? Some people have indicated concern by going to the courts, others have demonstrated; some have tried working with State and local government officials while still others have worked with, and sometimes against, manufacturers. If your case is good enough you can "beat City Hall."

If you are in school or college, you can gain an understanding of the rather basic facts of living on this planet by taking courses in ecology, biology, chemistry, physics, economics, political science. Courses such as these are helpful in understanding man and his ecological relationships.

As a graduate, whether you seek employment in an environmental protection organization or not, you can make decisions based on a clear consideration of the environmental consequences of an action. Opportunities to use good sense in business and government are unlimited.

As a citizen (even if you're too young to vote) you can use good judgment in campaigning for issues and for legislators who will support efforts to improve the environment. You should keep your legislators at every level of government informed of your support for environmental issues. Be sure your local community has adequate anti-pollution laws and that they are being enforced.

If you are looking for a way to fight land pollution, one way to get involved is through efforts to prevent further land pollution, and through clean-up campaigns for volunteers who personally want to take part in the crusade against litter. The

Department of the Interior offers the Johnny Horizon Program for such an effort.

As a concerned person you can do your homework, learn the facts and explore both sides of the question – and then come up with a better way of doing things.

Making A Community Inventory

Before a community can act intelligently to protect its environment, it needs to know its problems. You can help by taking part in a community-wide inventory, documenting your findings with photographs and statistics. Here are some things to look for:

Water Pollution: Is your city's water supply taken from protected sources, or must it depend on water that has been used before by upstream cities or industries? Is your water supply adequately protected from encroachment or do zoning authorities permit building of new sources of pollution within the watershed? Does your city live up to its obligation to downstream neighbors by properly treating sewage? Which polluters are lax in their treatment of plant wastes? What are their attitudes toward pollution, and what are their plans for future pollution abatement?

Air Pollution: Does your community have a program for reducing air pollution? Is the program enforced? Does the city permit open burning of trash, garbage, or industrial wastes? Does the community require automobiles to have effective emission control devices? Are they checked periodically? Who are the polluters who contribute measurably to air pollution? What are their plans for abatement? Can you identify apartments and office buildings whose heating plants send up clouds of smoke?

Agricultural Pollution: Check with your county Extension Agent for a listing of pesticides and fertilizers used by local farmers. Where are livestock feedlots located and what facilities are provided to prevent harmful runoff into water resources? Is an education program provided to assist farmers in properly using pesticides and fertilizers to protect themselves, their employees, consumers and wildlife?

Land Pollution: Does your community have adequate zoning ordinances to encourage good land planning and good land use? Are industries permitted to destroy future productivity of land by dumping industrial wastes or mine tailings? Does the city have adequately litter laws, coupled with enough litter receptacles to encourage people to properly dispose of trash? How are abandoned cars disposed of in your community; and at whose expense? Are abandoned buildings allowed to stand indefinitely, attracting litter, rats, and other unwanted tenants? How does your community dispose of its garbage? Do you have a community dump, open at reasonable hours to encourage its use? What recycling possibilities are being explored?

Noise Pollution: Does your community require that automobile and motorcycle exhausts be properly muffled, and is the law enforced? Is construction work confined to reasonable hours? Are low-flying aircraft prohibited? Are loudspeakers and other noise-makers regulated?

Environmental Education: Does the public school system use its resources for environmental education? Are there outdoor classrooms and are they being utilized? Are teachers required to have training in environmental education? Are inner-city children being neglected in outdoor education programs? Are there adult or extension courses being offered to help create an informed body of citizens?

Ecological Awareness: Has the community taken steps to preserve unique natural environments such as swamps and marshes, streambanks and forests, rare and endangered species? Are land developers permitted to alter watersheds at will, creating erosion or causing downstream flooding by increasing run-off of surface water from paved lots and rooftops? Are there adequate safeguards for use of pesticides and herbicides? Are there dangers of agricultural pesticides entering the community water supply? Are dairy products tested for residual insecticides? Are power line rights-of-way granted regardless of scenic value?

These are just some of the questions that might be asked in your community environmental inventory; there are others that will be equally important in your locality.

And after you've completed your inventory, discuss alternative solutions to the problems you've uncovered with government officials, civic groups and the press.

Concerned, informed citizens must – and can – get results. It is everybody's world and everybody's responsibility to make it better.

Children observing a box turtle in Prince William Park, Va. – participants in the NEED program of the National Park Service. (Photo: USDI/NPS)

New Brochure Ready

Members who wish to introduce others to A.N.S.S. may use the new membership brochure, available in modest quantities by writing to Wilkins Printers, 4000 West Rd., Cortland, N. Y. 13045. The new brochure was prepared by 2nd Vice President Helen Russell.

TIPS *for Environmental Education . . .*

You Can Sample The Air Around You

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In terms of use by man, the 10-mile layer above the earth's surface constitutes the working atmosphere. From the relatively thin layer he obtains his life-giving oxygen by breathing about 30,000 times each day.

Within this narrow band, the greatest density of gases (the greatest concentration of air molecules) is very close to the earth's surface. About one-half of all the air above us is packed into the first 18,000 feet. This is only about three and one-half miles above earth level and 10 miles below the top of Mt. Everest. Most of the weather, a product of air movement, occurs within the 10-mile limit (below 50,000 ft.), an area known to meteorologists as the troposhere.

Millions of kinds of fine particles and gaseous materials are being dumped into the atmosphere daily. Almost all of man's activities result in the discharge of airborne foreign materials. The burning of fuels for heat and power, waste material disposal, manufacturing operations and construction activities add their share. The automobile is one of the worst offenders.

Once in the air, reactions take place between some of this material producing new pollutants, far different and sometimes more troublesome than those in the original form.

The assessment of the condition of your atmospheric environment has been the privilege of a few highly-trained individuals with much expensive monitoring equipment. But every individual should be able to assess the condition of his own local environment to some degree.

The following activities are recommended to all for evaluation. No method has been standardized, but by comparison of the information from one location against another, a definite "feel" can be developed for certain types of "dirt" in the air.

Magnetic Materials — Although "star dust" or meteoric remains does filter down from the sky, and a small amount of magnetite is available in the earth, the majority of magnetic material in our environment is due to manufacturing processes or transportation activities.

Place a small magnet in a plastic sandwich bag and drag it over a certain size area of ground (the magnet size is your choice and the ground area covered is also up to you). Go over each area a few times to pick up all of the material available. Put the collected material into a measuring container for comparison with other collections from other areas. A good tube for volume (how much?) collecting and comparison is a plastic soda straw with the bottom end taped (a small funnel made of paper will help in filling the tube). By comparing this relatively heavy material by volume or weight, from different areas, such as a main highway, the road, a location near a manufacturing plant with machinery, downwind versus upwind of an urban area, in a field, a wooded area, etc. — some idea of the distribution of this type of material can be obtained.

Dirt — Sedimentation devices are used to determine the *total* solid material accumulating in one area over a period of time. These could be called "dirt collectors."

Type #1 — Punch a ¼-inch hole (standard paper punch) about one inch from the edge of a 3x5 file card or any other piece of thin cardboard or even heavy paper. Cover the hole with a small piece of gummed transport tape. Notice that some of the sticky stuff is exposed through the hole. Carefully fold the card in half so this sticky area is protected for transportation to the exposure site. Open and allow this to remain, tacked to a post, tree, house, etc. for a period of time (eight hours seems good in most cases but this is up to the observer). Analyze for the number of particles adhering to the exposed tape by using a small hand lens or a low power (10x) microscope. An analysis can also be made by dividing the particles into different sizes or even different shapes or colors. Only count those that you can readily see, for there will be many, many more that you cannot see. Again, make comparisons from place to place, to get a "feel" for the distribution of this large size atmospheric dust.

Type #2 — A more detailed method of determining the *amount* of dirt which falls from the atmosphere, can be developed by using the following procedure:

Place a few clean, large sauce pans or deep, glass baking dishes in an open area away from trees or buildings. Keep them about half full of clean, distilled water for 30 days. Evaporate the water over a slow heat being careful not to burn the dust particles. Weigh the containers and their contents on a milligram scale. Wash and dry the containers thoroughly and again weigh. The difference in weight will be the total dust collected.

Figure the area of each container's mouth in square centimeters. Then divide the amount of dust (milligrams) by this figure to give the amount of dust that fell on one square centimeter. Since air pollution scientists convert figures similar to this on a regular basis, they have a conversion factor which when multiplied by the number of milligrams per centimeter, will give tons per square mile per month. The figure is 28.6.

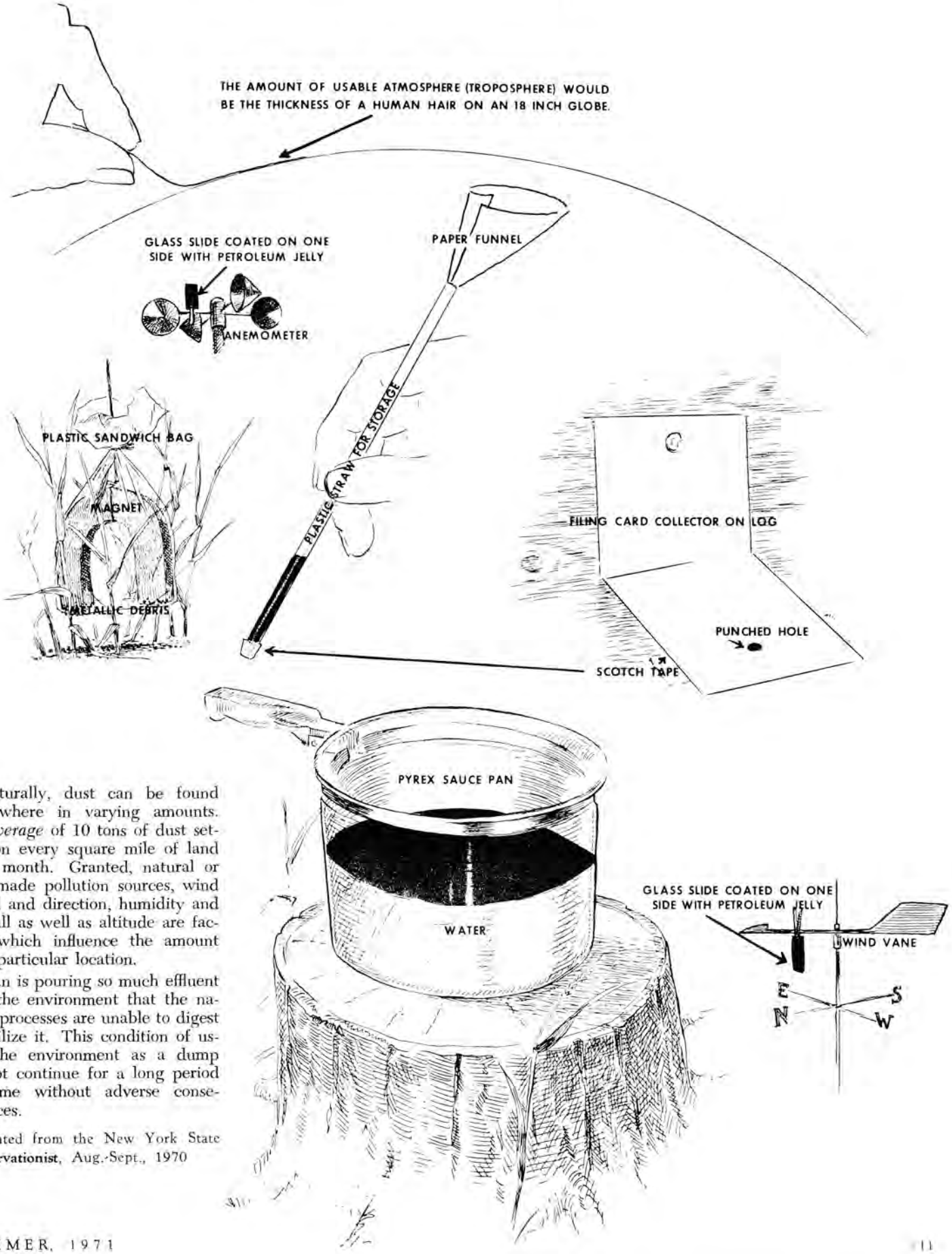
By averaging the weight from a few containers, a realistic figure can be found for the amount of solid dust-like material being deposited at any given time.

Example:

Diameter of mouth of container	20 cm.
Radius of mouth (½ dia.)	10 cm.
Square of radius (radius x itself)	100 cm.
Area of container mouth (3.14 x sq. of radius)	314 sq. cm.
Mg. of dust (from container)	140 mg.
Amount of dust that fell on 1 sq. cm. (wt. ÷ sq. cm.)	.44 mg.
Tons of dust/sq. mi./month (dust/sq. cm. x 28.6)	12.6 tons (sq. mi.)

Sedimentation devices are in use using glycole (common auto anti-freeze), special silicone glue, some liquid plastics and other non-drying sticky materials spread on glass microscope slides. These are carried in many types of collecting contraptions. As an example, a simple whirling anemometer equipped with a pinch clothespin will keep a petroleum jelly (vaseline) covered slide exposed to the prevailing wind. Exposed for certain periods of time each day or week an interesting picture of contamination can be established relating to wind direction and pollution sources.

SIMPLE AIR SAMPLING DEVICES



Naturally, dust can be found everywhere in varying amounts. An *average* of 10 tons of dust settles on every square mile of land each month. Granted, natural or man-made pollution sources, wind speed and direction, humidity and rainfall as well as altitude are factors which influence the amount in a particular location.

Man is pouring so much effluent into the environment that the natural processes are unable to digest or utilize it. This condition of using the environment as a dump cannot continue for a long period of time without adverse consequences.

Reprinted from the New York State **Conservationist**, Aug.-Sept., 1970

GOOD READING:

Mark Twain in The American Wilderness

Richard F. Fleck

The American West

The wilderness of the American West impressed Twain sufficiently for him to transcribe his impressions in the colorful landscape passages that pervade *Roughing It*. Although Mark Twain has been considered as being primarily a social critic and humorist, it is hoped that the evidence presented here will shed new light on Twain as a nature writer. While we must keep in mind that Twain's second book, *Roughing It*, was written nine years after his trip west in 1862 and that his impressions were not as fresh as those of his 1867 trip to the Old World recorded in his first book, *The Innocents Abroad*, in 1868, we must assume that Mark Twain had sufficiently memorable experiences that his recordings of them were accurate and vivid. Twain readily expressed his mood and reaction to the wilderness landscapes in over fifty major landscape passages of *Roughing It* varying in tone from the enthusiastic rapture of Walt Whitman and John Muir to the emotional alienation of Robert Louis Stevenson's western impressions. Wilson Clough's contention in his book, *The Necessary Earth*, that the "shock of geography" stunned the admiring western traveler into wordlessness does not seem to apply to Mark Twain. Bernard DeVoto explains the varying quality of Twain's descriptions of the western wilderness by stating that "a gentleman said it was the damnedest country under the sun. Sam agreed with him at first, remembering magnolias and live oaks and lush river bottoms to the deprecation of this emptiness and thin air . . . Then the desert began to exert its influence. The Mountains became an acceptable substitute for the Mississippi. Soon he climbed to Lake Tahoe, which 'throws Como in the shade.' Thereafter one hears no more about desolation."[1] Although this statement is for the most part true, there is one significant exception as we shall see. The western impressions of the wilderness in *Roughing It* vary from Kansas to California not only because of physical features but also because of Mark Twain's shifting and varied moods.

Early in the book Twain expresses his joy at the sense of freedom given to him by the rolling prairies of Kansas: "It was a superb summer morning, and all the landscape was brilliant with sunshine. There was a freshness and breeziness, too, and an exhilarating sense of emancipation from all sorts of cares and responsibilities, that almost made us feel that the years we had spent in the close, hot city, toiling and slaving, had been wasted and thrown away. We were spinning along through Kansas, and in the course of an hour and a half we were fairly abroad on the great Plains. Just here the land was rolling – a grand sweep of regular elevations and depressions as far as the eye could reach – like the stately heave and swell of the ocean's bosom after a storm. And everywhere were corn-fields, accenting with squares of deeper green this limitless expanse of grassy land."[2] Whether Mark Twain was aware of Lord Kame's theory of aesthetic associationism or not, he expressed it; that is, the vast rolling prairies and the feeling of freedom or emancipation become interwoven. In addition, he intuitively associated his own overland journey with the original journeys twenty years or so before. As Henry Nash Smith explains, "the first half of *Roughing It* is a striking demonstration of Mark Twain's ability to recognize the representative aspects of his own experience. He was intuitively aware that in crossing the plains and mountains to the Pacific coast he had duplicated the experience of generations of his countrymen. The depth of his insight becomes clear if one compares his account of the overland journey with such earlier narratives of Far Western travel as Irving's *A Tour on the Prairies* (1835) and Francis Parkman's *The Oregon Trail* (1849)."[3]

Even as far west as Nebraska, Twain related his enthusiasm for the arid landscape by exclaiming, "Even at this day it thrills me through and through to think of the life, the gladness and the wild sense of freedom that used to make the blood dance in my veins on those fine overland mornings!" (I, 31). However, soon his attitude changed after he witnessed the struggle of life on this hostile, empty land. He facetiously related coyotes and Indians as being two of a kind in a desolate and forbidding realm: "The coyote of the deserts beyond the Rocky Mountains has a peculiarly hard time of it, owing to the fact that his relations, the Indians, are just as apt to be the first to detect a seductive scent on the desert breeze, and follow the fragrance to the late ox it emanated from." (I, 35). Twain's and Cooper's Indians are as opposite as black and white, and, as Hamlin Hill points out, they are merely literary substitutes for his Old Masters in his first book, *The Innocents Abroad*.[4]

By the time he arrived in Colorado, Twain's attitude shifted from a sense of "wild Freedom" to a sense of melancholy: "We came to the shallow, yellow, muddy South Platte, with its low banks and its scattering flat sand-bars and pygmy islands–a melancholy stream straggling through the center of the enormous flat plain, and only saved from being impossible to find with the naked eye by its sentinel rank of scattering trees standing on either bank." (I, 43). The contrast of the lushness of Missouri and the barrenness of the Rocky Mountain West began to hit home. Yet Twain was able to find beauty in the desolation of the Rockies as the stage coach pushed north into Wyoming where "we passed Fort Laramie in the night, and on the seventh morning out we found ourselves in the Black Hills, with Laramie Peak at our elbow (apparently) looming vast and solitary – a deep, dark, rich indigo blue in hue, so portentously did the old colossus frown under his beetling grows of storm clouds." (I, 57). Just as he was beginning to be able to accept the barren desolation of the Wyoming Rockies. Twain was forced to cope with yet another landscape even more alien than the strange, looming peaks – the deserts of western Wyoming and Utah. His reaction is remarkably similar to that of Robert Louis Stevenson who, in 1880, wrote in *From Scotland to Silverado*, "Hour after hour it was the same unhomely and unkindly world about our onward path; tumbled boulders, cliffs that drearily imitate the shape of monuments and fortifications – how drearily, how tamely, none can tell who has not seen them; not a tree, not a patch of sward, not one shapely or commanding mountain form; sage-brush, eternal sage-brush; over all, the same weariful and gloomy colouring, greys warming into brown, greys darkening towards black; and for sole sign of life, here and there a few fleeing antelopes; here and there, but at incredible intervals, a creek running in a canyon."[5] Mark Twain, in describing the laying of telegraph wires across the West, again strikes a melancholic tone: "Mr. Street was very busy with his telegraphic matters – and con-

sidering that he had eight or nine hundred miles of rugged, snowy, uninhabited mountains, and waterless, treeless, melancholy deserts to traverse with his wire, it was natural and needful that he should be as busy as possible . . . Mr. Street's contract was a vast work, every way one looked at it; and yet to comprehend what vague words 'eight hundred miles of rugged mountains and dismal deserts' mean, one must go over the ground in person – pen-and-ink descriptions cannot convey the dreary reality to the reader." (I, 98). The reader begins to wonder if Twain's appointment as secretary to the Secretary of Nevada will not at best be a dismal experience in a desolate land. By the time he passed through western Utah, he could only ask the reader to share in his misery by telling us to "imagine a vast, waveless ocean stricken dead and turned to ashes." (I, 127). Twain's initial reaction to the death-like quality of Nevada's lifeless landscape was unfavorable: "Visibly our new home was a desert, walled in by barren, snow-clad mountains. There was no vegetation but the endless sage-brush and greasewood. All nature was gray with it. We were plowing through great deeps of powdery alkali dust that rose in thick clouds and floated across the plain like smoke from a burning house." (I, 144). Even the life-giving Carson River was "melancholic" to Twain, and the nearby mountain summits "seemed lifted out of companionship and consciousness of earthly things." (I, 145).

But somehow Mark Twain grew to love the Nevada landscape and no longer conveyed a feeling of desolation because, as both Smith and DeVoto state, he almost immediately felt a strong association with frontier life. After a few weeks, according to DeVoto, he "went about this gorgeous spectacle completely enraptured. Every one knew him, he told Jan Clemens, and he fared like a prince wherever he went. He added that he was proud to say he was the most conceited ass in Washoe . . . Nurtured on the drama of frontier life, deeply dramatic in his own impulses, he found this Western drama infinitely absorbing."[6]

No longer is one reminded of Robert Louis Stevenson after he reads Twain's descriptive passages of Lake Tahoe and the Sierra Nevadas; instead, the reader calls to mind Walt Whitman's sublime and rhapsodic description of the Colorado Rockies:

> "Through the cañon we fly – mountains not only each side, but seemingly, till we get near, right in front of us – every rood a new flashing, and each flash defying description – on the almost perpendicular sides, clinging pines, cedars, spruces, crimson sumach bushes, spots of wild grass . . . New senses, new joys, seem develop'd. Talk as you like, a typical Rocky Mountain cañon, or a limitless sea-like stretch of the great Kansas or Colorado plains, under favoring circumstances, tallies, perhaps expresses, certainly awakes, those grandest and subtlest element-emotions in the human soul, that all the marble temples and sculptures from Phidias to Thorwaldsen – all paintings, poems, reminiscences, or even music, probably never can."[7]

The only difference between the enthusiasm of Twain and of Whitman is that Twain used the words "defying description" only for dreary desolation and never for what he considered to be poetic landscape; in this sense the "shock of geography" (á la Wilson Clough) did not affect Mark Twain as it did Walt Whitman.

Twain seemed much like John Muir in his admiration for the wilderness of Tahoe and the surrounding mountains: "We plodded on, two or three hours longer, and at last the lake burst upon us – a noble sheet of blue water lifted six thousand three hundred feet above the level of the sea, and walled in by a rim of snow-clad mountain peaks that towered aloft full three thousand feet higher still! It was a vast oval, and one would have to use up eighty or a hundred good miles in traveling around it. As it lay there with the shadows of the mountains brilliantly photographed upon its surface I thought it must surely be the fairest picture the whole earth affords." (I, 156). Experiences (as commercial as they were) along the shores of Lake Tahoe seemed to change Twain's entire attitude toward Nevada itself. Because he was a part of the Western community he felt a kinship (even to the desert, as we shall see) that he did not feel during portions of his overland journey. As he wrote, "nothing could disturb the sleep that fettered us, for it had been fairly earned, and if our consciences had any sins on them they had to adjourn court for that night, anyway. The wind rose just as we were losing consciousness, and we were lulled to sleep by the beating of surf upon the shore." (I, 157). During the day, "the view was always fascinating, bewitching, entrancing. The eye was never tired of gazing, night or day, in calm or storm; it suffered but one grief, and that was that it could not look always, but must close sometimes in sleep." (I, 157). Perhaps Tahoe served as his substitute for the distant Mississippi River.

Passage after passage is devoted to the beauties of Lake Tahoe and the surrounding country. Even after Twain foolishly caused a devastating forest fire, he was still dazed and so enraptured that the very flames had a sublime quality for him:

> "Within half an hour all before us was a tossing, blinding tempest of flame! It went surging up adjacent ridges – surmounted them and disappeared in the cañons beyond – burst into view upon higher and farther ridges, presently – shed a grander illumination abroad, and dove again – flamed out again, directly, higher and still higher up the mountain-side – threw out skirmishing parties of fire here and there, and sent them trailing their crimson spirals away among remote ramparts and ribs and gorges, till as far as the eye could reach the lofty mountain-forests were webbed as it were with a tangled network of red lava streams. Away across the water the crags and domes were lit with a ruddy glare, and the firmament above was a reflected hell!"

Twain concludes with "Both pictures were sublime, both were beautiful." (I, 165). Such a passage is reminiscent of Stewart Edward White's *Forest*. Twain somehow establishes aesthetic distance in describing such a scene even though he himself was the cause of this disaster.

At this point in *Roughing It* the reader senses Twain's rapport with the land, a kinship which developed through his feeling of comraderie at Tahoe and in the mining camps in the gulches of the Sierra. This growing sense of rapport is in marked contrast with his feeling of desolation earlier in the Utah and eastern Nevada deserts, but somehow even the desert became fully enjoyable for him. Several chapters earlier, no one would have thought the following description possible: ". . . after each day was done and our wolfish hunger appeased with a hot supper of fried bacon, bread, molasses, and black coffee, the pipe-smoking, song-singing, and yarn-spinning around the evening campfire in the still solitudes of the desert was a happy, care-free sort of recreation that seemed the very summit and culmination of earthly luxury. It is a kind of life that has a potent charm for all men, whether city or country bred. We are descended from desert-lounging Arabs, and countless ages of growth toward perfect civilization have failed to root out of us the nomadic instinct." (I, 192). The West had brought out the wild in Twain, and he liked it; he did not rebel against it because it had become a part of him.

As I before mentioned, there is one significant exception to DeVoto's statement that "thereafter one hears no more about desolation." Apparently one location existed that seemed so desolate and even "hideous" that Twain could not refrain from describing it as such: "Mono Lake lies in a lifeless, treeless, hideous desert, eight thousand feet above the level of the sea, and is guarded by mountains two thousand feet higher, whose summits are always clothed in clouds. This solemn, silent, sailless sea – this lonely tenant of the loneliest spot on earth – is little graced with picturesque. It is an unpretending expanse of grayish water, about a hundred miles in circumference, with two islands in its center, mere upheavals of rent and scorched and blistered lava, snowed over with gray banks and drifts of pumice-stone and ashes, the winding-sheet of the dead volcano, whose vast crater the lake has seized upon and occupied." (I, 259). The use of the words "hideous," "lonely," "loneliest." "blistered lava" and "dead volcano" convey a far more somber picture than the "noble sheet of blue water" of Lake Tahoe. Why the difference? Lake Mono and Lake Tahoe, to me, at least, seem equally picturesque. It is true that Twain had the bad experience of being caught in a terrible storm which forced him and his friends to abandon ship at the last minute and to swim ashore in the strong alkali water, and perhaps he let this experience affect his word choice in landscape description. Yet he did not let the forest fire experience dampen his Tahoe adjectives. Was it because the stinging alkali water offended his sensibilities and the foolish fire he caused did not?

The Mono episode, however. only temporarily affected his landscapes. While the desert near Lake Mono was "hideous," the desert outside of Virginia City was "soft-tinted" with

> the silver thread of a river winding through it, bordered with trees which many miles of distance diminished to a delicate fringe; and still further away the snowy mountains rose up and stretched their long barrier to the filmy horizon – far enough beyond a lake that burned in the desert like a fallen sun, though that, itself, lay fifty miles removed. Look from your window where you would, there was fascination in the picture. At rare intervals – but very rare – there were clouds in our skies, and then the setting sun would gild and flush and glorify this mighty expanse of scenery with a bewildering pomp of color that held the eye like a spell and moved the spirit like music. (II, 14-15).

Such a passage shifts back to the "new senses, new joys" rhapsody of Walt Whitman who also was spell-bound, so to speak. Even the underground mine landscape passages are metaphoric and vivid: "These timbers were as large as a man's body, and the framework stretched upward so far that no eye could pierce to its top through the closing gloom. It was like peering up through the clean-picked ribs and bones of some colossal skeleton." (II, 93). The West had become poetry for him.

After Mark Twain arrived in California for a new editorial position, he had occasion not only to describe new landscapes but also to comment upon the nature of beauty in land. "California," wrote Twain, "requires *distance* to give it its highest charm. The mountains are imposing in their sublimity and their majesty of form and attitude, from any point of view, but one must have distance to soften their ruggedness and enrich their tintings." (11, 124). He continues to theorize about the nature of beauty in landscape: "No land with an unvarying climate can be very beautiful. The tropics are not, for all the sentiment that is wasted on them. [He later contradicts himself.] They seem beautiful at first, but sameness impairs the charm by and by. *Change* is the handmaiden Nature requires to do her miracles with. The land that has four well-defined seasons cannot lack beauty, or pall with monotony." (II, 125-126). Robert C. Bredeson, in his doctoral dissertation, "Mark Twain's Landscapes: A Study in Changing Literary Conventions," sums up Twain's views by explaining that he "struggled, not always successfully, to avoid the hypocrisy he found in conventional attitudes, and to avoid the inadequacies of conventional style in his landscapes. He objected to the conventional view of nature as static and calm; he insisted on nature's energy and power."[8] Surely Twain's idea of change as beauty and his descriptions of latent and active power in nature in previously cited passages would lend credence to Mr. Bredeson's thesis. Yet Twain *does* find beauty in the "calm" jungles of Hawaii where there are no seasons. In fact, it is difficult to see why Twain left this particular passage in *Roughing It* since the last one hundred and twenty pages dwell on the tantalizingly picturesque qualities of tropical Hawaii.

(To be continued)

Endnotes

1. Bernard DeVoto, **Mark Twain's America** (Boston: Little, Brown, and Company, 1932), pp. 116-117, by permission of Mrs. Bernard DeVoto, owner of copyright.
2. Mark Twain, **Roughing It** (New York: Harper & Brothers Publishers, 1913), 1, 6-7. Hereafter all passages cited from **Roughing It** are from this two volume edition.
3. Henry Nash Smith, **Mark Twain: The Development of a Writer** (Cambridge: Belknop Press, Harvard University Press, 1962), pp. 52-53.
4. Hamlin Hill, **Mark Twain and Elisha Bliss,** (Columbia, Mo.: University of Missouri Press, 1964), p. 62.
5. Robert Louis Stevenson, **From Scotland to Silverado,** ed. James D. Hart (Cambridge: Belknap Press, Harvard University Press, 1966), p. 127.
6. DeVoto, p. 133.
7. Walt Whitman, **Leaves of Grass and Selected Prose,** ed. John Kouwenhoven (New York: Random House, Inc., 1950), pp. 700-701.
8. Robert C. Bredeson, "Mark Twain's Landscapes: A Study in Changing Literary Conventions," **Dissertation Abstracts,** XXIV (October, 1963), 2028.
9. Walter Francis Frear, **Mark Twain and Hawaii** (Chicago: The Lakeside Press, 1947), p. 217.
10. Frear, p. 21.
11. Frear, p. 91.
12. Frear, P. 58.

Directory of Degree Programs Related to Conservation Education, Environmental Education, and Outdoor Education in Colleges and Universities in the United States and Canada.

Would you be interested in learning more about where you might earn a degree in Environmental Science Education (B.A.), Conservation Biology (B. A.), Outdoor Teacher Education (M.S.), Outdoor Education Administration (M. S.), or in Outdoor Education and School Camping (Ed.D.)?

Because of a growing interest among students in degree programs in the areas of conservation education, environmental education and outdoor education, Russel E. Bachert, Jr., outdoor education teacher at the Battle Creek Outdoor Education Center and member of the Committee on Professional Preparation of the Council on Outdoor Education initiated a survey to gather such data.

The survey is endorsed by the Outdoor Education Project of the American Association for Health, Physical Education, and Recreation and the Committee on Professional Preparation of the Council on Outdoor Education.

Data gathered from the survey is now being edited and readied for publication this summer. The directory will include the name and address of where further information can be obtained, as well as an annotation describing the degree program. The directory will be an excellent reference for students interested in learning more about such programs and for those individuals responsible for offering guidance to such students.

NEWS and NOTES . . .

on Environmental Education and Action

IUCN Meetings Scheduled For September 1972

The 11th General Assembly and 12th Technical Meeting of the International Union for Conservation of Nature and Natural Resources will be held in Banff, Canada, from 11 to 16 September 1972. The theme for the Technical Meeting will be *Conservation for Development*, and a coordinated series of papers by leading authorities will be presented.

The General Assembly and Technical Meeting are open to the official delegates of the Member States and Member Organizations of IUCN. ANSS is such a member organization, and the Board of Directors will appoint delegates to attend these meetings (at their own expense) at the Annual Meeting in December of this year. Persons interested in attending the meetings should inform President Crayton Jackson accordingly.

There will be a choice of pre-Assembly tours from 5 to 8 September 1972. These tours will include Yellowstone and Grand Teton National Parks, and the national parks in the Canadian Rockies.

Request For Help From New Zealand

Anthony C. M. Baker is perhaps the most distant member of the American Nature Study Society. He recently wrote requesting our support for an urgent environmental need in his country. We quote from his letter:

"You may have heard of the intention of our government, technically responsible protectors of the environment, to raise Lake Manapouri (translation: 'Water of Mourning') in order to provide hydro-electric power for an aluminium smelter at Bluff, under the auspices of the 'Comalco' concern.

"Comalco representatives have refused (following public outcry) an alternative thermal (gas fired) source of electricity.

"New Zealand is, by virtue of being under an indecisive and ineffectual government, in the position of having terms *dictated* it by this Concern, which is acting almost in the capacity of a sovereign state.

"I hope that the Nature Study Society may provide at least moral support for the 'Save Manapouri' campaigners – one hundred and twenty years of intensive settlement have left little enough of our environment unchanged – the rabbit, the possum (Australian) and various browsers (chamois, red deer) and domestic stock have, in conjunction with bush burning, poor catchment control, etc. changed the face of the land greatly."

Let us hope that our ally, New Zealand, learns from our mistakes, and takes drastic action to preserve its natural ecosystem and its unique fauna and flora before any further degradation occurs. New Zealand is a beautiful country, and deserves the best from its people.

Nature Downtown

The National Park Service and other agencies of the Department of the Interior have issued a booklet entitled "Nature Downtown," which outlines the intriguing idea that urban centers can install artificial ponds which can be made into almost-natural sanctuaries for a variety of wild life. The ponds are planted with aquatic plants and stocked with turtles and hardy fish, such as gold fish, and the water darkened by a harmless dye which inhibits the growth of algae and makes it less attractive to children who would like to take a dip. Such ponds become a little bit of real nature in an urban setting, and can be used for much nature interpretation and environmental education. ANSS members who are interested in this kind of project should send for this bulletin, for sale by the Superintendent of Documents, U.S. Government Printing Office, Washington, D. C. 20402 for 20¢.

"Pollution" Defined

With the help of Daniel Smiley, well-known naturalist of the Hudson Valley, John Gustafson has defined pollution as follows:

"Any act or substance resulting from man's activities which decreases the capacity of the ecosystem to sustain life or of organisms to function properly within it."

This rather broad definition of pollution gets the idea away from simple esthetics or personal inconvenience, and identifies the real importance of pollution, namely its effect upon the functioning ecosystem. Readers are urged to react to this definition, and to improve upon it if possible.

A Note From Ann Dunham

In a recent note, Ann Dunham, niece of the late Albert H. Wright of Cornell, famous herpetologist, made the following comments:

"My work as executrix for Dr. Wright keeps me busy. Let me mention a few items found in his effects: Indian bones from Okefinokee Swamp, 1912; arrowheads and pottery fragments, 1921; a sketch of an eagle by Louis A. Fuertes, done in 1925 for some Boy Scouts; a live small salamander on the cellar floor in January 1971; and 13,000 negatives of amphibians and reptiles to go to the U.S. National Museum."

Dr. Wright, as one of the grand old naturalists at Cornell, died last year in his nineties. Naturalists through the years have used his handbooks to amphibians and reptiles, jointly authored with his wife. With the passing of Dr. Wright and Dr. Palmer within a few months of each other, a great era of nature study at Cornell seems to be coming to a close.

Environmental Education

A definition of Environmental Education, written by B. Ray Horn of Northern Illinois University, has been accepted and recommended for wide use by all of the participants of the international working meeting on "Environmental Education in the School Curriculum." The definition is:

Environmental education is the process of recognizing values and clarifying concepts in order to develop skills and attitudes necessary to understand and appreciate the interrelatedness among man, his culture and his biophysical surroundings. Environmental education also entails practice in decision making.

New Sections Forming

Jim Jontz, ANSS member from Indiana, is investigating the possibilities of forming an Indiana Section of ANSS, perhaps patterned after the successful Utah Nature Study Society. Jim writes:

"I would like to take this opportunity to tell you how much I always enjoy reading NATURE STUDY – and more importantly, how pleased I am that there is an organization which is dedicated to the solution of our environmental problems through developing an awareness of and involvement in nature. As an idealistic kid of 19 who has already spent his last six summers as a

naturalist, spends too much time (for one who is supposed to be studying) at schools and camps leading hikes and talking about birds, skunks, and the like, and intends to spend the rest of his life doing the very same thing, I would like to do more, though, than just pay dues, for the Nature Study Society."

We hope that other young or not-so-young ANSS members in other states will follow Jim's lead and start local sections. The recently distributed membership booklet gives the names of other ANSS members nearby where you are. Let's hear from more of you.

Save Our Wetlands

"Mother Nature, who is constantly being 'triumphed over' by her ungrateful son, Man, has the inconsiderate habit of leaving hub caps along the expressway of progress. For example, after we have finished draining and filling a particular wetland area, converting a 'useless swamp' into 'Happy Acres, a thriving new community,' we find to our dismay that things are not as they should be or at least as we intended them to be. The houses and apartments we have carelessly slapped on the face of the still sticky earth start to settle. Foundations crack. Sewage bubbles up around septic tanks or finds its way to nearby wells. Flash floods sweep away the redds of spawning trout in a dozen local streams, then surge through cellar windows in a hundred homes.

" 'Happy Acres' stagnates under a midsummer sun. Ponds and lakes recede. Polluted wells dry up. Poison salts seep slowly into public water supplies to mix with clouds of evil-smelling algae.

"Suddenly, the remaining woods are sterile, devoid of pheasants, grouse, rabbits, deer, fox. Even the songbirds have declined noticeably. Fishermen give up in disgust and shotguns rust in corners.

"More floods. Taxpayers stamp on the Senate floor. The Government commits millions in relief. Finally, the Army Corps of Engineers is called in to build dams in the name of flood control.

"Fertile flood plains disappear. Dying rivers languish at the feet of concrete giants. But, miraculously, there are fewer floods. Once again Man has 'triumphed over Nature.'

"Of course there's an alternative to this costly and complicated procedure—preserve our wetlands in their natural state.

"The gauntlet now lies at our feet and we must pick it up or admit that what has been heralded as a universal awakening in our society is, in reality, nothing more than 'an environmental kick.'" (Quoted from *Massachusetts Wildlife*, March-April, 1971.

Eastern Airlines Prepares School Material on Caribbean, Floridian Environment

Eastern Airlines is sending to thousands of schools a kit of educational material on the ecology of Florida and the Caribbean. Additional copies are free on request.

Each kit contains booklets and film slides on Floridian and Caribbean ecology. They are designed to help teachers in the middle grades, primarily junior high school, prepare week-long courses on ecology, covering the related subjects of geography, geology and biology.

The material was prepared under Eastern's direction and at Eastern's expense by R. J. Doyle Associates of Westport, Connecticut and is available free to any school official or teacher writing Eastern Airlines Educational Programs, P.O. Box 752, Darien, Conn. 06820. Although identified as to source, they contain no Eastern promotional material.

The two areas were chosen because they are unfamiliar to a majority of students and because they pose distinct environmental problems. Their ecological systems and their geological formations are different and they are both under severe pressures, most commonly in their waterfront zones.

Global Search For Wildlife Film Footage

Washington, D. C. — A world-wide search for motion picture footage on wild life and conservation has been launched by the National Wildlife Federation.

"We believe that millions of feet of high quality 16mm color movie footage are in the hands of countless film-makers, from professional producers to amateur photographers," said the Federation's Executive Director, Thomas L. Kimball.

"We want to tap that reservoir of film to help advance our plans for an extensive educational film program for television and the classroom."

The Federation is particularly interested in action scenes involving animals and illustrating animal behavior and footage that dramatizes ecological problems.

Film-makers are encouraged to donate footage to the Federation as a tax-deductible contribution. However, leasing or purchase can be negotiated.

Inquiries should be directed to the National Wildlife Federation Film Library, 245 W. 55th Street, New York, New York 10019.

Melvin Authors Guide

Mrs. Ruth Melvin, Board Director of ANSS, is the author of the new *Guide to Ohio Outdoor Education Areas.* The Guide, put out by the Ohio Academy of Science and Ohio's Department of Natural Resources, may be obtained from the latter at the Ohio Departments Building, Columbus, Ohio 43215. Mrs. Melvin is an active member of the Columbus Audubon Society, and serves as a geology instructor at the National Audubon Camp in Wisconsin.

Earth Care, Inc. — Another ECO Group Forms

Adding to the steady proliferation of ecology groups, Earth Care, Inc. has been formed, and is starting the publication of a newsletter entitled EARTH, I CARE. The editor of this letter is Mr. Albert M. Chop, in Somerville, New Jersey.

(One cannot help but wonder if we are entering an era of a kind of "pollution" from ecology groups and publications.)

THE POPULATION PROBLEM

It took many thousands of years from the dim past for the human population to reach one and a half billion by 1900. It took only two thirds of a century until 1966 to double that population to three billion. At the present rate of increase it will take only the remaining third of this century to double that number to over six billion.

According to the Population Reference Bulletin only a scant majority of people in America are aware of the dangers of the population explosion. However, it undoubtedly is true that in the areas of low education in the world as among the masses in Africa, Asia, and South American only a small percent of the educated are aware of the danger. In these underdeveloped countries the average annual increase is approximately 2.5% which would double the population in twenty-eight years. In some areas this increase is greater. Latin America is destined to have its present 200 million raised to 600 million at the end of this century unless the present trend can be reversed.

In Latin America as in many other areas, food production has not kept pace with the population increase. More and more has to be imported in exchange for their own products of manufacture which they can scarcely spare, yet this is better than starving.

Nature Study

The journal of the American Nature Study Society

NATURE STUDY is published quarterly in March, June, September and December by the AMERICAN NATURE STUDY SOCIETY, and is sent to all members and subscribers. *Deadlines for* copy: January 25, March 25, June 25, September 25.

Concerning subscriptions, change of address, and membership: address the treasurer.

Concerning requests for back issues, TIPS, and other information: address the secretary.

Concerning manuscripts, notes, letters for publication, and membership news: address the editor.

Reprints of articles may be obtained within six weeks after publication by placing order with the editor. Cost of reprints is $4.00 per page for 100 copies and $1.00 per page for each additional hundred copies.

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The Annual Meetings of the ANSS will be held in Philadelphia December 27-30. First Vice President Kingsley L. Greene has announced the following program:

ANSS MEETINGS *in Philadelphia in December*

Monday, December 27

9:00 a.m. — Opening remarks (Kingsley L. Greene)

9:15 a.m. — The Role of the Nature Center (Chairman and arranger: Richard L. James, Director, Schuylkill Valley Nature Center, Hagy's Mill Road, Philadelphia)

Tuesday, December 28

9:00 a.m. — From Classroom to Environmental Action (Chairman and arranger: Charles C. Ochs, Biology Department, Rose Tree Media School District, Media, Pa.)

7:15 p.m. — Lenses on Nature (Chairman and arranger: Paul V. Webster, Audio-Visual Director, Bryan City Schools, Bryan, Ohio)

Wednesday, December 29

9:00 a.m. — Legislation and Ecological Impact (Arranger: Adele N. Wilson, 2400 Virginia Ave. N. W., Washington, D. C.)

12:00 noon — Presidential Address and Luncheon (Chairman and arranger: Kingsley L. Greene)

Thursday, December 30

9:00 a.m. — Field Trip and Luncheon — Schuylkill Valley Nature Center (Chairman and arranger: Richard L. James)

Members should begin now to make plans to attend these meetings, which always prove to be worthwhile and instructive. Those who live in the Northeast should especially make arrangements to attend. Further information and details will be forthcoming later. For information, contact Kingsley L. Greene, 48 Sullivan Street, Cazenovia, N. Y. 13035.

The American Nature Study Society

Invites you to join us in promoting Environmental Education

Send in this membership form to J. A. Gustafson, R. D. 1, Homer, N. Y. 13077.

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